MetaCube for Excel User's Guide

MetaCube™ ROLAP Option

for Informix® Dynamic Server™

Windows® 95 and Windows NT™

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Table of Contents

Introduction

This manual contains information to assist you in using Informix-MetaCube data warehousing software.

Organization of This Manual

The chapters in this manual describe MetaCube for Excel features that allow you to query a data warehouse in multi-dimensional terms. Each chapter contains step-by-step instructions for using the features of MetaCube for Excel. The second chapter also contains hands-on tutorial instructions that allow you to get started using the key features of the product. The chapters of this manual are designed to be read in sequential order, from beginning to end. The manual includes the following chapters:

- This Introduction provides an overview of the manual.
- Chapter 1, "Overview," provides an overview of MetaCube for Excel and discusses of some features of multi-dimensional data warehousing.
- Chapter 2, "Getting Started with MetaCube for Excel," provides information on using the Report Wizard and the PivotTable Wizard to execute stored queries that retrieve data from the data warehouse. MetaCube for Excel displays the results in an Excel worksheet as either a spreadsheet or a PivotTable.
- Chapter 3, "Defining and Managing Queries," describes the use of the Query Wizard to specify queries, apply filters to them, and save and execute them. This chapter also describes using the Query Manager to manage stored queries.
- Chapter 4, "Defining and Managing Filters," describes the use of the Filter Wizard for specifying filters for your queries. Also, this chapter describes using the Filter Manager to manage filters.

- Chapter 5, “MetaCube Analysis Features,”describes the analysis features offered by MetaCube for Excel. These features allow you to include meaningful data analysis calculations in the results retrieved from the data warehouse.
- Chapter 6, “Other Features,”describes various miscellaneous features and operations provided by MetaCube for Excel.
- Appendix A, “Configuring MetaCube for Excel,”explains how to customize the copy of MetaCube for Excel that runs on your PC.
- Appendix B, “Formats for Numeric Data,”describes custom formatting options for numeric data.

Types of User

This manual is written for people who are responsible for analyzing data about their company’s business. Simply storing data in a database is not enough; the data is useful only when meaningful reports can be generated that reflect business activity and provide a focus on important data. Such reports and charts are the basis for timely business decisions that can affect the future of a company.

Documentation

In addition to this book, printed manuals for other MetaCube products include the following:

- *MetaCube Explorer User’s Guide*. This manual is written for people who are responsible for analyzing data about their company’s business. It describes the features of MetaCube Explorer for querying a MetaCube data warehouse in multi-dimensional terms to obtain meaningful reports that are the basis for timely business decisions.
- *MetaCube Warehouse Manager’s Guide***.** This guide is written for the data warehouse administrator and describes how to specify internal information (metadata) about the data warehouse so that the MetaCube components are able to access and graphically present the database for querying.

- *MetaCube Data Warehouse Administrator's Guide*. This guide is written for the data warehouse administrator. It describes the overall process of developing a data warehouse and it introduces the tools for managing a data warehouse—MetaCube Secure Warehouse, MetaCube Agent Administrator, and MetaCube Warehouse Optimizer.
- *MetaCube Application Programmer's Manual***.** This manual is written for programmers who will write custom applications that interact with the MetaCube analysis engine. This manual describes MetaCube's OLE Automation programming interface.
- *MetaCube SDK for Snap-Ins Programmer's Manual*. This manual is written for C++ programmers who will write custom measure calculations for MetaCube Explorer and MetaCube for Excel using the MetaCube SDK for Snap-Ins. The MetaCube Extension Wizard generates skeletal code that is a framework for adding custom C++ code for customized measure calculations.
- *MetaCube SQL Optimizer User's Guide*. This guide describes how to use the MetaCube SQL Optimizer for connecting third-party query tools or custom query applications to the MetaCube analysis engine to access a MetaCube data warehouse. Queries are optimized to run against aggregate and sample tables, thereby significantly improving query performance against very large data warehouses.
- *MetaCube Installation and Configuration Guide*. This guide describes how to install and configure MetaCube software components on both the database server platform and on PCs.
- *Introduction to New Features*. This guide describes the new features and enhancements for Release 4.0 of MetaCube. It provides information to existing MetaCube users.

Typeface

The text in this guide uses the following set of conventions.

Convention	Meaning
italics	Emphasized words appear in italics. Also used for the names of MetaCube components and some terms that are specific to MetaCube Web Explorer.
boldface	Used for the names of menu options and popup menu options.
`monospace`	Used for information that the product displays and information that you type.

Online Help

MetaCube for Excel includes an online help system. The help system consists of the following components:

- Help Topics: a complete online help system that contains "how to" topics and procedural information on using the product.
- Help on Help: For users unfamiliar with using online help systems, contains instructions on using MetaCube online help.

Access to these MetaCube help systems is from the Help menu for Excel.

Readme Files

In addition to the printed manuals, readme files are distributed with the Informix-MetaCube product. These files contain technical information, including last-minute changes to product capability or documentation. Please read these files, as they contain important information.

Related Reading

For information on data warehousing, see *The Data Warehouse Toolkit*, by Ralph Kimball (John Wiley & Sons, Inc., 1996).

Compliance with Industry Standards

The American National Standards Institute (ANSI) has established a set of industry standards for SQL. Informix SQL-based products are fully compliant with SQL-92 Entry Level (published as ANSI X3.135-1992), which is identical to ISO 9075:1992, on Informix Dynamic Server. In addition, many features comply with the SQL-92 Intermediate and Full Level and X/Open C CAE (common applications environment) standards.

Informix SQL-based products are compliant with ANSI SQL-92 Entry Level (published as ANSI X3.135-1992) with the following exceptions:

- Effective checking of constraints.
- Serializable transactions.

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Chapter

1

Overview

This chapter introduces MetaCube for Excel.

About MetaCube for Excel

MetaCube for Excel is an add-in for Excel spreadsheet software that enables quick retrieval and analysis of business data stored in a MetaCube data warehouse. MetaCube for Excel works with the MetaCube analysis engine to query a multidimensional data warehouse that resides in an Informix database. Using MetaCube for Excel, you can:

- Retrieve results of complex queries.
- Automatically sort, subtotal, and total data retrieved from the data warehouse.
- Apply powerful analysis calculations to returned data.

Note: *In order to access and use MetaCube for Excel, you must add it in to the Excel software. Refer to Microsoft Excel documentation for information on doing this.*

A Multidimensional View of the World

MetaCube provides you, as a business analyst, a view of your data warehouse that matches your understanding of your own business. If you understand your data in terms of, say, product, time, and geography—that is, according to what, when, and where transactions occurred—MetaCube for Excel allows you to retrieve data from a data warehouse in those same terms.

MetaCube organizes the criteria for defining queries into *dimensions*. Dimensions are different ways of viewing, organizing, or constraining data, if you will. For example, a *geography* dimension might specifically contain information about the city, state, or country where business transactions occur.

The components of a dimension are typically organized in a hierarchy. For example, many cities belong to one state, and many states belong to one country. *Country* is at the top of such a geography hierarchy, *city* at the bottom. *Country*, *state*, and *city* are, therefore, hierarchical components of a *geography* dimension.

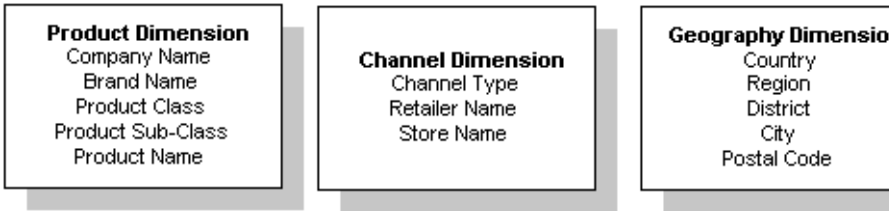

Figure 1-1 *Example dimension hierarchies*

As illustrated in the figure above, the components of each dimension are arranged in a hierarchy. Starting at the bottom of the hierarchy, the contents of that level can all be included in the next level above.

The hierarchies in a dimension represent the various levels of detail by which you can summarize information in a report. Taking the *geography* dimension example one step farther, a report retrieving sales information from the data warehouse could be summarized by city, by state, or by country.

One or more *attribute*s describe each component of a dimension. For example, attributes, such as *City Name* and *City Size*, may be associated with the *City* level of the hierarchy. Attribute values for *City Name* might include values such as “Seattle,” and “Berkeley”; values for *City Size* might be “large” and “small.”

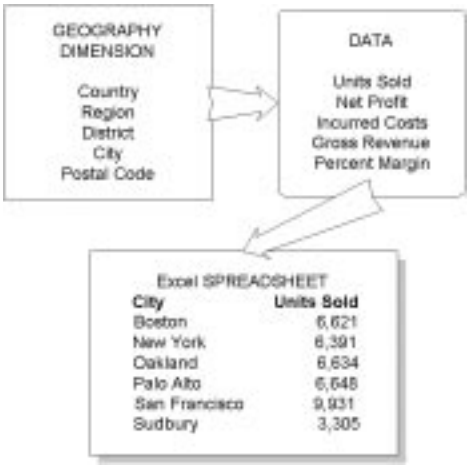

Figure 1-2 *Sales Report by City*

The hierarchical organization of the *Geography* dimension, for example, facilitates retrieving a sales report by city. A report could, just as easily, be generated by postal code, by district, by region, or by country. Each level of the hierarchy determines the degree of summarization of the returned sales data. More complex, or multidimensional, reports can be generated by using the attributes of several different dimensions in the same query.

Branching Hierarchies

A hierarchy can branch, thereby having more than one consolidation path.

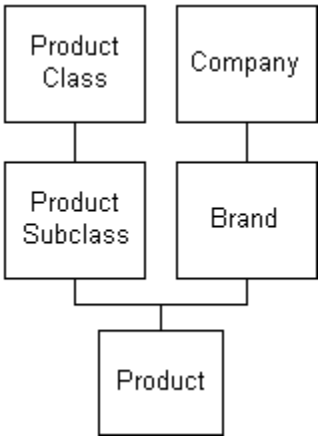

Figure 1-3 *Product branching hierarchy in demonstration database*

The MetaCube demonstration database illustrates a branching hierarchy in its *Product* dimension. The *Product* attribute, the base attribute in the hierarchy, is the point at which the *Product* hierarchy branches, following two paths upward through the dimension.

Components of a MetaCube Query

A MetaCube query contains two components:

- Measures.
- Attributes.

Measures, also referred to as facts, are the numeric values returned when you query the data warehouse. Measures are the numeric data derived from the business transactions stored in the database. Examples of measures include such data as “Gross Revenue,” “Units Sold,” or “Net Profit.” When you retrieve numeric data into an Excel worksheet, you can manipulate the data as you do any numbers in a spreadsheet or PivotTable.

Attributes are the components of the data warehouse that allow you to fine-tune your query to retrieve the exact data you wish to view. By incorporating attributes from one or more dimension into your query, you allow the MetaCube analysis engine to present information in a meaningful context and to eliminate unneeded data.

Data Sources

A MetaCube data source is a collection of business transactions and related dimensional information stored in a Decision Support Software (DSS) system in the data warehouse. A MetaCube DSS System may contain one or more data source(s). The use of data sources offers performance gains as well as providing a mechanism for organizing data for you and other users who have specific data retrieval requirements.

Each data source has a single source of measure values (data), known as a fact table. All the data available for retrieval from that data source is stored in its fact table.

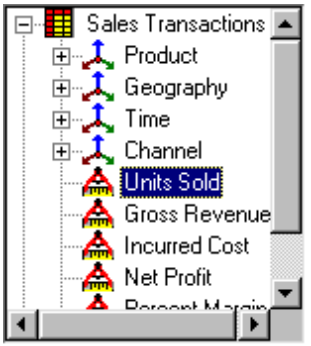

Figure 1-4 *Data source with fact table and associated dimensions*

A data source has one and only one fact table. Along with the fact table, the data source has its associated dimensions and attributes that provide the mechanism for retrieving data from the fact table in meaningful, business-related reports.

The graphical representation of the Sales Transaction data source, shown above, shows the four dimensions in the data source—*Product*, *Geography*, *Time*, and *Channel*—as well as the data (known as measures) stored in the fact table, *Units Sold*, *Gross Revenue*, *Incurred Cost*, *Net Profit*, and (partially hidden) *Percent Margin*. The Sales Transaction data source is a data source within the MetaCube demonstration database, a component of the MetaCube software.

Viewing the Data Warehouse in MetaCube for Excel

Because of the hierarchical nature of the MetaCube data warehouse, the graphical representation of the data warehouse is also hierarchical in nature. The top level of the hierarchy is an icon that represents a data source contained in the data warehouse. In the case of the MetaCube demonstration database, there are two data sources:

- Sales Transactions.
- Competitive Data.

When the data source icon is expanded, icons display that represent the dimensions and the measures (data) within the data source.

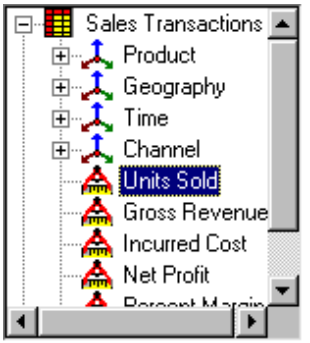

Figure 1-5 *Contents of Sales Transactions data source*

In the figure above, the Sales Transactions data source icon is expanded to display the icons for all the dimensions and measures in that data source.

Expanding one of the dimension icons displays icons for the attributes for that particular dimension. The arrangement of the attributes is determined by your data warehouse administrator. Frequently, they are arranged according to their hierarchy with the highest attribute in the hierarchy at the top of the tree and the lowest attribute in the hierarchy at the bottom of the tree. The MetaCube demonstration database illustrates this arrangement scheme.

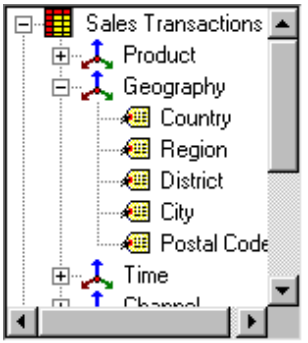

Figure 1-6 *Geography dimension attributes*

In the figure above, the *Geography* dimension icon is expanded to display its hierarchy of attributes.

More About Measures

Measure is the name given to the numeric data tracked in a data warehouse. Measures can be one of two kinds:

- Stored; that is, contained in the fact table itself.
- Calculated; that is, derived, using a formula based on the stored measure values. Calculated measures can also be based on other calculated measures.

More specifically, stored measures track business transactions at your company and are stored in a data source's fact table. Your data warehouse administrator has specified one or more stored measures in your data warehouse so that you can view them with MetaCube for Excel and incorporate them into your queries.

A calculated measure, on the other hand, is defined as a formula, based on previously-defined measure(s), either stored or calculated, to produce additional data about your business. Values for calculated measures are computed at the time a query is executed. Because these values are dynamic, they are always calculated using the most current data stored in your data warehouse.

The MetaCube demonstration database contains:

- Three stored measures: *Units Sold*, *Incurred Cost* and *Gross Revenue*.
- Two calculated measures: *Percent Margin* and *Net Profit*.

The *Percent Margin* measure is not stored in the demonstration database tables. Instead, the formula for calculating percent margin is stored in the data warehouse; the MetaCube analysis engine can calculate this measure when a query executes. The formula used to return a value for *Percent Margin* is based on *Gross Revenue* and *Incurred Cost*, two stored measures.

Chapter

2

Getting Started with MetaCube for Excel

This chapter is an introduction to using MetaCube for Excel; it explains how to:

- Log in to the database that houses your data warehouse
- Use the Report Wizard and the PivotTable Wizard to retrieve data into your Excel spreadsheet.

After reading this chapter and using MetaCube for Excel in the tutorial examples, you should have an understanding of how to retrieve data from the data warehouse so that you can display and manipulate values in your Excel spreadsheet.

The examples appearing throughout this manual use the demonstration database supplied with the MetaCube decision support software (DSS) system. You will need access to this same demonstration database in order to do the hands-on tutorials. The demonstration system consists of two data sources; the one named Sales Transactions is used for this manual. The Sales Transactions data source tracks sales of electronic equipment in two regions and six cities in the US over a time period from January 1, 1996, to March 31, 1997. The Sales Transactions data source has four dimensions—Product, Geography, Time, and Channel. Each dimension has a variety of attributes with which to formulate queries. The sample data includes the measures Units Sold, Gross Revenue, Incurred Cost, Net Profit, and Percent Margin.

Connecting to the Data Warehouse

To use MetaCube for Excel, you must first connect to the database that houses your data warehouse.

To connect to the database, you must have:

- A login name and password for the database that houses the data warehouse.
- A network connection setting in MetaCube for Excel that is correctly configured for communicating with the database server.

When MetaCube for Excel starts, it automatically starts the MetaCube analysis engine; when you disconnect from the database or close Excel, the MetaCube analysis engine automatically stops. Or, you can start the engine before starting MetaCube for Excel. If you do this, the MetaCube analysis engine continues to run after you close MetaCube for Excel.

If you cannot log in to the demonstration database, contact your data warehouse administrator. Information on how to correctly configure MetaCube for Excel to connect to the database is contained in Appendix A of this guide.

The MetaCube for Excel Interface

The features contained in MetaCube for Excel are available in the Excel spreadsheet software after adding MetaCube for Excel to the Excel software. From the **MetaCube** menu, you can:

- Connect and disconnect from the database that houses your data warehouse
- Access the MetaCube for Excel wizards for running queries, defining new queries and filters, and submitting queries for background processing
- Manage saved queries by performing such operations as organizing saved queries in folders, copying an existing query, and creating new queries
- Manage filters by performing such operations as organizing filters in folders, setting a default filter for a dimension or a fact table, copying an existing filter, and creating new filters
- Manage MetaCube snap-ins—modules that programmers write in C++ to add analysis functions to MetaCube for Excel. You can use these snap-ins when you specify in your queries

- View messages sent by your data warehouse administrator. System messages can contain pertinent information about, for example, the status of the data warehouse, when the latest data has been uploaded into the data warehouse, and so forth.
- Turn MetaCube's sampling feature on or off. The sampling feature provides performance improvements on queries to very large data warehouses. You can learn more about sampling in Chapter 6, "Other Features."
- Configure MetaCube for Excel for network connections and for other default values
- View the release level of your copy of MetaCube for Excel.

MetaCube for Excel Wizards

MetaCube for Excel provides the following wizards:

- Report Wizard—to retrieve data using an existing query and display the results in an Excel spreadsheet
- PivotTable Wizard—to retrieve data using an existing query and display the results in an Excel PivotTable
- Query Wizard—to define, execute, and save a new query to retrieve data in an Excel spreadsheet or PivotTable
- Filter Wizard—to specify a filter for an attribute or measure. The filter is saved and you can then apply it to any query
- QueryBack Wizard—to submit a query for background processing.

Using the MetaCube for Excel wizards, you can quickly execute existing queries, either in foreground or background mode, and create new queries and filters for your specific data retrieval requirements.

Drag and Drop

MetaCube for Excel provides drag-and-drop capability for the Query Wizard. When you position the cursor over an object that can be dragged, it displays as a hand, indicating that you can drag that object to another location.

Right-Click Functions

When you work with the Query Wizard, you can access the many analysis functions provided by MetaCube by right-clicking the components of the query you are currently defining. In a popup menu, MetaCube for Excel displays a list of options that is appropriate for the object that you right-click.

The MetaCube analysis functions are described in Chapter 5, "MetaCube Analysis Features" in this guide.

Balloon Help

For information on the buttons in the MetaCube for Excel dialog boxes, position the cursor over the button for a moment. MetaCube for Excel displays a short description of the button.

Starting MetaCube for Excel

Before attempting to use MetaCube for Excel, verify that the procedures described below have been completed on your PC.

Add-In MetaCube for Excel

To use your Excel software for querying a MetaCube data warehouse, you must first add in the MetaCube for Excel software to your Excel spreadsheet software. The name of the MetaCube for Excel file is metacube.xla and it resides in the MetaCube folder on your PC. Use the **Excel Add-Ins** option on the **Tools** menu. Refer to Microsoft Excel documentation for more information on adding in software modules.

After adding in MetaCube for Excel, the Excel Menu bar contains a MetaCube option. Under this menu, all MetaCube for Excel features can be accessed.

Configure Network Connection

The next step is to configure MetaCube for Excel with the necessary information for connecting to the database where your data warehouse resides. Your data warehouse administrator may have already configured your copy of MetaCube for Excel; if so, you do not need to perform any configuration tasks.

To configure the network connection, you need to:

- Specify an ODBC User Data Source, using ODBC Administrator. Your data warehouse or network administrator can help you configure ODBC.
- Configure information in MetaCube for Excel that enables the connection, through ODBC, to the database.

To configure MetaCube for Excel, click **Preferences** on the **MetaCube** menu. Information on configuring MetaCube for Excel is contained in Appendix A.

Connect to the Data Warehouse

To use the features of MetaCube for Excel, you must first connect to the database where your data warehouse resides. To connect, click **Connect** on the **MetaCube** menu.

In the **MetaCube Login** dialog box:

1. Enter your user name and password, if required.
2. Click the **Connect** button.

After you have successfully connected to the data warehouse, all options on the **MetaCube** menu become available.

Using the Report Wizard

This section contains a tutorial example of using the MetaCube for Excel Report Wizard.

To do the steps in the tutorial, you need to:

- Open Excel from your Windows desktop.
- Connect to the MetaCube demonstration database and log in as the user metacube.

The Report Wizard is a three-step wizard that allows you to select an existing query to run against the data warehouse, apply a filter to the query to limit the amount of data returned by the query, and display the results in an Excel spreadsheet.

Follow the steps below.

To access the Report Wizard: Click **Report Wizard** on the **MetaCube** menu.

To complete Step 1:

1. Double-click the Public Queries folder.
2. Click the icon for the query: Top 10 Brand Revenues.
3. Click the **Next** button.

Step 2 allows you to:

- Apply a filter to the query you have selected.
- Remove a filter from the query you have selected.

A filter causes the MetaCube analysis engine to return only data that meets the criteria stated in the filter. For example, you might wish to include only one week's worth of data in a report. In this tutorial example, for the query Top 10 Brand Revenues, the filter applied allows the last two weeks' worth of data to be retrieved. More information on filters is available in "Filtering Result Sets" on page 3-6 and in Chapter 4, "Defining and Managing Filters."

To complete Step 2: no action is required. Click the **Next** button.

Step 3 allows you to select the format you wish to use for displaying the data retrieved by the query.

To complete Step 3:

1. If you wish, you may select another format to display the results of the query in Excel.
2. To execute the query, click the **Finish** button.

Tip: *Sometimes, when you run a query, you may receive the following warning, called the* ***Slow Query Warning****.*

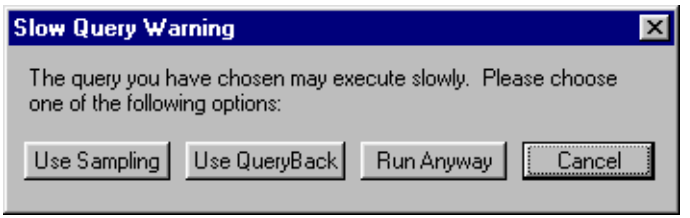

Figure 2-1 *Slow Query Warning*

The warning is generated by MetaCube for Excel based on configuration values set for the MetaCube demonstration database. For these tutorial examples, you can ignore the warning. Click the ***Run Anyway*** *button.*

The results of this query illustrate some of the MetaCube for Excel analysis features:

- The query selects only the top-selling products for the two most recent weeks of data in the data warehouse. The Brand name of each product is shown.
- Although the query specified retrieving the top 10 products, because two products sold equally well, there are actually eleven products listed in the report.
- The report also provides a ranking of the top-selling products. Since the report ranks top-selling products for each week, the ranking for each week allows comparison of sales between the two weeks.

In Excel, the worksheet has been given the name of the query you selected. You may rename the worksheet, if you wish.

Using the PivotTable Wizard

This section contains a tutorial example of using the MetaCube for Excel PivotTable Wizard. To do the steps in the tutorial, you need to:

- open Excel from your Windows desktop
- connect to the MetaCube demonstration database
- log in as the user metacube.

The PivotTable Wizard is a two-step wizard that allows you to select an existing query to run against the data warehouse, apply a filter to the query to limit the amount of data returned by the query, and display the results in an Excel PivotTable

Follow the steps below.

To access the PivotTable Wizard: Click **PivotTable Wizard** on the **MetaCube** menu.

To complete Step 1:

1. Double-click the Public Queries folder.
2. Click the icon for the query: Brand Region Units Sold.
3. Click the **Next** button.

Step 2 allows you to:

- Apply a filter to the query you have selected.
- Remove a filter from the query you have selected.

A filter causes the MetaCube analysis engine to return only data that meets the criteria stated in the filter. In this tutorial example, the query Brand Region Units Sold will return data for the most recent, or current, week in the data warehouse.

To complete Step 2: no action is required. Click the **Finish** button.

The results of this query create a PivotTable in Excel. You may pivot the **Brand** and the **Region** columns to reformat the report.

The worksheet has been given the name of the query you selected. You may change the name, if you wish.

Chapter

3

Defining and Managing Queries

This chapter describes how to use the Query Wizard and how to manage stored queries with the Query Manager.

After reading this chapter and using MetaCube for Excel in the tutorial examples, you should have an understanding of:

- How to create and save a query.
- How to manage and work with saved queries.

Using the Query Wizard

This section contains a tutorial example of using the MetaCube for Excel Query Wizard. To do the steps in the tutorial, you need to:

- Open Excel from your Windows desktop.
- Connect to the MetaCube demonstration database.
- Log in as the user MetaCube.

The Query Wizard is a three-step wizard that allows you to:

- Select the components of a query and specify the format of the retrieved data in the Excel worksheet.
- Apply one or more filter to the query.
- Execute and save the query as well as specify whether the results should be displayed in a spreadsheet or a PivotTable.

First Query Wizard Tutorial

For this tutorial, the example query will return sales information from the MetaCube demonstration database listing brand sales by region.

To access the Query Wizard: Click **Query Wizard** on the **MetaCube** menu.

To complete Step 1:

1. Specify the measure to include in the query:
   a. Expand the *Sales Transactions* data source icon.
   b. Drag the *Units Sold* measure icon to the Measures text box in the lower right-hand corner of the wizard page.
2. Specify the attributes to include in the query:
   a. Expand the *Product* dimension icon.
   b. Drag the *Brand* attribute icon to the Rows text box in the wizard page.
   c. Expand the *Channel* dimension icon.
   d. Drag the *Channel* attribute icon to the Columns text box in the upper right-hand corner of the wizard page.

Step 2 allows you to select a filter to apply to the query.

To complete Step 2: The filter for this query is the Current Week filter; this filter is the default *Time* dimension filter for the MetaCube demonstration database. You will use this filter when you run the query. No action is required.

Step 3 of the Query Wizard allows you to make choices about running the query, saving the query, and specify the type of spreadsheet output:

- You may run the query without saving it.
- You may run the query and save it in the same step. Specify the name of the query and the folder in which to save it.
- You may save the query without running it.
- You may retrieve results into an Excel spreadsheet or PivotTable.

To complete Step 3:

1. Leave the **Run Now** option selected.
2. Format the output as a report.
3. Click the **Finish** button to execute the query.

The results of the query are displayed in an Excel spreadsheet.

Channel	Department Stores	Retail Chains	Warehouse Stores
Brand	**Units Sold**	**Units Sold**	**Units Sold**
Alden	44	95	46
Barton	45	57	28
Delmore	55	101	36
Extreme	11	25	7
Lasertech	36	64	16
NVD	80	124	70
Onetron	28	41	14
Suresound	64	114	67
Techno Components	113	173	93

Figure 3-1 *Results of MetaCube query displayed in an Excel spreadsheet*

In your Excel workbook, the Excel worksheet has been given the default name New Wizard Query. You can rename the worksheet, if you wish.

Second Query Tutorial

In this tutorial, you will add a filter to a query and then save the query.

To access the Query Wizard: Click **Query Wizard** on the **MetaCube** menu.

To complete Step 1:

1. Expand the *Sales Transactions* data source icon.
2. Drag the *Gross Revenue* measure icon to the Measures text box.
3. Expand the *Geography* dimension icon.
4. Drag the *City* attribute icon to the Columns text box on the wizard page.
5. Expand the *Product* dimension icon.
6. Drag the *Product Class* attribute icon to the Rows text box on the wizard page.

Filtering Result Sets

A *filter* is a constraint placed on the range of values retrieved by a query. A filter narrows the scope of a query, returning a subset of the total data a query might otherwise return. MetaCube for Excel's filtering capability provides a high level of control over what data is returned by a query—your query can retrieve critical data and eliminate unneeded data for the specific analysis you want.

Your data warehouse may contain some previously-defined filters, developed and made available to you by your data warehouse administrator. You can also create your own filters, if you wish; once you have specified a filter, you can use it for one or more queries.

So far, the query you have specified returns gross revenue figures for all cities by *Product Class* (that is, for video, computer, and audio products). This query tutorial, however, will retrieve gross revenues only for the city of San Francisco. In order to limit the data to only one city (San Francisco, in this case), a filter is applied to the basic query.

To complete Step 2:

1. Expand the Filters folder, then expand the Public Filters folder.
2. Drag the *San Francisco* filter icon from the Available Filters text box to the Selected Filters text box in the wizard page. You now have two filters in effect for this query: Current Week and San Francisco. The query will retrieve data only for the latest week in the demonstration database and for the city of San Francisco.

Note: *For more information on filters, see Chapter 4, "Defining and Managing Filters."*

To complete Step 3:

1. In the Run Mode frame:
   a. Leave the **Run Now** option checked.
   b. Click the **Save Query** option.
2. In the Save Information frame:
   a. Type the name of the query (use any name).
   b. Click the ROOT folder; notice that the word ROOT displays in the Folder informational text box.

3. Leave the **Report** button active, then click **Finish** to run the query.

The filtered query produces a report on gross revenues for sales of products by class in the city of San Francisco.

City	San Francisco
Product Class	**Gross Revenue**
Video	36,250.00
Computer	250,360.00
Audio	65,600.00

Figure 3-2 *Gross revenues for San Francisco by product class*

The Excel worksheet is given the same name as the saved query. You can change the name if you wish.

To rerun the query you just saved, use the Report Wizard. You can apply a different filter to the query to retrieve gross revenue for another city.

Tip: *To remove a filter from a stored query, right-click the filter icon in Step 2 of the Report Wizard, then click* ***Delete*** *in the popup menu. To apply another filter to a stored query, in Step 2 of the Report Wizard, expand the Filters folder and any sub-folder(s) needed to display the icon for the filter, then drag the filter icon from the Available Filters text box to the Selected text box.*

What's In Your Data Warehouse?

You can view the organization of the dimensions and the attribute values in the dimensions of a data source by specifying a query that contains only the attributes in a single dimension and requests no numeric data (that is, no measures).

For example, using the MetaCube demonstration database, you might view the following attribute values in the *Geography* dimension:

- Names of all regions.
- Names of all districts.
- Names of all cities.

To display this information:

1. Access the Query Wizard: click **Query Wizard** on the **MetaCube** menu.
2. Expand the Sales Transactions data source icon.
3. Expand the Geography dimension icon.
4. Drag the *Region*, *District*, and *City* attributes to the Rows box in the wizard page.
5. Click the **Next** button twice, then run the query.

The resulting report indicates the two region names (Northeast and West), the three district names (New England, New York, and California), and the names of the six cities in the demonstration database. In addition, the report indicates which districts are in the two regions, and which cities are in the districts and the regions.

Managing Queries

With MetaCube for Excel's Query Manager, you can:

- Organize queries into folders and sub-folders.
- Create a new query.
- Create a new folder.
- Copy an existing query.

When you access a saved query, you must first open the folder in which that query is stored. After you select the appropriate folder, MetaCube for Excel displays only the queries in that folder.

Saving and Using Queries

As part of your company's data warehouse, your data warehouse administrator may have provided a set of queries that you and other MetaCube for Excel users in your company can run at any time. This set of queries is shared by all MetaCube for Excel users; such queries might, for example, produce standard charts and reports that you and others in your company refer to frequently. It is efficient, in this case, to store shared queries in a central location, accessible by all users. Using saved queries is useful for rerunning standard reports to obtain new information after a data refresh of the data warehouse, for example.

Public and Private Queries

All MetaCube for Excel users accessing the same data warehouse have access to the public queries stored there. Public queries are created by a user, usually your data warehouse administrator, who logs in using a specific user ID that is allowed to create these public MetaCube objects. Neither you nor other users can modify a public query; however, you may copy a public query, modify it, and then save it back to the database as a private query.

You may save your own queries in the same central location where the public ones are saved. Queries you save in the database are private rather than public. Your private queries are accessible only by you; you may save, delete, and modify your private queries. Other MetaCube for Excel users cannot access or change your private queries. Queries that you save are also accessible to you from other MetaCube applications.

Managing Public Objects

Public MetaCube objects—queries and filters—can only be created by the user "metapub." This user ID can be created at the time MetaCube is installed and it may have a password assigned to it. Therefore, to manage public queries, you must be able to log in as the user metapub.

Public queries can be saved in the ROOT folder, or in sub-folders, where sets of queries can be organized by your company's specific criteria.

Since public queries are typically accessed by many users, modifications to or deletions of public queries should be done carefully. If you are responsible for managing public objects, be sure to notify all users of changes made to these objects.

The Query Icon

Query icons that display in black and gray represent queries that were created by your data warehouse administrator and are accessible by all MetaCube for Excel users. These are public queries. You cannot modify a public query, although you can make a copy of one, modify it, and save it as your own private query.

Query icons that display in color are your own saved queries; they are your private queries. Private queries are only accessible by you; they are not available for other MetaCube for Excel users, even though those users are accessing the same DSS System as you are.

About the Query Manager Dialog Box

Buttons in the **Query Manager** dialog box toolbar allow you to perform a number of operations related to queries.

Go up one level. Queries can be stored in a folder at the ROOT level or in sub-folders. You might wish to group related queries into one folder. To go down a level, double-click the folder whose contents you wish to display. To go up, click this button.

Create a new folder. MetaCube for Excel creates a folder with a default name, which you can change, if you wish.

Create a new query using MetaCube for Excel's Query Editor.

Copy a query. You may copy either a public or a private query. The copy is named "Copy of *query_name*." The query copy is a private object that you can modify and rename, if you wish.

The Query Popup Menu

When you right-click a query icon, a popup menu allows you to perform the following operations with queries:

- **Cut**: causes the selected query to be deleted; its contents are placed in the clipboard. MetaCube for Excel verifies that you want to delete the filter.
- **Copy**: places a copy of the selected query in the clipboard.
- **Paste**: places the contents of the clipboard (a query definition) in the current location, unless it is a duplicate name. To paste into the current location, right-click any object, then click **Paste** in the popup menu. Or, places the contents of the clipboard into a sub-folder that you have previously selected.
- **Rename**: allows you to rename the query using the same procedure as renaming files for your Windows operating system.
- **Edit**: allows you to edit the definition of the selected query. When you edit a query, you use the same dialog boxes used to create the query in the first place.
- **Delete**: causes the selected query to be deleted. MetaCube for Excel verifies that you want to delete the query.

Defining and Editing Queries with Query Manager

You may create and edit queries using the Query Manager. This method for creating a query is different from using the Query Wizard.

Defining a New Query

Listed below are the general steps for specifying a new query.

To access the Query Manager: Click **Manage Queries** on the **MetaCube** menu.

To create a new query definition:

1. On the toolbar of the **Query Manager** dialog box, click the **Create a new query** button.

2. In the **Query Editor** dialog box:
   a. Type a name for the query in the Name box.
   b. Drag the attributes and measures for the new query from the Query Components box to the Pages, Columns, Rows, and Measures boxes. This defines both the content of the query and the orientation of attribute values and data retrieved from the data warehouse.
3. To apply a filter to the query, click the **Filters** button.
4. In the **Filters** dialog box:
   a. In the Available Filters box, open a folder icon, if required, to display the icon of the filter you wish to apply to the query.
   b. To apply a filter, drag its icon to the Select Filters box. You may apply as many filters as you wish.

   When you click **OK**, the query you specified is saved in the current folder. It displays as a colored icon, indicating that it is a private query. To run the query, access the Report or PivotTable Wizard.
5. Click **OK**.

Editing a Query

To access the Query Manager: Click **Manage Queries** on the **MetaCube** menu.

To edit an existing query definition:

1. In the **Query Manager** dialog box, right-click the icon of the query you wish to edit.
2. Click **Edit** in the popup menu.
3. In the **Query Editor** dialog box, use the same techniques to modify the query that you used when you created the query.
4. To edit the filter applied to the query, click the **Filters** button.
5. In the **Filters** dialog box, you can apply a filter, remove the current filter, or add another filter to the query.

Chapter

4

Defining and Managing Filters

This chapter describes how to use the MetaCube for Excel Filter Wizard to create filters and the MetaCube for Excel Filter Manager to manage filters.

About MetaCube Filters

In order to limit the amount of data returned by a query, you can apply filters to dimensions or measures or both. All filter definitions are saved in the database and you can access them at any time to apply to existing stored queries or new queries that you are specifying with the Query Wizard or Query Manager.

Public and Private Filters

As part of your company's DSS Systems, your data warehouse administrator may have provided a set of filters that you, and other MetaCube for Excel users in your company, can use at any time. This set of filters is shared by all MetaCube for Excel users and it is efficient, in this case, to store saved filters in a central location, accessible by all MetaCube for Excel users.

Filters, both public and private, are stored in the same database where the data warehouse resides. By applying the same filter to different reports generated by you or others, the reports have a common basis for comparison—that is, the result set is similarly constrained for all the reports.

All MetaCube for Excel users accessing the same data warehouse have access to the public filters stored there. Public filters are created by a user, usually your data warehouse administrator, who logs in using a specific user ID that is allowed to create public filters.

However, you may save your own filters in the same central location where the public ones are saved. Filters you save in the database are private rather than public. Your private filters are accessible only by you; you may save, delete, and modify your private filters; other MetaCube for Excel users cannot access or change your private filters. Filters that you save are also available from other MetaCube applications.

Managing Public Filters

Public MetaCube filters can only be created by the user "metapub," who can also assign the default filter for MetaCube for Excel users. This user ID can be created at the time MetaCube is installed and it may have a password assigned to it. Therefore, to manage public filters, you must be able to log in as the user metapub.

Public filters can be saved in the ROOT folder or in sub-folders, where sets of filters can be organized according to your company's specific criteria.

Since public filters are typically accessed by many users, modifications to or deletions of public filters should be done carefully. If you are responsible for managing public filters, be sure to notify all users of changes made to these objects.

About Folders

When you save queries and filters, they are stored in folders and sub-folders organized in a tree structure similar to the file system on your PC. The top-level folder is named ROOT; you can create sub-folders in which to organize saved filters and queries. In fact, your data warehouse administrator may have created folders for you to use whenever you specify filters and save queries.

All folders in the data warehouse are visible to all MetaCube for Excel users. A single set of folders and sub-folders is accessible to all MetaCube for Excel users.

Because it is possible that you will share folders with other MetaCube for Excel users, understanding the characteristics of folders is important. The list below highlights some important things to understand about folders:

- All folders are always visible, whether you are viewing saved queries or filters.
- Saved filters are related to given dimensions. Therefore, when you view filters, only filter icons for the currently-selected dimension are visible. In the demonstration database, for example, when viewing filters for the *Time* dimension, you do not see filters related to the *Product*, *Geography*, or *Channel* dimensions, even though filters for those dimensions may be stored in the same folder as the time filters.
- When viewing saved queries, filter icons are not visible, even though they may be stored in the same folder. Likewise, when viewing filters, saved query icons are not visible.
- Your private objects (queries and filters) are visible only to you. Other MetaCube for Excel users' private objects are not visible to you, nor are yours visible to them, even though they may be stored in the same folder. You may edit, rename, or delete your own private objects, but not others, just as other users cannot change or delete your private objects.
- A folder cannot be deleted unless it is empty. A folder may appear to be empty when it isn't. That is, you may delete all your private objects from a given folder so that it appears empty to you. However, if another user has stored a private object in that folder, it is not really empty and, therefore, you cannot delete it.

  Likewise, a folder that appears empty may contain filters related to other dimensions. Those filters are not currently visible. And, the folder cannot be deleted.

The Filter Icon

Filter icons that display in black and gray are filters that were created by your data warehouse administrator and are accessible by all MetaCube for Excel users. These filters are known as public filters. You cannot modify a public filter, although you can make a copy of one, modify it, and save it as your own private filter.

Filters that display in color are your own saved filters; they are your private filters. Private filters are only accessible by you; they are not available for other MetaCube for Excel users, even though those users are accessing the same DSS System as you are.

Using the Filter Wizard

When you specify a filter, it is automatically saved as a private filter in the database where the data warehouse resides. With a library of previously-defined filters, you can construct new filtered queries quickly.

The Filter Wizard is a three-step wizard that allows you to specify a filter for an attribute or a measure. Filters are useful in focusing on the exact data you wish to analyze.

Specifying an Attribute Filter

This tutorial example leads you through the steps for using the Filter Wizard to create an attribute filter. The filter you specify will be for the *Company* attribute in the *Product* dimension. Because it is a private filter, its icon will display in color.

To access the Filter Wizard: Click **Filter Wizard** on the **MetaCube** menu.

To complete Step 1:

1. Expand the *Sales Transactions* data source icon.
2. Expand the *Geography* dimension icon.
3. Click the *City* attribute icon.

Step 2 allows you to specify the attribute value or values you wish to filter on. When you click the **Search** button, MetaCube for Excel actually retrieves all possible attribute values from the data warehouse, displaying them in the Values Retrieved from Database text box and allowing you to select one or more of these values for your filter.

The **Search** button in the **Step 2 of 3** wizard page activates the search for attribute values.

To complete Step 2:

1. Click the **Search** button.
2. Click New York in the Values Retrieved from Database box.

To complete Step 3:

1. Type a name for the filter: NewYorkCity (do not type spaces).
2. To store the filter, click the **metacube user only** folder.
3. Click the **Finish** button to save the filter.

You have specified a private attribute filter that, when applied to a query to retrieve company data, will cause MetaCube for Excel to retrieve only data for the Electrotron Inc. company.

Specifying a Measure Filter

This tutorial example leads you through the steps for using the Filter Wizard to create a measure filter. The filter you specify will be for the *Units Sold* measure in the *Sales Transactions* data source. Because it is a private filter, its icon will display in color.

To access the Filter Wizard: Click **Filter Wizard** on the **MetaCube** menu.

To complete Step 1:

1. Expand the Sales Transactions data source icon; it contains the measure you wish to filter.
2. Click the *Units Sold* icon.

Step 2 allows you to select the comparison operator you wish to use in the filter. The options are:

Operator	Meaning
=	equal
< >	not equal
>	greater than
>=	greater than or equal to
<	less than
<=	less than or equal to

The operator you select is used by MetaCube to test data returned by the query.

After selecting the Operator, you type the value that completes the comparison statement. This is the actual value used by MetaCube to determine whether a given data value meets the criterion of the comparison expression. Data values that evaluate to true are included in the results of the query.

To complete Step 2:

1. Click the operator >=.
2. In the text box, type the value 550.

   The resulting comparison expression will exclude from the report all Units Sold data that is less than 550.

To complete Step 3:

1. In the Name box, type a name for the measure filter: UnitsSold550.
2. Store the filter by clicking the **metacube user only** folder.
3. Store the filter by clicking the **Finish** button.

Applying Filters Tutorial

To see how the filters you have created affect the results of a query, create an unfiltered query, then add the filters to the query. Follow the steps below.

To create the basic query: Click **Query Wizard** on the **MetaCube** menu.

To complete Step 1:

1. Expand the *Sales Transactions* data source icon.
2. Drag the *Units Sold* measure icon to the Measures text box in the wizard page.
3. Expand the *Channel* dimension icon, then drag the *Channel* attribute icon to the Columns text box in the wizard page.
4. Expand the *Geography* dimension icon, then drag the *City* attribute icon to the Rows text box in the wizard page.

5. Expand the *Products* dimension icon, then drag the *Product Class* attribute icon to the Rows text box in the wizard page.

Tip: *To rearrange items in the same list box, drag one icon above or below another. This causes the two icons to switch position in the list.*

To complete Step 2: Remove the Current Week filter.

- Right-click the Current Week filter icon, then click **Delete** on the popup menu.

To complete Step 3:

1. Save the query:
   a. Click Save Query in the Run Mode frame.
   a. Type a name in the Name text box.
   b. Click the **metacube user only** folder.
2. Format the output as a report.
3. Click the **Finish** button to run and save the query.

Notice that the results, shown below, display sales data by product class for each city in the data warehouse, broken out in columns for the three sales channels—Department Stores, Retail Chains, and Warehouse Stores.

	Channel	Department Stores	Retail Chains	Warehouse Stores
City	**Product Class**	**Units Sold**	**Units Sold**	**Units Sold**
Boston	Audio	689	1,129	529
	Computer	555	904	453
	Video	690	1,128	544
New York	Audio	6643	1,093	522
	Computer	531	870	445
	Video	657	1,076	533
Oakland	Audio	683	1,144	554
	Computer	530	886	467
	Video	701	1,116	553
Palo Alto	Audio	688	1,141	548
	Computer	537	904	461
	Video	693	1,120	556
San Francisco	Audio	1,029	1,675	826
	Computer	813	1,377	678
	Video	1,015	1,689	829
Sudbury	Audio	346	555	277
	Computer	277	469	217
	Video	349	545	270

Figure 4-1 *Results of unfiltered basic query*

In the following steps, apply each of the filters you created to the basic query. You will see how each filter constrains the data returned in the report.

To access the Report Wizard: Click **Report Wizard** on the **MetaCube** menu.

To complete Step 1: Click the icon for the query you saved.

To complete Step 2:

1. Expand the Filters folder.
2. Expand the **metacube user only** folder.
3. Drag the icon for the NewYorkCity filter you just created from the Available Filters box to the Selected box.

To complete Step 3: Click the **Finish** button to run the query.

Notice that the resulting report contains only sales data for New York City. The filter caused the MetaCube analysis engine to include only data for that city. Compare this report with the report obtained from the basic, unfiltered query.

Now apply the second filter; follow the steps below.

To access the Report Wizard: Click **Report Wizard** on the **MetaCube** menu.

To complete Step 1: Click the icon for the query you saved.

To complete Step 2:

1. Expand the Filters folder.
2. Expand the **metacube user only** folder.
3. Drag the icons for both filters you just created—the UnitsSold550 filter and the NewYorkCity filter—from the Available Filters box to the Selected box.

To complete Step 3: Click the **Finish** button.

Now the report shows even less data than before because it is constrained by two filters. Compare the results with the original report. Notice that it contains only data for New York City and only Units Sold figures where sales were 550 or more units.

Managing Filters

With MetaCube for Excel's Filter Manager, you can:

- Create a new filter.
- Organize filters into folders and sub-folders.
- Specify a particular filter as your default.

You can specify and use filters on both dimensions and measures. Therefore, the first step in managing filters is to choose whether you want to access dimension filters or measure filters.

When you access an attribute filter, you must first access the dimension to which that filter belongs. After you select the appropriate dimension, you view only the filters for that dimension.

When you access a measure filter, you must first access the data source that contains the measure. After you select the appropriate data source, you view only the filters for that data source.

In the tutorial example below, the steps will allow you to work with the filter you created.

To access the Filter Manager:

1. Click **Manage Filters** on the **MetaCube** menu.
2. For an attribute filter, in the **Filter Group** dialog box:
   a. Expand the Dimensions folder.
   b. Click the dimension that contains the attribute the filter applies to.

   OR

   For a measure filter, in the **Filter Group** dialog box:
   a. Expand the Fact Tables folder.
   b. Click the Data Source icon that the measure filter applies to.
3. Click the **Manage** button to display the **Filter Manager** dialog box.

About the Filter Manager Dialog Box

Icons in the **Filter Manager** dialog box allow you to perform a number of operations related to filters.

Go up one level. Filters can be stored in a folder at the ROOT level or in sub-folders. You might wish to group related filters into one folder. To go down a level, double-click the folder whose contents you wish to display. To go up, click this button.

Create a new folder. MetaCube for Excel creates a folder with a default name, which you can change, if you wish.

Specify a new filter for the dimension. After you have specified the filter definition, MetaCube for Excel places the filter in the currently active folder.

Copy a filter. You may copy either a public or a private filter. The copy is named "Copy of *filter_name*." After copying, the filter becomes a private filter that you can modify and rename it, if you wish.

Make currently selected filter the default for this dimension.

The "All" Filter

Each dimension and data source contains a filter, known as the "All" filter, that is empty. That is, it does not constrain data in any way; it retrieves all data. Hence, the name "All" filter. The "All" filter is typically assigned as the default filter for a dimension and a data source. Therefore, queries return all data appropriate for the components of the query. The "All" filter displays in gray and black and is always visible, regardless of the current folder. Therefore, it can always be applied to a query and can always be designated as the default filter.

Default Filters

A default filter is the filter currently in effect for a dimension or a data source. Default filters apply to all data sources in the DSS System. Typically, when configuring MetaCube for Excel, your database administrator has left all dimensions and data sources unfiltered. That is, the filter that uses the word "All" in its name is applied.

Warning: *If a filter other than the empty, or "All" filter is in effect when you define a query, the filter is applied to the query and MetaCube for Excel retrieves information according to the constraints of that filter, regardless of whether the query explicitly incorporates the filter's attribute or, in fact, any attribute from the dimension. When formulating queries, it is important to verify that filters are not inadvertently applied when you don't need them.*

When selecting a default filter, you can select either a private or a public filter. Private filters are only available to the user who creates them. When you set a filter as your default, it will be in effect until you change the default or close Excel.

When you use MetaCube for Excel to formulate queries, all default filters in effect other than the "All" filter display as a filter icon. If the default filter is a public filter, its icon is gray and black; if the default filter is a private filter, its icon is colored. You may delete the default filter from any given query or add more filters to the query.

The Filter Popup Menu

When you right-click a filter icon in the **Filter Manager** dialog box, a popup menu allows you to perform the following operations with filters.

- **Cut**: causes the selected filter to be deleted; its contents are placed in the clipboard. MetaCube for Excel verifies that you want to delete the filter.
- **Copy**: places a copy of the selected filter in the clipboard.
- **Paste**: places the contents of the clipboard (a filter definition) in the current location, unless it is a duplicate name. To paste a filter definition in the current location, right-click any object, then click **Paste** in the popup menu. Or, places the contents of the clipboard into a sub-folder that you have previously selected.
- **Rename**: allows you to rename the object using the same procedure as renaming files for your Windows operating system.
- **Edit**: allows you to edit the definition of the selected filter. When you edit a filter, you use the same dialog boxes used to create the filter.
- **Delete**: causes the selected object to be deleted. MetaCube for Excel verifies that you want to delete the object.
- **Set Default**: allows you to set the current filter as the default.

You can perform all these operations on your private filters. You can use only the Copy and Set Default options with public filters.

Using the Filter Manager for Attribute Filters

You can create and edit filters using the Filter Manager. This method for creating a filter is different from using the Filter Wizard and allows you to create more complex filters.

To access the Filter Manager: Click **Manage Filters** on the **MetaCube** menu.

1. In the **Filter Group** dialog box, expand the Dimensions folder.
2. Click the icon of the dimension for which you will specify a filter, then click the **Manage** button.

To create a new filter definition:

1. On the toolbar of the **Filter Manager** dialog box, click the **New filter** button.
2. In the **Filter Elements** dialog box:
   a. Type a name for the filter.
   b. Click the **New** button.

Filter Element Definition Dialog Box for Attribute Filters

Filters are defined in the **Filter Element Definition** dialog box. In this dialog box, you build one or more comparison expressions, called filter elements. When the query executes, the comparison expressions cause MetaCube for Excel to limit the range of data in the results. Only data for which the attribute value evaluates to true are displayed in Excel.

The features of the **Filter Element Definition** dialog box are described below.

Dimension: displays the name of the dimension for which you are specifying the filter.

Attribute: used to display a list of available attributes you can use for the filter's comparison expression. Only attributes within the dimension for which you are building the filter appear in this list.

Note: *Your database administrator may prevent some attributes that appear in the Query Wizard from being available for use in a filter definition. Such attributes will not appear in the* ***Attribute*** *list.*

Subset Condition text box and **Search** button: used to generate the list of all attribute values for the attribute name displayed in the **Attribute** list box.

Values Retrieved from Database: displays the list of attribute values retrieved when you click the **Search** button.

Note: *If the list of attribute values exceeds 200, you may need to subset the list. Subsetting a value list is discussed in the section* *"Working with Long Attribute Value Lists" on page 5-16*.

Operator: used to select the operator for the comparison expression. The comparison operators that you can use are:

Operator	Meaning
=	equal; the default and most commonly used operator
< >	not equal
>	greater than; most useful for numeric comparisons*
>=	greater than or equal to; most useful for numeric comparisons*
<	less than; most useful for numeric comparisons*
<=	less than or equal to; most useful for numeric comparisons*
In	within the specified list; used for both numeric and character string comparisons
Not In	not within the specified list; used for both numeric and character string comparisons
Like	used for pattern matching; the wildcard is % and can be used to replace 0 or more characters in the search pattern
Not Like	used for pattern matching; the wildcard is % and can be used to replace 0 or more characters in the search pattern
Is Null	is empty
Is Not Null	is not empty

*The operators >, <, >=, and <= can also apply alphabetical parameters to string values. For example, the "Alden" brand is less than the "Delmore" brand, because "A" precedes "D" in the alphabet.

Operand: displays the attribute value that completes the filter's comparison expression. Drag a value from the **Values Retrieved from Database** list into this text box.

Dialog box buttons in the **Filter Element Definition** dialog box:

- **Add**: used to add an attribute value to the comparison expression. Click a value in the **Values Retrieved from Database** list, then click the **Add** button; the attribute value appears in the **Filter** text box.

  Tip: *Instead of using this button, you can drag an attribute name to the* ***Operand*** *text box. You can also manually enter the attribute value.*

- **Drill Down**: used to display attribute values in the next level down in the dimension hierarchy. Drilling down automatically changes the name of the attribute on which you are filtering, thereby changing the comparison expression.
- **Drill Up**: used to display attribute values in the next level up in the dimension hierarchy. Drilling up automatically changes the name of the attribute on which you are filtering, thereby changing the comparison expression.

  Note: *When drilling up or down, you may be required to specify the attribute to which you wish to drill. This happens when dimension hierarchies branch, that is, when they follow more than one path of consolidation between levels. In this case, you must tell MetaCube for Excel which branch to follow.*

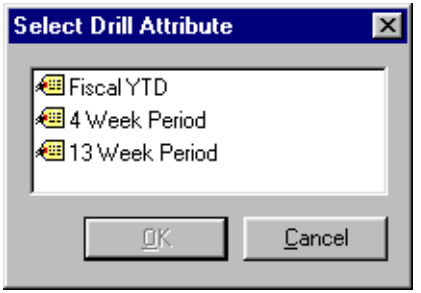

Figure 4-2 *Select Drill Attribute dialog box*

For example, in the demonstration database, the *Time* dimension contains three branches. You must choose the consolidation path to follow when drilling up or down in this dimension.

Specifying an Attribute Filter Definition

To define a filter element using the Filter Element Definition dialog box:

1. In the **Attribute** box, select the attribute name having the value(s) on which you wish to filter.
2. Click the **Search** button to display the list of values for the attribute you selected.
3. Drag the attribute value (or values) that completes the comparison expression to the **Operand** text box.
4. If needed, click the comparison operator to create a definition that, when evaluated to true, returns the desired data. The default operator is =. MetaCube for Excel automatically changes comparison operators based on what you drag to the **Filter** text box; you may not need to change the operator.
5. Click **OK** to add the filter element to the filter definition; it is displayed in the **Filter Components** list box of the **Filter Elements** dialog box.

   Note: *You can add as many filter elements as you wish to a filter specification. Click the* ***New*** *button and repeat the steps above for each filter element you wish to add to the filter.*

When the filter is defined, its icon displays in the folder that was currently active in the **Filter Manager** dialog box. You can move the filter to another folder, if you wish.

Editing an Attribute Filter Definition

Edit an attribute filter in the same **Filter Element Definition** dialog box you used to create the filter in the first place.

To edit an attribute filter:

1. Click **Manage Filters** on the **MetaCube** menu.
2. In the **Filter Group** dialog box, expand the Dimensions folder.
3. Click the dimension that the filter you wish to edit applies to, then click the **Manage** button.
4. In the **Filter Manager** dialog box, right-click the icon of the filter to edit, then click **Edit** in the popup menu.

5. In the **Filter Elements** dialog box, click the filter element you wish to edit, then click the **Edit** button.
6. In the **Filter Element Definition** dialog box, you may change the values in the Attribute, Operator, or Operand text boxes using the techniques described above in the section "Specifying an Attribute Filter Definition" on page 4-18.
7. To finish, close all dialog boxes by clicking **OK**, then **Done**.

Working with Measure Filters

You can create and edit measure filters using the MetaCube for Excel Filter Manager. This method for creating a filter is different from using the Filter Wizard.

To access the Filter Manager: Click **Manage Filters** on the **MetaCube** menu.

1. In the **Filter Group** dialog box, expand the Fact Tables folder.
2. Click the icon of the data source that contains the measure for which you will specify a filter, then click the **Manage** button.

To specify a new filter definition:

1. On the toolbar of the **Filter Manager** dialog box, click the **New filter** button.
2. In the **Filter Elements** dialog box
   a. Type a name for the filter.
   b. Click the **New** button to display the **Filter Element Definition** dialog box.

Filter Element Definition Dialog Box for Measures

Filters are defined in the **Filter Element Definition** dialog box. In this dialog box, you build one or more comparison expressions, called filter elements, that, when the query executes, cause MetaCube for Excel to limit the range of data in the results. MetaCube for Excel displays only data for which the measure value evaluates to true.

The features of the **Filter Element Definition** dialog box are described below.

Fact Table: displays the name of the fact table that contains the measure for which you are specifying the filter.

Measure: used to display a list of available measures you can use for the filter's comparison expression. Only measures within the fact table for which you are building the filter appear in this list.

Note: *Your database administrator may prevent some measures that appear in the Query Wizard from being available for use in a filter definition. Such measures will not appear in the* ***Measure*** *list.*

Operator: used to select the operator for the comparison expression. The comparison operators that you can use are:

Operator	Meaning
=	equal; the default and most commonly used operator
< >	not equal
>	greater than
>=	greater than or equal to
<	less than
<=	less than or equal to
In	within the specified list
Not In	not within the specified list

Operand: used to enter the value that completes the filter's comparison expression.

Specifying a Measure Filter Definition

To define a filter element: access the **Filter Element Definition** dialog box.

1. In the **Measure** list box, select the measure name on which you wish to filter.
2. In the **Operator** box, click the comparison operator to create a definition that, when evaluated to true, returns the desired data. The default operator is =, the most commonly used comparison operator.
3. In the **Operand** box, type the value that completes the comparison expression.

4. Click **OK** to add the filter element to the filter definition; it is displayed in the **Filter Components** list box of the **Filter Elements** dialog box.

   Note: *You can add as many filter elements to a filter definition as you wish. Click the* ***New*** *button and repeat the steps above for each filter element you wish to add to the filter definition.*

When the filter is defined, its icon displays in the folder that was currently active in the **Filter Manager** dialog box. You can drag the filter to another folder, if you wish.

Editing a Measure Filter Definition

To edit a measure filter:

1. Click **Manage Filters** on the **MetaCube** menu.
2. In the **Filter Group** dialog box, expand the Fact Tables folder.
3. Click the icon for the fact table that the filter you wish to edit applies to, then click the **Manage** button.
4. In the **Filter Manager** dialog box, right-click the icon of the filter to edit, then click **Edit** in the popup menu.
5. In the **Filter Elements** dialog box, click the filter element you wish to edit, then click the **Edit** button.
6. In the **Filter Element Definition** dialog box, you may change the values in the Attribute, Operator, or Operand text boxes using the techniques described in the section "Specifying a Measure Filter Definition" on page 4-20.

Filtering "On the Fly"

You can create MetaCube for Excel filters that take user input (or parameters) at the time the query is executed. When a query that includes a parameterized filter runs, MetaCube for Excel displays a dialog box prompting for user input that completes the comparison expression(s) for that filter.

You can apply more than one parameterized filter to a single query. As shown below, when multiple parameterized filters are applied, a single **Query Parameters** dialog box prompts for all input required to complete the comparison expressions and run the query.

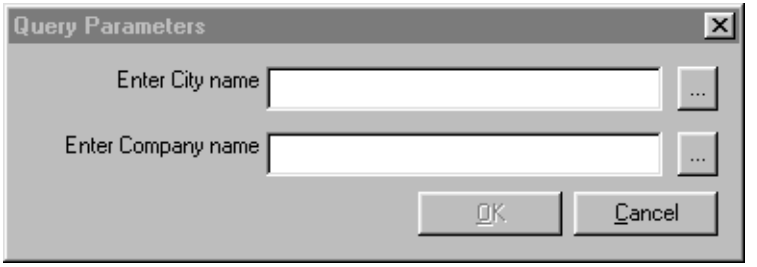

Figure 4-3 *Query Parameters dialog box for user input*

The **...** button to the right of each input text box allows you to view a listing of all values for the attribute. You may then select the value you wish to use in the query.

Specifying a Parameterized Filter

To specify a parameterized filter:

1. Click **Manage Filters** on the **MetaCube** menu.
2. In the **Filter Group** dialog box, expand the folder that contains the attribute(s) or measure(s) for which you wish to specify a parameterized filter.
   a. For an attribute filter, expand the Dimensions folder, then click the dimension icon that contains the attribute to which you wish to apply a parameterized filter.

      OR

      For a measure filter, expand the Fact Tables folder, then click the icon for the data source that contains the measure to which you wish to apply a parameterized filter.
   b. Click the **Manage** button.

3. In the **Filter Manager** dialog box, click the **New filter** button on the toolbar.
4. In the **Filter Elements** dialog box, click the **New** button.
5. To define a parameterized filter:
   a. For a parameterized attribute filter, in the **Attribute** box of the **Filter Element Definition** dialog box, select the attribute name whose values you wish to filter.

      OR

      For a parameterized measure filter, in the **Measure** box of the **Filter Element Definition** dialog box, select the measure name on which you wish to filter.

   b. In the **Operator** box, click the comparison operator to create an expression that, when evaluated to true, returns the desired data. The default operator is =, the most commonly used comparison operator.

   c. Position the cursor in the **Operand** text box and enter the message you wish to display, asking for user input. Enclose the message string in double angle brackets:

      ```
      <<message string>>
      ```

      The message string should be fairly short to ensure that it displays properly in the **Query Parameters** dialog box. It should prompt for the correct information to run the query successfully. The message might say “Type the city name” or “Enter the time period.”

   d. Click **OK** to add the comparison expression to the filter element definition. You can add another element to the parameterized filter, if you wish.

   e. Enter a name for the filter in the **Filter Name** box.

   f. Click **OK** to save the filter. Then, click **OK** again.

      You can specify another parameterized filter if you wish. Otherwise, click **Done**.

Pre-Defined Parameters

Your data warehouse administrator may have defined some parameters that you can incorporate into your Explorer queries. When you incorporate a pre-defined parameter into your query, you type the parameter's name, enclosed in double angle brackets, just as you did when defining your own parameterized filters.

For example, your data warehouse administrator may have defined a parameter, named Top Product, that, when applied to a query, constrains the query to retrieve only data about the top-selling product. To use this parameter in your query, you would specify the following *Product* dimension filter:

```
Product = <<Top Product>>
```

where Top Product is the name of the pre-defined parameter.

When you execute the query, MetaCube automatically executes the commands necessary to identify the top-selling product and return data about it.

Use of a pre-defined parameter does not cause the **Query Parameters** dialog box to display, since no user input is required. Because of this, a query using a pre-defined parameter may be successfully submitted to QueryBack. A parameterized query requiring user input cannot be submitted to QueryBack.

Filtering on Time

Filtering on time is different from filtering on an attribute, such as city, that has absolute values. Because MetaCube understands the idea of relative time as well as absolute time, you indicate at the time you create a time filter whether the filter is an absolute time filter or a relative time filter.

Absolute Time Filter

In a data warehouse, a time dimension table contains absolute values that MetaCube for Excel uses when retrieving results. For example, you can retrieve sales data for the first half of 1997 by filtering data using the dates January 1, 1997, and June 30, 1997, to limit the information returned by your query. This is filtering on absolute time.

When you create an absolute time filter, you indicate this in the **Filter Element Definition** dialog box. For time filters, the **Filter Element Definition** dialog box contains two buttons, **Relative** and **Absolute**, with which you can indicate whether you wish to use absolute or relative time values for your filter.

To display absolute time values:

1. In the **Filter Element Definition** dialog box, select, from the **Attribute** list, the time attribute on which you wish to filter.
2. Click the **Absolute** button in the Time frame.
3. Click the **Search** button.

MetaCube for Excel displays the absolute time values contained in the data warehouse. From this list, select the value(s) you wish to use in your filter.

Relative Time

MetaCube recognizes notions of relative time, such as the current week, the last four weeks, or the same time last year. A relative time filter allows you to retrieve results for last week or last month, regardless of the actual date, or to compare results for the current time period and the same time period last year, again regardless of the actual dates. Using MetaCube for Excel, you can design queries that can be executed over time to retrieve data and comparisons for the most recent data in your data warehouse without changing the query itself.

For example, you can run weekly reports that always retrieve the most recent week's data. Without a relative time filter, producing a weekly sales report, for example, would require continuous redefinition of the query for each report, using absolute dates such as February 13-19 or October 20-26. A relative time filter, such as the "most recent week," remains undefined in absolute terms until the query executes, at which time MetaCube identifies the latest week of data stored in the data warehouse.

To allow building of relative time filters, MetaCube understands the following ideas of relative time:

- Current Period.
- Last 2 Periods.
- Last 3 Periods.
- Last 4 Periods.
- Current Period and Same Period Last Year.

The word "period" has no absolute meaning. Its meaning is derived from the attribute on which you are filtering. If you are filtering on week, for example, current period means the current week.

Tip: *The periods listed above are commonly used for standard reports. However, MetaCube understands any quantity of time periods, such as Last 5 Periods or Last 14 Periods. You can use any number of time periods in your time filter definition by typing the syntax when you define a filter. For example, to report data in 1-week chunks for the last 10 weeks, the filter definition would be:*

```
Fiscal Week In <<Last 10 Periods>>
```

When you create a relative time filter, click the **Relative** button in the Time frame of the **Filter Element Definition** dialog box.

To display time data so you can use it to define a relative time filter:

1. In the **Filter Element Definition** dialog box, select, from the **Attribute** list, the time attribute on which you wish to filter.
2. Click the **Relative** button in the Time frame.

From the list displayed by MetaCube for Excel, you can select the relative time value you wish to use in your filter.

Comparing Changes in Data Over Time

When analyzing fourth quarter sales, for example, the absolute numbers may be less important than how those numbers compare with fourth quarter sales a year ago. MetaCube for Excel can calculate data changes over time in absolute terms or in percentages.

When formatting reports that calculate changes over time, it is helpful to organize the time attribute by column and the other attributes in the query by row. This provides a readable format in which MetaCube for Excel can display its comparison calculations in an additional column of the report. When formatting a report to compare changes in data over time, you will use:

- A relative time filter that produces two columns of data, one for each time period being compared.
- A measure calculation used by MetaCube to calculate the absolute or percent change between the two columns of data.

When returning the data for a two-column report, MetaCube executes the comparison calculation and places the column containing the results to the right of the second column of the report. When more than two columns are returned, MetaCube for Excel interpolates a comparison column after each successive column. For example, if there are three columns of data, MetaCube for Excel inserts a column to the right of column 2 to display the comparison between columns 1 and 2, and another column to the right of column 3 to display the comparison between columns 2 and 3.

Note: *Typically, comparative calculations are performed on columns, not rows, of data. However, there is no requirement to do this. You can change the orientation of the measures in the query specification to display data in rows if this makes your report more readable. The discussions in this guide, however, refer to columns containing data and comparison values.*

Query Example: Comparing Values for Discrete Periods

Fiscal Week	96/03/26 - 96/04/01	97/03/25 - 97/03/31	
Brand	**Gross Revenue**	**Gross Revenue**	**Gr Revenue Change**
Alden	$793,240.00	$607,700.00	-$185.540.00
Barton	$188,320.00	$137,820.00	-$50.500.00
Delmore	$36,350.00	$43,250.00	$6,900.00
Extreme	$96,250.00	$75,250.00	-$21,000.00
Lasertech	$91,850.00	$80,150.00	-$11,700.00
NVD	$42,650.00	$45,440.00	$2,790.00
Onetron	$13,600.00	$14,450.00	$850.00
Suresound	$61,040.00	$55,410.00	-$5,630.00
Techno Components	$199.450.00	$211,475.00	$12,025.00

Figure 4-4 *Report showing change over time*

The query results shown above display two columns of data showing gross revenues for two different time periods. These results were obtained by applying a MetaCube for Excel time filter that automatically retrieves two columns of data for two time periods—the current fiscal week and the same week a year ago. The syntax for the time filter is shown below:

```
Fiscal Week In (<<Current Period and Same Period Last Year>>)
```

Applying the relative time filter that compares this week's data with the same period last year causes MetaCube to return two columns of data.

You can recreate the report shown above by following the steps below. You will perform two major tasks:

- Create a relative time filter that retrieves data for a time period this year and for the same time period last year.
- Specify and run a query in which you will use the relative time filter and a measure calculation to compare the two columns of data.

To specify the relative time filter: Click **Manage Filters** on the **MetaCube** menu.

1. Expand the Dimensions folder, then click the *Time* dimension icon.
2. Click the **Manage** button.
3. In the **Filter Manager** dialog box, click the **New filter** button on the toolbar.

4. In the **Filter Elements** dialog box, click the **New** button.
5. In the **Filter Element Definition** dialog box:
   a. Verify that the **Relative** button in the Time frame is active.
   b. Select *Fiscal Week* from the Attributes list.
   c. Drag the <<Current Period and Same Period Last Year>> relative time value to the **Operand** box.
   d. The default operator, In, is correct for this filter definition.
   e. Click **OK**.
6. In the Filter Name box of the **Filter Elements** dialog box, enter a name for the filter, then click **OK**.
7. Close the remaining dialog boxes to return to the Excel worksheet.

After creating the filter, you are ready to specify a query and apply the filter.

To specify and run the query: Click **Query Wizard** on the **MetaCube** menu.

To complete Step 1:

1. Expand the Sales Transactions data source icon.
2. Drag the *Gross Revenue* measure icon to the Measures text box.
3. Expand the *Time* dimension icon, then drag the *Fiscal Week* attribute icon to the Columns text box.
4. Expand the *Product* dimension icon, then drag the *Brand* attribute icon to the Rows text box.
5. To format the *Gross Revenue* data:
   a. Right-click the *Gross Revenue* icon in the Measure box.
   b. Click **Format** in the popup menu.
   c. In the **Format** dialog box, click Currency in the Category box.
   d. Click the **Use $** box.
   e. Click the **-$1234.98** negative number format in the Negative Numbers box.
   f. Click **OK**.

   Note: *Complete information on formats for numeric data is contained in Chapter 5, "MetaCube Analysis Features" and Appendix B.*

6. To specify the measure calculation that will compare two columns of data:
   a. Drag another *Gross Revenue* icon to the Measures box.
   b. Right-click the second *Gross Revenue* icon.
   c. Click **Define Calculation** on the popup menu.
   d. In the **Measure Calculation** dialog box, click Absolute Change, then click **OK**.

   Note: *Complete information on measure calculations is contained in Chapter 5, "MetaCube Analysis Features."*

7. To format the measure calculation data:
   a. Right-click the icon that represents the measure calculation in the Measure box.
   b. Click **Format** in the popup menu.
   c. In the **Format** dialog box, click Currency in the Category box.
   d. Click the **Use $** box.
   e. Click the **-$1234.98** negative number format in the Negative Numbers box.
   f. Click **OK**.

8. To rename the measure calculation icon:
   a. Right-click the icon in the Measures text box that represents the measure calculation you just specified.
   b. Click **Edit Definition** in the popup menu.
   c. In the Label for Reports box, type: Gr Revenue Change, then click **OK**.

   Note: *Complete information on editing definitions is contained in Chapter 6, "Other Features."*

To complete Step 2:

1. Drag the relative time filter you created to the Selected Filters text box.
2. Assure that it is the only filter in effect by deleting any other filter icon displayed in the Selected Filters text box.

To complete Step 3:

1. If you wish, save the query:
   a. Click Save Query in the Run Mode frame.
   b. Type a name for the query in the Name box of the Save Information frame.
   c. Click the folder where you wish to save the query.
2. Format the output as a report.
3. Run the query.

MetaCube's relative time capability allows you to filter data on the current period and the same period last year. However, if you wish to compare dissimilar time periods or if you wish to compare a given period over a span of more than two years, you must explicitly choose those periods in absolute time.

Chapter

5

MetaCube Analysis Features

This chapter describes the analysis features provided by MetaCube for Excel. The MetaCube for Excel analysis features include:

- Sorting attribute values.
- Subtotals in break reports.
- Custom comparison queries.
- Grouping attributes into user-defined buckets.
- Grand totals for rows or columns of measure data.
- Comparison and analysis calculations for measures.
- Formats for measure data.

This chapter also discusses:

- Reformatting results to display measure data in either rows or columns.
- Redefining attribute and measure names and internal specifications.

Accessing MetaCube for Excel's Analysis Features

You can apply MetaCube for Excel's analysis features to a query by accessing either of the following:

- The Query Wizard
- The Query Editor, accessible from the Query Manager.

MetaCube for Excel's analysis features are available for both attributes and measures.

To apply a MetaCube for Excel analysis feature to either an attribute or a measure:

- Right-click the attribute or measure after you have dragged it to a list box.

A popup menu displays the analysis options that are available; operations that cannot be performed on the icon you clicked are dimmed.

Note: *You can apply some MetaCube for Excel analysis features by simply clicking in an empty box that contains no icon. MetaCube for Excel displays the analysis feature(s) that you can apply when no icon has been dragged to that box. For example, in a box that normally holds an attribute name, you can define a custom comparison when no icon is present in that box.*

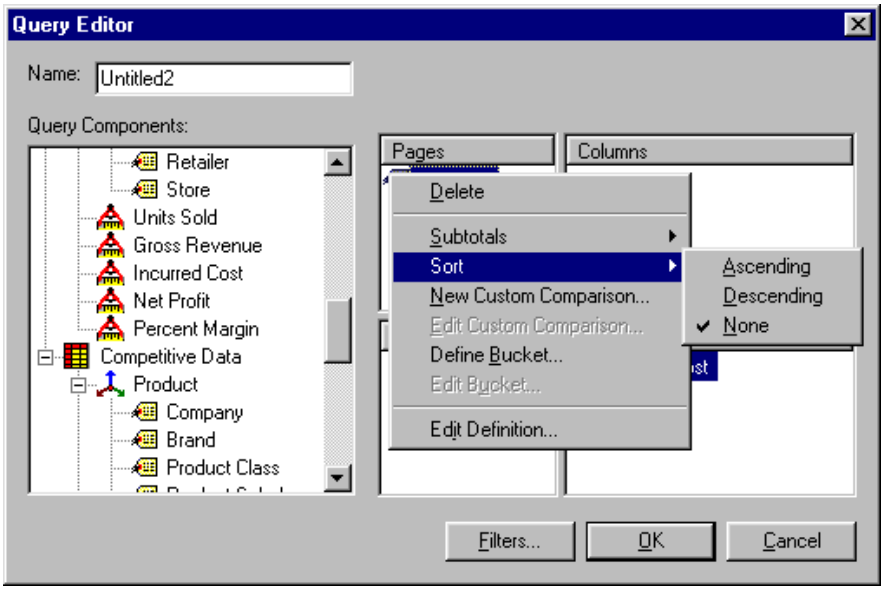

Figure 5-1 *Attribute analysis functions popup menu*

The figure above shows the attribute analysis functions that are currently available for the attribute clicked. In this example, the attribute's sorting order will be defined.

Analysis Features for Attributes

Sorting Results

MetaCube for Excel's sorting capability allows you to specify the sort order used for the results of your query.

The sorting options are described in the table below.

Sort Options	What it does
Ascending	Sorts alphabetic values from a to z. Sorts numeric values from smallest to largest. Sorts dates from oldest to most recent. This is the MetaCube for Excel default sort order.
Descending	Sorts alphabetic values from z to a. Sorts numeric values from largest to smallest. Sorts dates from most recent to oldest.
None	No sorting applied to the results.

In a query that generates a break report with multiple attributes in either rows or columns, the first attribute in a column or row is sorted first. The sort order for any single attribute, regardless of its position in a break report, does not affect the sorting order of any other attribute; MetaCube applies sort orders independently to every level.

You can sort on either rows or columns of attribute values, or both. MetaCube for Excel sorts the rows first, then the columns. Sorting reports does not change the underlying query; it changes only formatting specifications for displaying the results.

Subtotals in Break Reports

MetaCube for Excel can calculate summary values for a report organized with multiple attributes in columns or rows—a break report. MetaCube can subtotal at each break point in the report.

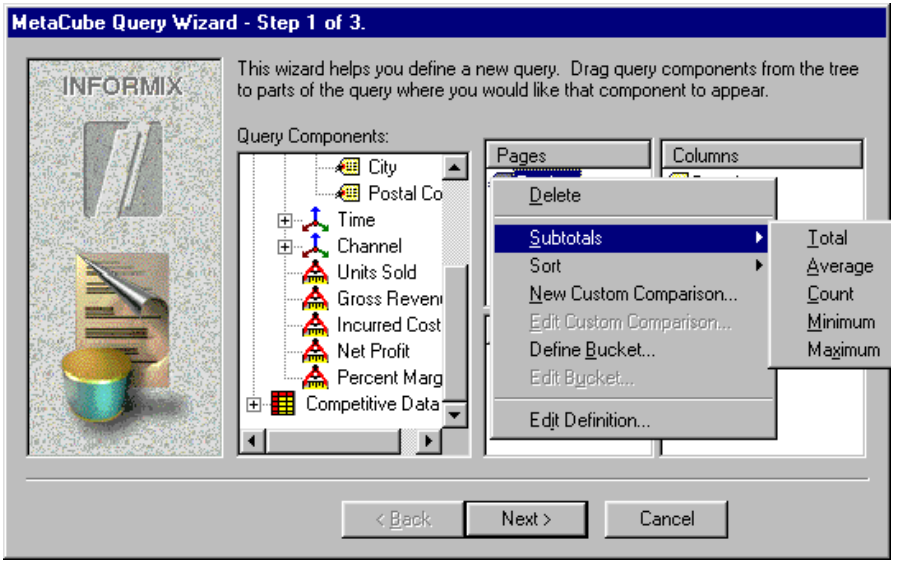

Figure 5-2 *Popup menu with attribute subtotal options*

As illustrated in the figure above, the subtotal options include:

- Total.
- Average.
- Count.
- Minimum.
- Maximum.

The structure of the query that produced the results shown below allowed MetaCube for Excel to calculate subtotal values.

Region	District	Product Class	Units Sold
Northeast	New England	Audio	381
		Computer	236
		Video	300
		Total	917
	New York	Audio	223
		Computer	146
		Video	180
		Total	549
	Total		1,466
West	California	Audio	804
		Computer	576
		Video	646
		Total	2,026
	Total		2,026

Figure 5-3 *Subtotaled results; by District and by Region*

To recreate these results: Use either the Query Wizard or the Query Editor (accessed from **Manage Queries** on the **MetaCube** menu).

1. Drag the three attributes, *Region*, *District*, and *Product Class*, to the Rows box. Be sure that the *Region* attribute is at the top and the *Product Class* attribute is at the bottom.
2. Drag the *Units Sold* measure to the Measures box.
3. Specify the Subtotal functions:
   a. Right-click the *Region* attribute icon.
   b. In the popup menu, point to **Subtotals**, then click **Total**.
   c. Right-click the *District* attribute icon.
   d. In the popup menu, point to **Subtotals**, then click **Total**.
4. To obtain the *Units Sold* data shown in the table above, apply the **Last 2 wks** filter, found in the **Public Filters** folder.

The subtotal function was applied to both the *Region* and the *District* attributes, but not the *Product Class* attribute. You may subtotal at any level of a break report except the final or lowest level.

Custom Comparisons

MetaCube for Excel includes a custom comparison feature that allows you to define a single query that generates two or more SQL statements to retrieve the data you request. MetaCube then combines the data into a single report.

Sales Comparison Report	USA	San Francisco	
Brand	**Units Sold**	**Units Sold**	**Pct of Country Sales**
Alden	4,437	1,166	26.28%
Barton	3,238	828	25.57%
Delmore	4,335	1,027	23.69%
Extreme	1,082	274	25.32%
Lasertech	2,770	715	25.81%
NVD	6,507	1,610	24.74%
Onetron	2,164	549	25.37%
Suresound	6,012	1,505	25.03%
Techno Components	8,985	2,257	25.12%

Figure 5-4 *Results of a custom comparison*

The example above, from the MetaCube demonstration database, compares brand sales for the city of San Francisco with brand sales country-wide. The query definition also includes a measure calculation to show what percent of total country sales is made in San Francisco.

Two columns of sales data display in this report: brand sales for the country and brand sales for San Francisco. In the custom comparison definition, a filter, embedded in the comparison definition, obtains data for San Francisco only. The right-most column in the report shows the difference, stated as a percent, for each brand, between sales for the country and sales for San Francisco.

To recreate the results shown in Figure 5-4: Access the Query Wizard by clicking **Query Wizard** on the **MetaCube** menu and follow the steps below.

To complete Step 1:

1. Expand the Sales Transactions data source icon.
2. Drag the *Units Sold* icon to the Measures box.
3. Expand the *Product* dimension icon, then drag the *Brand* icon to the Rows box.
4. To define the custom comparison that produces two columns of sales data—one for the country and one for San Francisco, right-click in the Columns box, then click **New Custom Comparison** in the popup menu.
5. In the **Custom Comparison** dialog box:
   a. Click the **Add Item** button.
   b. Expand the *Geography* dimension icon, then drag the *Country* icon to the empty Attribute cell.
   c. Drag the ALL filter icon from the Filters box to the Filter cell.
   d. Click the **Add Item** button again.
   e. Drag the *City* icon to the Attribute cell.
   f. Expand the Public Filters folder in the Filters box.
   g. Scroll down to display the **San Francisco** filter icon, then drag it to the Filter cell.
6. Verify that the **Separate** button is active in the Sort frame.
7. Type the name for the custom comparison in the Name box: Sales Comparison Report. This name appears as a report header in the results displayed in Excel. Click **OK**.

8. To specify the measure calculation:
   a. Drag a second *Units Sold* icon to the Measures box, then right-click it.
   b. Click **Define Calculation** in the popup menu.
   c. In the **Measure Calculation** dialog box, click Pct of Previous, then click **OK**.
   d. Right-click the new icon that represents the measure calculation you just specified, then click **Edit Definition**.
   e. Type a new Label for Reports heading: Pct of Country Sales, then click **OK**.

   Note: *More information about measure calculations is contained in the section* *"Analysis Features for Measures" on page 5-19*.

To complete Step 2:

- Delete any filter icon displayed in the Selected Filters text box.

To complete Step 3:

1. If you wish to save the query, click Save Query in the Run Mode frame. Provide a name for the query and click the folder where it should be stored.
2. Format the output as a report.
3. Run the query.

Note: *The filters applied to dimensions within a custom comparison become a part of the custom query. They have the effect of filtering individually each SQL statement issued to retrieve the attribute values you specified in the custom comparison. This has a different effect from a filter applied outside the custom comparison definition, which limits data in all columns returned.*

Depending on how your query is formatted, you may wish to use the sorting options for custom comparisons. If the attributes being compared will all display in rows, you have the option of displaying them as a single list or as two separate lists.

- If you wish to arrange all the attributes in a single list, click the **Together** button in the Sort frame. This causes MetaCube for Excel to sort the attributes you specified in the custom comparison in a single list.

- If you wish the data for each of the comparison attributes to appear separately in the results list, click the **Separate** button in the Sort frame. MetaCube for Excel arranges the attributes you specified in the custom comparison according to the order in which they are listed in the Compare Items box. To rearrange that list, delete and re-enter items using the **Delete** and **Add Item** buttons above the box.

Editing Custom Comparisons

To access an existing custom comparison:

1. Click **Manage Queries** on the **MetaCube** menu.
2. In the **Query Manager** dialog box, right-click the icon for the query that contains the custom comparison, then click **Edit** in the popup menu.
3. In the **Query Editor** dialog box, right-click the icon that represents the custom comparison.
4. In the popup menu, click **Edit Custom Comparison**.

Grouping Attributes into User-Defined Buckets

MetaCube for Excel provides a feature that allows you to customize reports by defining groups of attributes to use as the basis for summarizing data. As part of your query definition, you can organize attribute values into user-defined groups, called buckets, thereby summarizing data to meet your own specific reporting requirements.

Attribute buckets are defined by categorizing attributes according to one of the following:

- Ranges of alphabetic or numeric values.
- Lists of specific attribute values.
- A combination of the two.

The ability to define your own attribute groupings allows you to summarize data based on your own specifications.

Using the demonstration database, you can define a query that returns sales totals for all subclasses of product tracked in the data source. The basic query produces the report shown below. The grand total of all sales has been added to the report.

Product Subclass	Units Sold
CDROM Drives	174
Compact Disc Players	174
Graphic Equalizers	125
Hardware Boards	66
IBM Compatible PCs	128
Laser Disc Players	123
Mac Compatible PCs	89
Memory Chips	53
Speakers	151
Tape Decks	135
Television Sets	177
VHS Recorders	174
Video Rewinders	78
Grand Total	1,647

Figure 5-5 *Report of sales summarized by product subclass*

Using the buckets feature, product subclass sales information can be summarized into two groups: PC products and Home Entertainment products. This summarization is achieved by specifying user-defined buckets.

Equipment Buckets	Units Sold
PC Equipment	510
Home Entertainment Equipment	1,137
Grand Total	1,647

Figure 5-6 *Report of sales summarized by user-defined buckets*

Specifying buckets of attribute values creates a custom set of user-defined attributes by which fact table data are summarized.

Defining a Set of Buckets by Selecting Items

To recreate the results shown above: Access the Query Wizard by clicking **Query Wizard** on the **MetaCube** menu and follow the steps below.

To complete Step 1:

1. Expand the Sales Transactions data source icon.
2. Drag *Units Sold* to the Measures box.
3. Expand the *Product* dimension icon, then drag *Product Subclass* to the Rows box.
4. Right-click the *Product Subclass* icon, then click **Define Bucket** in the popup menu.
5. In the **Buckets** dialog box, display the attribute values for *Product Subclass* by clicking the **Search** button.
6. Define the first bucket:
   a. Click the **Add List** button.
   b. Use standard Windows keyboard and mouse techniques to select and drag the following attribute values to the Value cell:
      - CDROM Drives.
      - Hardware Boards.
      - IBM Compatible PCs.
      - Mac Compatible PCs.
      - Memory Chips.
   c. To name this bucket, click the Name cell that currently reads List1. Type the name for the bucket: PC Equipment. Click in the white space to close the editing box.

      The new name appears in place of the attribute names in the original report. In the results, there will be one row that summarizes the data for all the attribute values you included in this bucket.

      Tip: *When defining the contents of buckets by selecting items, you may, if you wish, include the same attribute value(s) in more than one bucket.*

7. Define the second bucket:
   a. Click the **Add List** button.
   b. Use standard Windows keyboard and mouse techniques to select and drag the following attribute values to the Value cell:
      - Compact Disc Players.
      - Graphic Equalizers.
      - Laser Disk Players.
      - Speakers.
      - Tape Decks.
      - Television Sets.
      - VHS Recorders.
      - Video Rewinders.
   c. To name this bucket, click the Name cell that currently reads List1. Type the name for the bucket: Home Entertainment Equipment. Click in the white space to close the editing box.

      The new name appears in place of the attribute names in the original report. In the results, there will be one row that summarizes the data for all the attribute values you included in this bucket.
8. Name the set of buckets. This name appears as the report heading. Type: Equipment Buckets, then click **OK**.
9. To add the Grand Total row:
   a. Right-click the *Units Sold* icon.
   b. In the popup menu, point to **Totals**, then click **Row Grand Totals**.

To complete Step 2: no action is required.

To complete Step 3:

1. If you wish to save the query, click Save Query in the Run Mode frame. Provide a name for the query and click the folder where it should be stored.
2. Format the output as a report.
3. Then, run the query.

The <OTHER> Option

When grouping attribute values into buckets by list, you can define a bucket that contains any attribute values not already included in a bucket. The <OTHER> option is used to create a bucket that contains the other values (those not already in another bucket or buckets).

To specify an <OTHER> bucket:

1. In the **Buckets** dialog box, click the **Add List** button.
2. Drag the <OTHER> icon to the Value cell.
3. Provide a name for the bucket in the Name cell.

An icon representing the <OTHER> bucket displays with the name you provided. The name also appears as a heading in the Excel worksheet that contains the results of the query.

Using an <OTHER> bucket is not required; you can eliminate attribute values from your query by not including them in a bucket definition.

Editing a Bucket Definition

Bucket definitions are saved as part of the query specification.

To change a bucket definition: Access the Query Manager by clicking **Manage Queries** in the **MetaCube** menu.

1. In the **Query Manager** dialog box, right-click the icon that represents the query containing bucket specifications.
2. Click **Edit** in the popup menu.
3. In the **Query Editor** dialog box, right-click the icon representing a set of bucket definitions, then click **Edit Bucket** in the popup menu.

You can edit portions of a bucket definition by clicking the cell containing the information you wish to edit. It expands to display the entire contents. Use standard Windows editing techniques to modify or delete the contents of a single cell.

Tip: *To delete an entire bucket specification, click the yellow icon to the left of the bucket definition. This activates the* ***Delete*** *button and you can delete the entire bucket specification.*

Working with Long Attribute Value Lists

If an attribute's list of values is especially long, you may receive a warning indicating that the value list is too long to display all at once, so a partial list has been retrieved. (This happens if the value list is longer than 200 items.) If the list contains the value or values you wish to select, you may use the truncated list. However, you may wish to select other values not in the initial list retrieved by MetaCube for Excel.

To divide the attribute value list into subsets:

- In the Subset Condition text box, enter the beginning letter or letters of the attribute values you wish to display and from which you wish to select.

For example, entering the letter "m" and clicking the **Search** button displays a list of all character string attribute values starting with the letter "m." Entering "mo" displays a list of all character string attribute values starting with the letters "mo." The search is case-sensitive, so you must enter capital letters to locate values that use upper case. You can include SQL wildcard syntax in this field; for example, "%o%" retrieves all the values containing the letter "o."

Defining a Set of Buckets by Range

You can organize attribute values into buckets by alphabetic or numeric ranges. Ranges can start and end with any arbitrary values you specify and you may specify overlapping ranges, if you wish.

When you specify a numeric range of, for example, 0 to 100, MetaCube for Excel retrieves all values greater than 0 to less than or equal to 100. The numbers 100.1 and 101, for example, are not included in the bucket.

Tip: *When specifying ranges, you may use more than one character (letter or number) to delimit a range.*

Similarly, when you specify an alphabetic range of, for example, A to F, MetaCube for Excel retrieves all character string values that start with AA to any character string that consists exclusively of the letter F. The single value, A, is excluded from this range as well as character strings that start with F and are followed by any other letter. To include all character strings that start with the letter F in the bucket, define the range as A to FZ.

Note: *Range values are not case sensitive. Therefore, A retrieves all values that are A or a.*

The <ALL> Option

The <ALL> option allows you to define a range that includes all values below or above a given threshold. For example, a specification of

```
<ALL> To FZ
```

defines a range that includes all alphabetic values from exactly A to all alphabetic values equal to FZ.

For a numeric range:

```
<ALL> to 50
```

defines a range that includes all numeric values less than 50 (including negative values) up to and including the value 50. A specification of:

```
100 To <ALL>
```

defines a range that includes all values greater than 100.

The <ALL> option allows you to define ranges that include values at the low and high end of the entire set of values for the attribute you are bucketing. You do not need to know (or specify) the actual lowest or highest value.

As an example, the following range specifications would include every possible value for an attribute whose values are alphabetic characters:

Definition	Range
<ALL> To DZ	A (beginning of the alphabet) through D
E To LZ	E through L
M To RZ	M through R
T To <ALL>	T through the end of the alphabet

Figure 5-7 *Example of using the <ALL> option to define buckets by range*

Displaying Grand Totals for Rows and Columns of Data

MetaCube for Excel can calculate grand totals for all rows and columns in a report. Grand total calculations that you can add to your query results are:

- Totals.
- Averages.
- Counts.
- Minimums.
- Maximums.

District	California	New England	New York	Grand Total
Product Class	**Units Sold**	**Units Sold**	**Units Sold**	**Units Sold**
Audio	329	163	93	585
Computer	317	118	75	510
Video	320	143	89	552
Grand Total	966	424	257	1,647

Figure 5-8 *Grand total (Sum) applied to brand sales report by district*

In the report above, grand totals are applied for both rows and columns. The report contains an added row to display the column totals for all districts (Column Grand Totals). The report also contains an added column to display the totals for each row of product classes (Row Grand Totals).

You can apply grand total calculations to a query using either the **Query Wizard** (for a new query) or the **Query Manager** (for an existing query).

To add grand total calculations to a report:

- Right-click a measure icon, point to **Totals** in the popup menu, then click the grand total you wish to have calculated.

You can use as many types of grand total calculation in a query as you wish. When you apply a grand total calculation to a single measure, all measures in the same orientation (row or column) are totaled.

Analysis Features for Measures

Often, data becomes more meaningful when it is compared with other data. MetaCube analysis features for measure data allow you to:

- Rank values.
- Show differences between two values.
- Calculate running totals.
- Calculate percentage of totals.

MetaCube for Excel's measure calculation feature provides many analysis options to easily generate meaningful comparisons of the data in query results.

Note: *The discussions in this section refer to columns of measure data. You can change the orientation of measure data to display in rows instead of columns. In that case, the information about measure calculations applies to rows of data, rather than columns.*

The table below lists MetaCube for Excel's measure calculation options.

Measure Comparison	What It Displays
Absolute Change	difference between the current value and the previous value, displayed as a number (negative numbers display with a minus sign)
Bottom N	results displayed contain a user-defined (N) number of the lowest values in the results returned from the database; all other values are eliminated from the results.
Bottom N Percent	results displayed contain a user-defined (N) percent of the lowest values in the results returned from the database; all other values are eliminated from the results.
Bottom Rank	sequential numbers indicating ranked order of measure values; 1 indicates lowest rank (largest negative number, or, for all positive numbers, smallest positive number)

Measure Comparison	What It Displays
Moving Average	average of a set of measure values that includes the current value and some user-defined number of previous values in the column; if the number of values to be averaged is less than the user-defined number (for example, at the beginning of the report), the actual number of values available is used for the calculation.
Moving Sum	sum of a set of measure values that includes the current value and some user-defined number of previous values in the column; if the number of values to be summed is less than the user-defined number (for example, at the beginning of the report), the actual number of values available is used for the calculation
Normal	used to remove an existing calculation for the measure; measure data displays as its actual value
Pct Change	result of dividing the numeric difference by the previous value; expressed as a percent
Pct Of Grand Total	comparison between the current measure value and the grand total of all values in the report (across all pages)
Pct Of Page Total	comparison between the current measure value and the sum of all values on the page, expressed as a percent
Pct Of Previous	result of dividing the current value by the previous value, expressed as a percent
Pct Of Row / Column	comparison between the current measure value and the sum of the entire row that contains it
Pct Of Subtotal	comparison between the current measure and the subtotal of which it is a part, expressed as a percent
Pct of Total	comparison between the current measure value and the sum of all values in the column, expressed as a percent
Quantiles	similar to rank; comparison among all measures in a column according to some number of user-defined groupings (quantiles); 1 indicates the highest quantile ranking. For example, setting the Quantiles to 3 divides returned data into 3 groups (tertiles); a setting of 4 divides data into quartiles; a setting of 100 divides data into percentiles.

Measure Comparison	What It Displays
Quartile	similar to rank; comparison among all measures in a column divided into 4 groupings; 1 indicates the highest quartile ranking; 4 indicates the lowest quartile ranking.
Rank	sequential numbers indicating ranked order of measure values; 1 indicates highest rank (largest number)
Running Sum	sum of the current measure value and all previous values in the same column
Tertile	similar to rank; comparison among all measures in a column divided into 3 groupings; 1 indicates the highest quartile ranking;3 indicates the lowest quartile ranking.
Top N	results displayed contain a user-defined (N) number of the highest values in the results returned from the database; all other values are eliminated from the results.
Top N Percent	results displayed contain a user-defined (N) percent of the highest values in the results returned from the database; all other values are eliminated from the results.

Formatting Your Query for Measure Calculations

Many of the MetaCube measure calculations require that you provide a column where MetaCube for Excel displays the results of its calculation.

Typically, you want your report to display the actual value or values returned for a given measure as well as the result of the measure calculation (ranking, change, percentage, etc.). In this case, you specify the following:

- One or more columns to display the actual data.
- One or more columns to display the results of the measure calculation(s).

Brand	Units Sold	Ranking
Alden	4,437	4
Barton	3,238	6
Delmore	4,335	5
Extreme	1,082	9
Lasertech	2,770	7
NVD	6,507	2
Onetron	2,164	8
Suresound	6,012	3
Techno Components	8,985	1

Figure 5-9 *Report ranking sales of products by brand*

This report, from the demonstration database, displays, in the first column, actual unit sales by brand and, in the second column, the ranking—from 1 to 9—of those brand sales.

To recreate this report: Access the Query Wizard and follow the steps below.

To complete Step 1:

1. Expand the Sales Transactions data source icon.
2. Drag the *Units Sold* measure icon to the Measures box in the wizard page.
3. Expand the *Product* dimension icon, then drag the *Brand* attribute icon to the Rows box.

4. To specify the measure calculation:
   a. Drag another *Units Sold* measure icon to the Measures box.
   b. Right-click the second *Units Sold* icon, then click **Define Calculation** in the popup menu.
   c. In the **Measure Calculation** dialog box, click the Rank measure calculation in the list, then click **OK**.
5. Rename the icon created by specifying the measure calculation:
   a. Right-click the new icon that represents the measure calculation, then click **Edit Definition** on the popup menu.
   b. In the Label for Reports box of the **Query Measure Definition** dialog box, type: Ranking. This text appears as the heading for the column that contains the calculated Rank values.

Note: *Information on editing definitions is contained in the section* *"Editing Measure Calculation Definitions" on page 5-35*.

To complete Step 2:

- Delete any filter icon displayed in the Selected Filters text box.

To complete Step 3:

1. Save the query, if you wish. Provide a name for the query and indicate the folder in which to store it.
2. Format the output as a report.
3. Run the query.

Only one measure calculation may be specified in a single column of a report. Each measure calculation you wish to include in a report must be entered as a separate item in the query.

Absolute and Percent Change

Absolute Change Calculation

Absolute change calculations show the numeric difference between two values. The measure calculation that computes this difference is **Absolute Change**. By default, in the resulting report, positive numbers are unsigned; negative numbers are signed.

Percent Change Calculations

MetaCube for Excel can report the percent change between two columns of data. The measure calculation that computes this change is **Pct Change**. This calculation is the result of dividing the numeric difference by the previous value, expressed as a percent.

A slightly different percentage calculation, **Pct of Previous**, is the result of dividing the current value by the previous value, expressed as a percent.

East Coast Cities	Boston	New York			
Brand	Units Sold	Units Sold	Abs Change	Pct Change	Pct of Prev
Alden	716	717	1	0.14%	100.14%
Barton	529	518	-11	-2.08%	97.92%
Delmore	706	718	12	1.70%	101.70%
Extreme	187	158	-29	-15.51%	84.49%
Lasertech	461	436	-25	-5.42%	94.58%
NVD	1,137	1,020	-117	-10.29%	89.71%
Onetron	362	360	-2	-0.55%	99.45%
Suresound	1,020	1,040	20	1.96%	101.96%
Techno Components	1,503	1,424	-79	-5.26%	94.74%

Figure 5-10 *Report illustrating change calculations that compare measure data*

The report above illustrates the three measure calculations that compare the data values in two columns.

The first two columns show the returned data: sales of brands in Boston and New York. The third column shows the difference in sales between the two cities. The percent figure in the fourth column, **Pct Change**, shows the difference in sales between the two cities, stated as a percentage. The percent figure in the last column, **Pct of Prev**, shows the change as a percentage of the previous value.

Ranking Data

MetaCube for Excel's ranking features compare values within a single column of data rather than between two columns. When MetaCube for Excel ranks values, it assigns 1 to the largest or highest value within a column, 2 to the second largest value, and so forth. Conversely, **Bottom Rank** assigns 1 to the lowest or smallest value in a column.

MetaCube for Excel's ranking features include:

- Rank.
- Bottom Rank.
- Quantiles, Quartiles, and Tertiles.

Note: *The Rank measure calculation ranks all data returned from the data warehouse. If you wish to eliminate some data, apply the Top N or Bottom N measure calculation to the query.*

Region	West		Northeast	
Brand	**Units Sold**	**Ranking**	**Units Sold**	**Ranking**
Alden	115	4	70	5
Barton	76	6	54	6
Delmore	107	5	85	4
Extreme	29	9	14	9
Lasertach	72	7	44	7
NVD	159	2	115	2
Onetron	47	8	36	8
Suresound	140	3	105	3
Techno Components	221	1	158	1

Figure 5-11 *Sales report showing rankings by brand for the two regions*

For each column of data in this report, which shows current week sales by region, MetaCube for Excel adds a column to display the results of the ranking calculation, as shown in the report above.

Unlike comparison calculations, which require at least two columns of data in order to be computed, ranking calculations can be applied to a single column of returned data.

Quantiles, Quartiles, and Tertiles

The quantile feature allows you to rank data into a number of user-defined ranking groups, or quantiles. Or, you can specifically rank data into quartiles (four ranking groups) or tertiles (three ranking groups). For example, you might wish to generate a report showing sales figures evenly divided into 10 ranked groups. In this case, MetaCube for Excel evaluates the sales data returned from the query and gives each value a ranking of 1 for the highest values and 10 for the lowest values.

Product Subclass	Units Sold	Sales Tertile	Ranking
CDROM Drives	1,410	1	4
Compact Disc Players	1,892	1	1
Graphic Equalizers	1,330	2	6
Hardware Boards	636	3	12
IBM Compatible PCs	1,299	2	7
Laser Disc Players	1,370	2	5
Mac Compatible PCs	888	3	11
Memory Chips	488	3	13
Speakers	1,286	3	9
Tape Decks	1,296	2	8
Television Sets	1,767	1	2
VHS Records	1,726	1	3
Video Rewinders	929	3	10

Figure 5-12 *Report showing ranking and tertiles of unit sales for the Northwest region*

To illustrate how MetaCube for Excel determines rankings, the report above, from the demonstration database, shows product subclass sales for a single region.

- The first column shows the actual sales data (number of units sold, by brand for the Northeast region).
- The second column shows sales ranked by tertile.
- The third column shows sales ranked from highest (1) to lowest (13).

To assign the tertile rankings in this report, MetaCube for Excel first ranked the unit sales values (as shown in the third column, above), then divided the highest rank number (13, in the case of the report above) by the number 3. The result determined the number of values to assign to the same tertile group. Therefore, in the report above, sales ranked from 1 to 4 were placed in the first tertile, sales ranked from 5 to 8 were placed in the second tertile, and sales ranked from 9 to 13 were placed in the third tertile.

This same methodology is used for quartiles and quantiles of any number.

As with rank and bottom rank, a report needs to contain only a single column of data in order to be ranked by tertiles, quartiles, or quantiles.

For quantiles, the number of groups is determined by a value you set when you select the Quantile ranking option. For example, setting a quantile value of 10 divides data into 10 groupings; setting a quantile value of 100 divides data into percentiles. MetaCube for Excel automatically displays the **Quantile Editor** dialog box after you have selected the Quantile ranking option.

To specify the number of quantiles:

- In the **Quantile Editor** dialog box, type the number of quantiles you wish MetaCube to use to rank the data returned in your report. The default value is 5.

Top/Bottom N Rankings

You can apply the Top N and Bottom N measure calculations in your query to cause the return of a certain number of rows ("N" rows) meeting one of the following criteria:

- The highest measures in the result set.
- The lowest measures in the result set.
- The top N percent of the result set.
- The bottom N percent of the result set.

City	Audio Units Sold
Boston	250
New York	223
Oakland	219
Palo Alto	229
San Francisco	356
Sudbury	131

Figure 5-13 *Audio sales by city*

The results above were generated from the MetaCube demonstration database. They show sales of audio equipment for all cities for the last two weeks. The results shown in the report were achieved by filtering for audio equipment sales only.

City	Top 3 Units Sold
Boston	250
Palo Alto	229
San Francisco	356

Figure 5-14 *Top 3 cities for unit sales: using Top N measure calculation*

By comparison, the results shown here list the top three cities for audio sales. Using the Top N measure calculation, the results display the three cities where sales of audio products were the best.

To recreate the report shown in Figure 5-14: Access the **Query Wizard** from the **MetaCube** menu, then follow the steps below.

To complete Step 1:

1. Drag the *Units Sold* icon to the Measures box in the wizard page.

2. Apply the Top N measure calculation:
   a. Right-click the *Units Sold* icon.
   b. Click **Define Calculation**.
   c. Click Top N in the **Measure Calculation** dialog box, then click **OK**.
   d. In the **Top N Editor** dialog box, verify that the Number of Records is 3. Use the spin arrows, if necessary, to display the correct number; then click **OK**.

      Notice that the icon is changed in appearance and that the name is also changed. This name replaces the Units Sold heading in the report.
3. Expand the *Geography* dimension icon, then drag the *City* icon to the Rows box in the wizard page.

To complete Step 2:

1. Delete any filter icons displayed in the Selected Filters text box.
2. Expand the Public Filters folder.
3. Drag the **Audio Only** filter to the Selected Filters box.
4. Drag the **Last 2 wks** filter to the Selected Filters box.

To complete Step 3:

1. Save the query, if you wish. Supply a name and select the folder where it should be saved.
2. Format the output as a report, then run the query.

Using the MetaCube demonstration database, the report shown in Figure 5-15 on page 5-30 below is created by applying the Top N measure calculation in a query retrieving net profit for sales of audio, computer, and video products, by city. The number of records set in the **Top N Editor** (3) results in a report showing the top three cities.

Product Class	Video	Computer	Audio
City	Top 3 Net Profits	Top 3 Net Profits	Top 3 Net Profits
San Francisco	$7,303.00	$19,676.00	$3,785.00
Palo Alto	$6,289.00	$10,647.00	$2,400.00
Oakland	$5,257.00	$11,672.00	$2,210.00

Figure 5-15 *Three most profitable cities by product class: Top/Bottom N feature applied*

In these results, the first column, showing net profit for Video products, shows the top three cities to be Oakland, Palo Alto, and San Francisco. However, the second and third columns cannot display the top three cities for Computer and Audio products; rather, they simply display data associated with the three top cities for Video sales. The Top N measure calculation can only take into consideration the first column.

Page 1: Video		Page 2: Computer		Page 3: Audio	
City	Top 3 Net Profits	City	Top 3 Net Profits	City	Top 3 Net Profits
San Francisco	$7,303.00	San Francisco	$19,676.00	San Francisco	$3,785.00
Palo Alto	$6,289.00	Palo Alto	$10,647.00	Palo Alto	$2,400.00
Oakland	$5,257.00	Oakland	$11,672.00	Boston	$2,565.00

Figure 5-16 *Pages of product class report*

However, if you organize this query to display the product classes by page, MetaCube for Excel can process each page separately and the resulting 3-page report shows the top three cities for each class of product on a separate worksheet. Notice that, although Oakland was among the three top cities for sales of video and computer equipment, Boston replaced it as one of the three top cities for sales of audio equipment.

Running Sum

Running sum measure calculation totals, for each row in a column, the current value and all values in previous rows within that column.

Region	Northeast	
Product Subclass	**Units Sold**	**Running Sum**
CDROM Drives	66	66
Compact Disc Players	69	135
Graphic Equalizers	48	183
Hardware Boards	28	211
IBM Compatible PCs‘	42	253
Laser Disc Players	49	302
Mac Compatible PCs	35	337
Memory Chips	22	359
Speakers	73	432
Tape Decks	66	498
Television Sets	74	572
VHS Recorders	76	648
Video Rewinders	33	681

Figure 5-17 *Running total report*

In the example above, MetaCube for Excel displays running sum values in a column adjacent to the column on which the calculation was performed. Running sum calculations can be specified for one or more columns of data.

More Percentage Comparisons

MetaCube for Excel provides a number of percentage calculations that allow you to compare individual values in a column of data with

- the total of the column that contains the value
- the total of a page (in a multi-page report) that contains the value
- the total of the entire report
- the total of the row of which the current column value is a member
- subtotals in a break report

and display the comparisons as percentages.

Comparing Data with Report Subtotals and Totals

Using the **Pct Of Total** measure calculation, MetaCube for Excel compares individual values in a column with the total of the column itself.

Using the **Pct Of Subtotal** measure calculation, MetaCube for Excel compares individual values in a column to the subtotals in a break report. The report itself does not need to display the subtotals for the percentage calculation to be run.

Company	Brand	Gross Revenue	Pct of Subtotal	Pct of Total
Electrotron Inc.	Delmore	$43,250.00	16.98%	3.40%
	Techno Components	$211,475.00	83.02%	16.64%
	Total	$254.725.00	100.00%	20.04%
Montel Technology	Alden	$607,700.00	81.51%	47.81%
	Barton	$137,820.00	18.49%	10.84%
	Total	$745,520.00	100.00%	58.66%
Soundbyte Inc.	Extreme	$75,250.00	27.80%	5.92%
	Lasertech	$80,150.00	29.61$	6.31%
	NVD	$45,440.00	16.79%	3.58%
	Onetron	$14,450.00	5.34%	1.14%
	Suresound	$55,410.00	20.47%	4.36%
	Total	$270,700.00	100.00%	21.30%
Grand Total		$1,270,945.00	300.00%	100.00%

Figure 5-18 *Percent of totals report*

This example, from the demonstration database, illustrates the use of **Pct of Subtotal** and **Pct of Total** calculations.

- The Gross Revenue column shows, in each row, gross revenues by brand, subtotaled by company.
- The Pct of Subtotal column shows, for each row, the percentage of the each company subtotal.
- The Pct of Total column shows, for each row, the percentage of the column total.

The **Pct Of Page Total** and **Pct Of Grand Total** calculations function similarly, calculating percentages based on an entire page of a multi-page report and for all returned values in an entire report, respectively.

Percent of Row/Column

The **Pct Of Row/Column** calculation compares a single value in a column with values contained in the row of which it is a member. If measure data has been oriented to row, this measure calculation does the opposite; it compares a single value in a row with values contained in the column of which it is a member.

	Northeast		West		Grand Total
Brand	Gr Revenue	Pct of Cur Row	Gr Revenue	Pct of Cur Row	Gross Revenue
Alden	$224,280.00	36.91%	$383,420.00	63.09%	$607,700.00
Barton	$51,800.00	37.59%	$86,020.00	62.41%	$137,820.00
Delmore	$19,300.00	44.62%	$23,950.00	55.38%	$43,250.00
Extreme	$24,500.00	32.56%	$50,750.00	67.44%	$75,250.00
Lasertech	$30,150.00	37.62%	$50,000.00	62.38%	$80,150.00
NVD	$18,610.00	40.96%	$26,830.00	59.04%	$45,440.00
Onetron	$6,675.00	46.19%	$7,775.00	53.81%	$14,450.00
Suresound	$23,250.00	41.96%	$32,160.00	58.04%	$55,410.00
Techno Components	$87,305.00	41.28%	$124,170.00	58.72%	$211,475.00

Figure 5-19 *Percent of row/column report*

This example shows sales revenue data for the two regions—Northeast and West—with grand totals for each brand.

In each row of this report, the Gross Revenue columns show sales revenues for a single brand, itemized by region. The Grand Total column displays total revenues for each brand.

For each individual revenue figure shown at the intersection of a region column and a brand name row, an adjacent column, labeled Pct of Current Row, shows a percentage of total revenues for the brand that is the result of dividing the individual revenue figure by the Grand Total of revenues for that brand.

Moving Comparisons

Moving sums and averages are calculated on a user-defined set of data values. This set of data always includes the current value plus some number of previous periods. For example, defining a set of 4 samples for a moving calculation includes the current value and the values of 3 previous periods.

Fiscal Week	Units Sold	Avg Units Sold
96/12/31 - 97/01/06	1,770	
97/01/07 - 97/01/13	1,649	1,710
97/01/14 - 97/01/20	1,480	1,565
97/01/21 - 97/01/27	1,357	1,419
97/01/28 - 97/02/03	1,311	1,334
97/02/04 - 97/02/10	1,286	1,299
97/02/11 - 97/02/17	1,317	1,302
97/02/18 - 97/02/24	1,280	1,299
97/02/25 - 97/03/03	1,533	1,407
97/03/04 - 97/03/10	1,884	1,709
97/03/11 - 97/03/17	2,029	1,957
97/03/18 - 97/03/24	1,845	1,937
97/03/25 - 97/03/31	1,647	1,745

Figure 5-20 *Moving average report*

The results above contain a moving average calculation based on two periods. That is, the value used for each moving average calculation is the average of the current value and the previous value. The report displays the following:

- Actual weekly sales in the first column.
- The moving average calculation in the second column.

The moving averages column displays the average of this week's and last week's sales, thereby partially smoothing the peaks and valleys of the sales figures.

The moving sum calculation works in a similar way by totaling the current value and some number of previous values.

Editing Measure Calculation Definitions

To change a measure calculation definition:

1. Click **Manage Queries** on the **MetaCube** menu.
2. Right-click the icon that represents the query using the measure calculation you wish to modify.
3. In the popup menu, click **Edit**.
4. In the **Query Editor** dialog box, right-click the icon representing the measure calculation, then click **Edit Calculation** in the popup menu.
5. To remove a measure calculation, use one of two ways:
   - To remove the measure calculation but retain the original measure:
     a. Right-click the measure calculation icon, then click **Edit Calculation** in the popup menu.
     b. Click the Normal option in the **Measure Calculation** dialog box. This removes the measure calculation and causes MetaCube for Excel to display actual data values for that measure.
   - To remove the measure calculation completely:
     - Right-click the measure calculation icon, then click **Delete** in the popup menu.

Row/Column Orientation for Measure Data

By default, MetaCube for Excel displays measure data in columns when displaying the results of a query. To improve the readability of the Excel worksheet, you can change the orientation of measure data to display in rows.

City	Units Sold	Gross Revenue	Pct Margin	Net Profit
Boston	6,621	$5,109,365.00	8.89%	454,350.00
New York	6,391	$5,087,440.00	8.80%	$447,719.00
Oakland	6,634	$5,116,380.00	8.88%	$454,124.00
Palo Alto	6,648	$5,211,240.00	8,90%	$464,046.00
San Francisco	9,931	$8,074,045.00	8.81%	$710,973.00
Sudbury	3,305	$2,560,375.00	8.85%	$226,485.00

Figure 5-21 *Results display measure data in columns*

In this orientation, all data for each city are displayed in the cells of a single row. When the measure data orientation is changed to row, the display looks like the following figure.

	City	
Boston	Units Sold	6,621
	Gross Revenue	$5,109,365.00
	Percent Margin	8.89%
	Net Profit	$454,350.00
New York	Units Sold	6,391
	Gross Revenue	$5,087,440.00
	Percent Margin	8.80%
	Net Profit	$447,419.00
Oakland	Units Sold	6,634
	Gross Revenue	$5,116,380.00
	Percent Margin	8.88%
	Net Profit	$454,124.00
Palo Alto	Units Sold	6,648
	Gross Revenue	$5,211,240.00
	Percent Margin	8.90%
	Net Profit	$464,046.00
San Francisco	Units Sold	9,931
	Gross Revenue	$8,074,045.00
	Percent Margin	8.81%
	Net Profit	$710,973.00
Sudbury	Units Sold	3,305
	Gross Revenue	$2,560,375.00
	Percent Margin	8.85%
	Net Profit	$226,485.00

Figure 5-22 *Results display measure data in rows*

Pivoting measure data by changing the orientation from column to row, or vice versa, has no effect on actual data values. It simply alters the format of the worksheet.

To change the orientation of measure data:

1. Click the measure icon whose display orientation you wish to change. The icon must have been dragged to the Measure box.
2. Point to **Item Orientation** in the popup menu, then click the orientation you wish to apply (either **Row** or **Column**).

When you specify row or column orientation for a single measure in a query, all measures are pivoted to change the display of the data.

Formatting Numeric Data

MetaCube for Excel provides default formats for numeric data displayed in the Excel worksheet. However, you can specify your own format for any numeric data whose icon has been dragged to the Measures box of the Query Wizard or the Query Editor.

To access the Format dialog box:

1. Right click the icon in the Measures box that represents the numeric data you wish to format.
2. Click **Format** in the popup menu.

This displays the **Format** dialog box, where you specify the exact format you wish MetaCube for Excel to use when displaying data.

The MetaCube for Excel data formats are described in Appendix B.

Chapter

6

Other Features

This chapter discusses the following features of MetaCube for Excel:

- Running queries in background.
- Estimating results, known as sampling.
- Administering snap-ins for MetaCube for Excel.
- Viewing system messages.
- Editing attribute and measure definitions.

Running Queries in Background

Once you have specified a query and submitted it for execution, the MetaCube analysis engine generates database commands in SQL to retrieve the results. MetaCube for Excel allows you to run the query directly or to submit the query for background processing. Background processing (called QueryBack) allows you to submit long-running queries to the server, thereby freeing your PC to perform other tasks. You may also schedule query jobs to run at a pre-determined time so that results will be available when you need them.

To submit a query to QueryBack, MetaCube's server-side processing agent, your administrator must have granted you background processing privileges for the data warehouse. Conversely, your data warehouse administrator may have specified that you must use QueryBack for all your queries.

As a separate software component, QueryBack is not available in all systems. Check with your data warehouse administrator to find out whether you can use MetaCube's QueryBack capability and what your QueryBack permissions are.

Running Queries in Real Time

When executing a query, the MetaCube analysis engine issues SQL commands to the server for immediate execution. While these commands process on the server, your computer waits for the result set to be returned. You can run a query by doing one of the following:

- Using either Report Wizard or PivotTable Wizard to execute a stored query.
- Using Query Wizard to specify a query from scratch and then execute and (optionally) save it.

MetaCube for Excel automatically displays the results in an Excel worksheet.

Slow Query Warning

For each query, MetaCube analyzes the database to identify the optimal tables from which to retrieve the result. However, queries requesting detail-level data may require the MetaCube analysis engine to access very large tables, causing slower performance than for queries requesting summarized data. The MetaCube analysis engine anticipates possible slow performance and displays the Slow Query Warning.

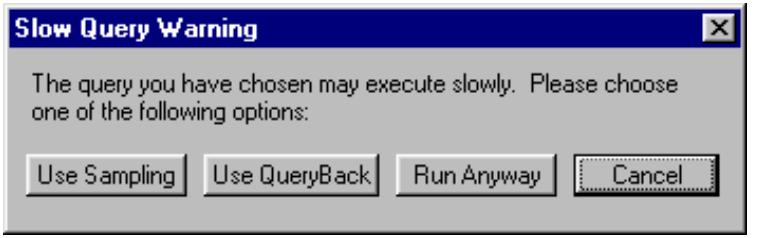

Figure 6-1 *Slow Query Warning*

If you receive a **Slow Query Warning**, you can:

- Use MetaCube for Excel's Sampling feature to run the query against smaller tables to obtain results more quickly. For information about the Estimate Results feature, see the section "Sampling" on page 6-9.
- Submit the query to the server for background processing (QueryBack)

- Ignore the warning and run the query anyway
- Cancel the query. You might decide to redefine the query so that it runs faster.

MetaCube for Excel is configured to display the Slow Query Warning when the cost of running the query exceeds a given configured value.

To change the Slow Query Warning value: Reconfigure the copy of MetaCube for Excel running on your PC; see Appendix A in this guide for information. Your data warehouse administrator can help you determine what number to set as a threshold for your Slow Query Warning.

QueryBack

If you submit a query to the server using QueryBack, MetaCube's server-side agents do the following:

- Schedules the query for execution.
- Stores the SQL commands on the server until they are scheduled to execute.
- Executes the commands on the server as a background process.
- Stores the result set in a database table on the server.

Sending Queries to QueryBack

Using QueryBack after receiving a Slow Query Warning is one way to submit a query to QueryBack. You may also use MetaCube for Excel's QueryBack option when you first run a query.

To submit a query to QueryBack: Click **Submit to QueryBack** on the **MetaCube** menu. MetaCube for Excel opens the QueryBack Wizard. This two-step wizard allows you to specify the query to run and all the QueryBack options.

To complete Step 1:

- Click the icon of the query you wish to run in QueryBack.

To complete Step 2:

1. Click the button that specifies how frequently you wish the QueryBack job to run.

   To run the query only once, click the **No periodicity, run once** button.

   OR

   To run the query now and then run again at specified intervals in the future, click the appropriate button for:

   - Daily—run every day.
   - Weekly—run every week.
   - Monthly—run every month.
   - Yearly—run every year.

   MetaCube for Excel will resubmit the query at the same time for the time interval you select.

2. Select the priority you wish to assign your background job.

   A query's priority determines the precedence your query takes over other queries in the queue issued by users with similar privileges. Your data warehouse administrator manages QueryBack privileges, granting users privileges that affect the order in which queries run. As a user, you can set a priority for your query. The highest priority you can assign your QueryBack job is 5; the lowest is 1.

Note: *QueryBack processing only occurs on the server where the MetaCube server-side components are installed. These components are not installed on a PC; therefore, QueryBack does not function when using the Microsoft Access version of the MetaCube demonstration database.*

3. Schedule the time at which the job should run.

   To run the job now, click the **As Soon As Possible** button.

   OR

   To schedule the job for a specific time in the future:

   a. Click the **Choose Time** button, then click the **...** button.

   b. In the **Choose Time** dialog box, you can set the year, month, day, and time that a QueryBack job should run. Use the spin arrows in the list boxes to set the values you wish for these fields. Then, click **OK**.

4. To submit the job to QueryBack, click the **Finish** button.

Status of QueryBack Jobs

To view the progress of your QueryBack job:

- Click **QueryBack Status** on the **MetaCube** menu.

The **QueryBack Status** dialog box provides information about your QueryBack jobs.

- The graphic indicates the current status of the QueryBack job:

Symbol	Meaning
	Job is pending. It is in the queue on the server, awaiting execution.
	Job is running.
	Job has completed without error. You may now retrieve the results as either an Excel spreadsheet or PivotTable.
	Job status is unknown.
	Job encountered an error while running. You may obtain further information by clicking the **Info** button.

- The **Job Name** field identifies the name of the query submitted for background processing. The name in this field matches the name of the query you submitted for background processing.
- The **Target Start** field indicates the time at which you submitted the job to QueryBack.
- The **Start Time** field indicates when the job actually executed on the server. A job may not run as soon as it is submitted because other jobs are in the queue ahead of it, because of the scheduler process is not running, or for other reasons.
- The **Stop Time** field indicates when the job completed on the server. When the job has completed successfully, you can access the results of your query.

Refresh button: While open, the **QueryBack Status** dialog box does not automatically update its contents to reflect changes in the status of QueryBack jobs. Click this button to update the display.

Report button: When a job is shown as completed without error, you may retrieve the data into an Excel Report by clicking this button.

PivotTable button: When a job is shown as completed without error, you may retrieve the data into an Excel PivotTable by clicking this button.

Info button: The **QueryBack Job Info** dialog box displays information for a specific job.

The **QueryBack Job Info** dialog box consists of nine informational fields. For pending queries, the **Start Time** and **Stop Time** fields are blank, since pending queries are waiting to execute. For jobs that did not complete because of an error, information in the Errors box will help you determine the problem.

Delete button: Click this button to flag the QueryBack job for deletion from the queue. MetaCube server-side processes actually delete the query from the queue and free the space allocated for that query's results on the server.

Sampling

MetaCube for Excel's sampling feature allows you to attain improvements in retrieval time for queries to very large data warehouses. Running against large database tables can cause queries to run slowly. During retrieval of information from any database, performance is directly related to the number of rows that are processed.

The MetaCube sampling feature provides an alternative solution for querying large database tables in your data warehouse. Smaller tables, called sample tables, can be used instead. By running queries against these tables, which are randomly generated from the larger tables, you can obtain highly accurate results while maintaining good performance.

Sample Tables

After setting sampling parameters and enabling MetaCube for Excel's sampling feature, you can query small subsets (known as sample tables) of very large data warehouse tables and obtain results that are statistically accurate.

Your data warehouse administrator can create one or more sample tables for your data warehouse. Using a MetaCube software component called the Sampling Agent, your data warehouse administrator could specify, for example, a sample table containing 10,000 records, to be randomly created from an original table containing 100,000,000 records. Clearly, querying against the 10,000-row sample table would result in noticeable performance improvement because you are running queries against a much smaller table.

With MetaCube for Excel's sampling feature enabled, you can query smaller sample tables, indicating the degree of accuracy you need, and obtain results many times faster than you might otherwise be able to do.

Getting Results Faster

In order to use MetaCube for Excel's Sampling feature, you need to:

- Set the **Sampling Accuracy** value in MetaCube for Excel's preferences to some value less than 100. If the Sampling Accuracy setting is 100, the MetaCube analysis engine does not use sample tables when retrieving data.
- Enable sampling on the **MetaCube** menu. Even if you have set Sampling Accuracy properly, querying from sample tables does not occur automatically if the feature is not toggled on. However, with sampling toggled off, the Slow Query Warning provides the option to execute the query against sample tables if you have previously set the **Sampling Accuracy** value to <100.

The Sampling Accuracy setting is related to the relative accuracy of the results of your queries against the sample tables.Your data warehouse administrator may have created more than one sample table. In this case, your accuracy selection tells the MetaCube analysis engine which sample table to query. If you set the accuracy level low, at, say, 1, the MetaCube analysis engine will run the query against the smallest sample table available. The benefit to you is that query performance is very good; results will be returned fast.

On the other hand, if you set the Sampling Accuracy to 99, the MetaCube analysis engine will run the query against the largest sample table available (not the original table, however).

The exact effect of a given Sampling Accuracy setting depends upon the number of sample tables available against which MetaCube can choose to run the query. By setting Sample Accuracy somewhere within the range of 1 to 99, you are giving guidelines to MetaCube about the tradeoff between performance and accuracy that you want for your reports.

Enabling Sampling

Configuring MetaCube for Excel for Sampling

To configure MetaCube for Excel to execute estimated results queries:

1. Click **Preferences** on the **MetaCube** menu.
2. In the **Preferences** dialog box, click the **Excel** tab.
3. Using the slider, set the **Sampling Accuracy** value to less than 100 for your sampling queries.

Toggling Sampling On/Off

After configuring MetaCube for Excel for sampling, activate the sampling feature.

To enable sampling:

- Click **Use Sampling** on the **MetaCube** menu.

When **Use Sampling** is checked on the **MetaCube** menu, sampling is enabled. To toggle sampling off, do the step above; when **Use Sampling** is not checked on the **MetaCube** menu, sampling is disabled.

Note: *The MetaCube demonstration database contains sample tables and you can set up MetaCube for Excel to run queries that estimate results. However, because the demonstration database is so small, you cannot really observe noticeable improvements in performance since even complex queries run very quickly.*

System Messages

A System Message is posted by your database administrator to communicate to you and other users the current status of the database. For example, the administrator can write System Messages informing users when the latest data has been loaded into the data warehouse, or when the database will be unavailable.

Viewing System Messages

To view the System Messages dialog box:

- Click **View System Messages** on the **MetaCube** menu.

Each message is dated, so you can recognize the most recent information. The first line of the message displays next to the date.

To view a long message:

- Click the date for the message you wish to view. The text of the message displays in the informational text box in the lower section of the dialog box.

Editing Attribute and Measure Definitions

You may change the default names of any of the attributes or measures displayed in MetaCube for Excel. These names were provided as defaults by your data warehouse administrator. If you wish to display names in your report that are more meaningful to you, you can do so. In the MetaCube demonstration database, for example, you might like to change the *Units Sold* measure name to read *Sales*.

When you change the name of an attribute or measure, the new name is saved if you save the query.

You can also redefine the internal specification for an attribute or measure. However, this capability is for special use only and you should not do this unless you are a programmer who is customizing the MetaCube for Excel application.

To change the name of an attribute or measure:

1. In the Query Wizard or the Query Editor, right-click the name you wish to change. The name must be displayed in one of the boxes.
2. Click **Edit Definition** in the popup menu. If you are redefining an attribute, MetaCube for Excel displays the **Query Attribute Definition** dialog box; if you are redefining a measure, MetaCube for Excel displays the **Query Measure Definition** dialog box. These dialog boxes contain two text fields:
   - **Label for Reports**: Used to enter the new name. The name appears in the Query Wizard or Query Editor and also in the results displayed in the Excel worksheet.
   - MetaCube **Definition**: This text box is for special use by a programmer who is customizing MetaCube for Excel. Changes made here affect how the software for MetaCube for Excel works.

   Warning: *Do not change MetaCube definitions displayed in this text box unless you are a programmer customizing MetaCube for Excel.*
3. To rename an attribute or a measure, type the new name for the attribute or measure in the Label for Reports box, then click **OK**.

MetaCube for Excel Snap-Ins

You may “snap in” extensions that provide additional analytical functions for MetaCube for Excel. MetaCube Snap-In extensions can extend the capabilities of the software to meet specific decision support requirements.

A Snap-In is written to MetaCube’s application programming interface (API) and the file itself is identified by the filename extension .mcx.

To snap in a new analytical tool for MetaCube for Excel:

1. Click **Administer Snap-Ins** on the **MetaCube** menu.
2. In the MetaCube **Snap-Ins** dialog box, click the snap-in you wish to activate. If you do not see it in the list box, use the **Browse** button to locate the file with the .mcx filename extension. After you have installed a Snap-In, MetaCube for Excel displays a description of it in the MetaCube **Snap-Ins** dialog box.

After you install a MetaCube for Excel Snap-In, it is available to use immediately. Refer to the section “Using a MetaCube Extension” on page 6-14 for information on using MetaCube Snap-Ins in a query.

To disable a snap-in module:

1. Click **Administer Snap-Ins** on the **MetaCube** menu.
2. In the MetaCube **Snap-Ins** dialog box, click the snap-in you wish to disable, then click the **Delete** button. The extensions that are contained in the Snap-In are no longer available.

Using a MetaCube Extension

Each MetaCube Snap-In may contain one or more calculations, known as extensions, that you can apply to a measure. To incorporate a MetaCube extension into a query, you must enter a definition of the extension you wish to apply using the **Query Measure Definition** dialog box.

To apply a MetaCube Extension to a Query:

1. Click **Query Wizard** on the **MetaCube** menu.
2. Specify the query that you wish to execute, dragging all attributes and measures to the appropriate boxes on the Wizard page.
3. Drag the measure to which you wish to apply the extension to the Measures box on the Wizard page, then right-click the measure name.
4. Click **Edit Definition** in the popup menu.
5. In the **Query Measure Definition** dialog box, change the text in the MetaCube Definition box to conform to this syntax:

   ```
   extension_name(measure_name,[argument1][,argument2][...])
   ```

   where:

   - *extension_name* is the name of the extension (measure calculation) you wish to apply to the measure.
   - *measure_name* is the name of the measure. This name appears in the MetaCube Definition text box when you first open the **Query Measure Definition** dialog box. If you were applying an extension to the *Units Sold* measure, using the Sales Transactions data source in the MetaCube demonstration database, for example, the name of the measure is: Measures.Sales Transactions.Units Sold.
   - *argument1*, *argument2*,... are the required arguments for the function. Arguments are separated by commas.

   To formulate this definition, you must obtain the name of the extension and its arguments from the C++ programmer who developed the Snap-In.
6. Click **OK**.

As with MetaCube measure calculations, the results of the extension's calculations display in the column or row to which the extension was applied.

Appendix

A

Configuring MetaCube for Excel

This appendix explains all of the options available for configuring MetaCube for Excel.

Preferences Dialog Box

To configure MetaCube for Excel,

- Click **Preferences** on the **MetaCube** menu.

Use the **Preferences** dialog box to set default values for:

- ODBC connection information.
- Slow query warning threshold.
- Maximum rows to retrieve from the data warehouse.
- Accuracy setting for sampling.

Many of the Preference options may have been set for you by your data warehouse administrator. You may decide to change some of these options after using MetaCube for Excel for awhile. If you wish to change Preference options, consult with your data warehouse administrator before making changes.

MetaCube saves the preferences you define in the metacube.ini file, stored in your Windows directory. This file also stores connection information and controls features that do not appear as fields in MetaCube for Excel's **Preferences** dialog box. For example, the metacube.ini file stores a default login name, so that, after you have connected once to a particular data source, you need not enter your login ID again.

Configurations Tab

Under this tab, information about connecting from MetaCube for Excel to the data warehouse is registered. Your data warehouse administrator may have entered one or more configurations for the version of MetaCube for Excel that runs on your PC. If so, the names of all configurations created for you are listed in the text box on the left side of the **Configurations** tab.

To select the configuration to use when accessing a data warehouse:

1. Click the configuration name.
2. Click **OK.**

To delete a connection configuration name:

1. Click the name of the configuration to delete
2. Click the **Delete** button.

If the **Configuration** tab text box is empty, you need to specify a named configuration set before you can use MetaCube for Excel. Your data warehouse administrator can provide the information required.

To specify a new connection configuration:

1. Click the **New** button in the **Configurations** tab. MetaCube for Excel provides a default name, NewConfiguration, in the text box and provides a set of fields for you to complete in order to define the configuration parameters. You can rename the configuration in the Name field.

2. Provide information for the following fields:

Name: Used to name this set of configuration parameters; it can be any name, although matching this name with the name of the ODBC data source to which you are connecting may provide logical, meaningful names for configurations.

Schema: Used to specify the schema / owner of the metadata tables in the database. For Informix databases, which support table owners, this value indicates the name of the user who owns the metadata tables, followed by a dot (.). In ANSI-standard SQL, the dot separates the name of the table owner from the table name.

For databases that do not support table owners, such as Microsoft Access, this value is a prefix common to all the MetaCube metadata table names. The prefix is not followed by a dot. Depending on your company's naming conventions, this value may end with an underscore character. In the MetaCube demonstration database, a Microsoft Access database, the MetaCube schema owns all metadata tables and the value for this field is "metacube_".

DSS System: Used to indicate the name of the DSS System to access upon connection with the database. To connect to the MetaCube demonstration database, enter "MetaCube Demo" in this field. Use the arrow button to display names of all available DSS Systems.

Database Type: This value should be either Informix Dynamic Server or Microsoft Access, the two database types to which MetaCube connects. MetaCube provides only limited support for Microsoft Access; therefore, your database type should be Informix Dynamic Server.

Data Source: Used to specify the name of the ODBC User Data Source defined using the ODBC administrator. If the name here and the ODBC User Data Source name are not spelled the same, no connection can be made. The ODBC data source name is not case sensitive. Use the arrow button to display names of all existing ODBC User Data Source configurations. For information on configuring ODBC User Data Sources, refer to the *MetaCube Installation and Configuration Guide*.

DSS Cache File: obsolete; do not use.

Database Parameters frame:

Use PDQ Priority: used to set queries submitted by MetaCube for Excel as PDQ queries. The Informix Online PDQ (Parallel Database Query) feature allows Online to manage resources when processing both OLTP and decision support transactions. If you enable PDQ processing by checking the box, you can set the priority value to a value between 1 (LOW) and 100 (HIGH). (If the number is zero (0), PDQ processing is OFF.) The default value for PDQ Priority is 1. For information on PDQ query processing, refer to the Informix Online documentation.

Data Skip: used to turn on the Informix Data Skip feature that allows a query to complete even when data stored on unavailable fragments cannot be retrieved. The effect of turning on Data Skip is to allow all SELECT statements to complete; however, operations that write to the database do not complete. When Data Skip is On, all unavailable fragments are skipped when a query is processed.

You can set the Data Skip option in the following ways:

- On—enables the Data Skip feature for MetaCube for Excel queries.
- Off—disables the Data Skip feature for MetaCube for Excel queries.
- Default—uses the Data Skip setting on the database server.

For information on data skipping, refer to the Informix Online documentation.

Excel Tab

This tab contains the following configuration options.:

Configuration option	What It Does
Slow Query Warning	Compared with the Cost field for the fact or aggregate table to be used for the query. If the Cost exceeds this number, MetaCube for Excel displays the Slow Query Warning.
Maximum Rows to Retrieve	0 means retrieve all rows; any other number limits the number of rows retrieved for a report to no more than that number.
Sampling Accuracy	Used by the MetaCube analysis engine when the Sampling feature is enabled. Affects which sample table is used for retrieving results.

Slow Query Warning

Before executing a query, MetaCube evaluates the performance cost of accessing the table needed to retrieve the results set. If a query accesses a large table, MetaCube may issue a **Slow Query Warning**, prompting you to:

- Use sample tables when running the query.
- Submit the query to QueryBack.
- Run the query anyway.
- Cancel the query.

You can set a threshold for this warning in the **Slow Query Warning** box. This value corresponds to the cost values your data warehouse administrator has assigned to tables in the data warehouse. The threshold allows you to specify when MetaCube for Excel should issue the warning. Before adjusting the **Slow Query Warning** value, you should consult your data warehouse administrator.

In the demonstration database, the **Slow Query Warning** value is set to 5000.

Maximum Rows to Retrieve

This option allows you to place a practical limit on the size of reports by limiting the number of rows MetaCube for Excel returns for all queries. In some cases, queries you formulate can result in reports which may take a long time to process and may be too long to be useful. If you wish to avoid generating overly-long reports, you can specify a maximum number of rows that any query can return, thereby placing a practical limit on the size of reports.

Sampling Accuracy

If Sampling Accuracy is set to 100, this effectively disables the Sampling feature. When Sampling Accuracy is set to 100, the MetaCube analysis engine does not use sample tables when retrieving results. When Sampling Accuracy is set to some number less than 100, the MetaCube analysis engine determines which of several sample tables to use for retrieving data from the data warehouse.

Appendix

B

Formats for Numeric Data

This appendix describes MetaCube for Excel's numeric data format options.

Your data warehouse administrator has defined default formatting for the display of numeric data in MetaCube for Excel worksheets. However, MetaCube for Excel offers many options for formatting numeric data and you can designate your own formats, if you wish. The formats you designate in MetaCube for Excel affect the display of data in reports; it is not related to the internal format of information stored in the data warehouse.

You can designate formats for:

- Numeric data retrieved from the data warehouse.
- Measure calculations you create.

Using the Format Dialog Box

The **Format** dialog box allows you to specify formats for numeric data.

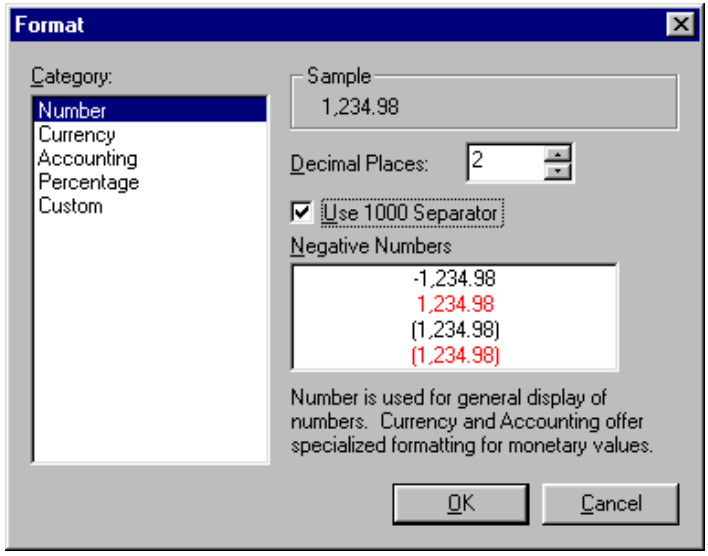

Figure B-1 *Format dialog box*

The main features of the **Format** dialog box are:

- **Category**: used to select one of the format categories of numeric data:
  - Number.
  - Currency.
  - Accounting.
  - Percentage.
  - Custom.

  When you select a format category, a short description of its use displays in the lower right-hand corner of the dialog box.
- **Sample**: displays a sample of the currently selected category. This informational text box is available for all format categories, except Custom.

- **Decimal Places**: used to select the number of digits to the right of the decimal point; spin arrows allow you to select the number using the mouse. This option is available for all format categories, except Custom.

Other formatting features are available depending on the category you select. The list below shows, for each category, the options you can set.

- **Number**:
  - **Use 1000 Separator**: used to specify comma separators in numeric data.
  - **Negative Numbers**: used to specify the way in which negative values should display; four options are available
- **Currency**:
  - **Use $**: used to specify a dollar sign ($) in the display of currency values
  - **Negative Numbers**: used to specify the way in which negative values should display; four options are available.
- **Accounting**:
  - **Use $**: used to specify a dollar sign ($) in the display of currency values.
- **Percentage**: none
- **Custom**: You can select other available custom formats or develop Custom Formats

Custom format specification options for MetaCube for Excel are very similar to those used in Microsoft Excel. If you select the Custom format category, you can select one of MetaCube for Excel's existing format specifications, or you can specify your own format.

Format specifications are structured in two sections, separated by a semi-colon (;). Each section specifies the display for positive and negative numeric data returned in MetaCube for Excel results. The general structure is shown below:

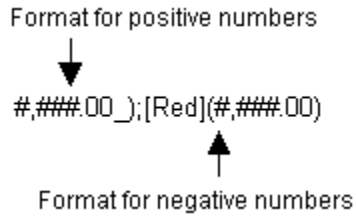

Figure B-2 *Format specification syntax*

Note: *Formats for numbers automatically display correctly for the regional setting configured on the PC. When using custom formats, specify the following characters using universal symbols, as shown in the table below:*

Universal Symbol	Meaning
, (comma)	1000 separator
. (period or dot)	decimal point
- (minus sign)	negative

These universal symbols are translated into the correct symbols for the regional setting in effect.

This table lists all the formatting options for custom format specifications and provides examples of the display of numeric data.

Format Specification	Example
0	1
0.00	1.23
#,##0	1,234
#,###0.00	1,234.56
#,##0_);(#,##0)	1,234; negative numbers as (1,234)
#,##0_);[Red](#,##0)	1,234; negative numbers in red as (1,234)
#,##0.00_);(#,##0.00)	1,234.56; negative numbers as (1,234.56)
#,##0.00_);[Red](#,##0.00)	1,234.56; negative numbers in red as (1,234.56)
$#,###0_);($#,##0)	$12,346; negative numbers as ($12,346)
$#,##0_);[Red]($#,##0)	$12,346; negative numbers in red as ($12,346)
$#,###0.00_);($#,##0.00)	$12,345.68; negative numbers as ($12,345.68)
$#,##0.00_)l[Red]($#,##0.00)	$12,345.68; negative numbers in red as ($12,345.68)
0%	1%
0.00%	1.23%
0.00E+00	1.23E+13
##0.0E+0	1.2E+13

The meanings of the symbols used in the format definitions are shown in the table.

Symbol	Meaning
#	Digit placeholder; displays a number
0 (zero)	Digit placeholder; displays a number. Displays 0 if no digit fills the place held by the 0. For example, the format #.00 displays the number 8.9 as 8.90.
$ - + / ( ) : space	Printing characters
, (comma)	Thousands separator; prints when surrounded by # or 0
. (period)	Decimal point. Used to display fractions as decimal values. Also used in time formats to display fractions of a second.
%	Percentage. The % symbol prints
_ (underscore)	Skips the width of the next character. For example, _) skips the width of the parenthesis character.
E- E+	Scientific notation format. Number of 0s to the right of the sign determines the exponent's number of digits. Plus sign (+) displays positive exponents with a + and negative exponents with a -.
[Red]	Displays characters in the cell in red

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