

Query Management Facility



# Introducing QMF

*Version 6*

**Note!**

Before using this information and the product it supports, be sure to read the general information under “Appendix. Notices” on page 39.

**Seventh Edition (December 1998)**

This edition applies to Query Management Facility, a feature of Version 6 of DB2 Universal Database Server for OS/390 (DB2 UDB for OS/390), 5645-DB2, and of Query Management Facility, a feature of Version 6 of DATABASE 2 Server for VM and VSE (DB2 for VM and VSE), 5648-A70, and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces and makes obsolete the previous edition, GC26-4713-05.

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## The QMF Library

You can order manuals either through an IBM representative or by calling 1-800-879-2755 in the United States or any of its territories.

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### Evaluating



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### Installing, planning for, administering, and diagnosing



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### Using



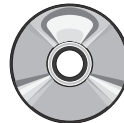
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### Application programming



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### Online libraries



## The QMF library

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## Chapter 1. Overview of QMF

IBM Query Management Facility (QMF) is a tightly integrated, powerful, and reliable tool that performs query and reporting for IBM's DB2 relational database Management System Family. It offers an easy-to-learn, interactive interface. Users with little or no data processing experience can easily retrieve, create, update, insert, or delete data that is stored in DB2.

QMF offers a total solution that includes accessing large amounts of data and sharing central repositories of queries and enterprise reports. It also allows you to implement tightly-controlled, distributed, or client/server solutions. In addition, you can use QMF to publish reports to the World Wide Web that you can view with your favorite web browser.

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### Data Access

Using QMF, users can access a wide variety of data sources, including operational or warehouse data from many platforms: DB2 for OS/390, MVS, VM, VSE, and Windows. Via IBM DataJoiner, you can access non-relational data, such as IMS and VSAM, as well as data from other vendor platforms.

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### Performance, Administration, and Control

Database administrators can use the QMF High Performance Option (HPO) feature as an all-in-one tool to:

- Control resource usage
- Manage QMF objects
- Track object usage
- Delete obsolete objects

An administrator can also compile queries and reports into COBOL programs for improved performance.

QMF makes your database information a valuable, well-managed part of your company's assets.

### QMF HPO

QMF HPO consists of three major components:

- QMF HPO/Manager
- QMF HPO/Compiler
- QMF for Windows

#### QMF HPO/Manager

The QMF HPO/Manager consists of a group of functions that improves governing and object management capabilities, including a preemptive governor to analyze QMF queries. The governing capabilities allow you to establish controls that protect production applications, while delivering "on demand" information. Many governing parameters are included. They include the following:

- Time of day
- Day of the week
- Maximum number of rows to fetch
- Allowing and disallowing SQL verbs and QMF commands
- Controlling resource consumption based on the use of QMF commands and SQL statements

### **QMF HPO/Compiler**

The QMF HPO/Compiler lets you convert queries and reports into efficient programs in OS/VS COBOL or COBOL II. This reduces:

- CPU consumption
- DB2 catalog contention
- DB2 Optimizer overhead
- Security concerns because converted programs use static Structured Query Language (SQL) in place of dynamic SQL

### **QMF for Windows**

For customers with DB2 databases of many sizes, QMF for Windows provides a Windows-based, point-and-click query tool.

With QMF for Windows, you can perform ad hoc queries or automate DB2 queries by using existing QMF queries and forms. You can also integrate the results into a favorite OLE 2.0 desktop application, such as a Lotus 1-2-3 or Microsoft Excel spreadsheet.

QMF for Windows includes a robust Windows-based API to automate database querying, updating, and report distribution tasks, so you can centralize control over resource consumption.

QMF for Windows also provides support for key functions such as the following:

- TCP/IP
- Static SQL
- Creating and editing QMF forms and procedures
- Full-screen table editor for updating enterprise data

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## **Application Development**

Application developers can use QMF to prototype and build applications rapidly. Application programmers who write programs that use QMF can easily measure the benefits. Benefits can include higher productivity, increased efficiency, and lower costs that can result in increased business opportunities.

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## **Ready for Year 2000**

QMF year 2000 capability is in place now. QMF's internal date process handles four-digit years. It is ready for the roll-over to the year 2000.



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## QMF Try and Buy

When you purchase and install DB2, you can choose to install QMF or QMF for Windows Version 6 for a trial period. For detailed information about installing and using a QMF trial version, see your DB2 program directory.



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## Chapter 2. What's New in QMF Version 6

QMF Version 6 provides new capabilities for the workstation environment and enhancements for the mainframe to help you access and present mission-critical data better than ever before.

QMF is now a feature of DB2 Version 6. The QMF version number has advanced from Version 3.3 to Version 6 to align with the level of DB2 for which it is now a feature.

---

### QMF Version 6 Enhancements

QMF Version 6 includes enhancements for end users, administrators, application developers, and the enterprise. New features and support include:

#### For users

- Euro currency symbol
- The user's current authorization ID displayed prominently on the new QMF home panel
- Enhanced SAVE command syntax. QMF now recognizes object name and type in context.
- A new global variable to set the default for the QMF scroll amount
- A new edit code to replace zeros with blanks (zero suppression) in a QMF report
- An additional edit code and associated global variable for currency formatting enabling two different currency symbols in the same report
- Table Editor support for column defaults in CHANGE mode
- The ERASE TABLE command can now be used to erase a database alias

#### For administrators and application developers

- Formal QMF administrative authority allowing administrators unrestricted ability to display, save, erase, import, and export QMF objects that are owned by any user
- A new confirmation panel that works with the DB2 V6 predictive governor. When a long-running query is detected, the user can choose in advance whether to run or cancel the query.
- The ISPF LIBDEF service that you can use to allocate QMF program libraries
- User-written edit codes using LE/370
- DB2 Universal Database Version 5
- DB2 Special Registers
- Consolidated installation and management information in a single book for each operating environment.

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## QMF HPO Version 6

QMF HPO/Complete is now simply called QMF HPO. It includes the QMF HPO/Manager, the QMF HPO/Compiler, and QMF for Windows as one comprehensive feature. When you get QMF HPO Version 6, you always receive all three components.

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## QMF for Windows Version 6 Enhancements

QMF for Windows V6 enhancements include support for:

### For users

- DB2 stored procedures
- Creating and running QMF linear procedures
- Command line parameters that allow you to easily automate start-up procedures and integration with other applications, such as Visual Warehouse
- Global variables that you can use in QMF for Windows procedures, forms, queries, and session variables
- QMF form calculations (requires 32-bit QMF for Windows and IBM Object REXX for Windows)
- Grouping of the most commonly used attributes of form components on a new form dialog for ease of use
- Control of formatting date and time values in your QMF reports
- Multiple formatted reports displayed on your desktop at the same time, while performing other application functions
- The ability to Import/Export data using the PC IXF format that allows you to use your QMF query results to create new DB2 tables or append to existing tables
- Ability for users to change their passwords from within QMF for Windows
- Ability for users to locate, run, create, and save reports from within Windows Explorer (32-bit only)

### For administrators

- DB2 V6 predictive governor that allows you to set QMF for Windows to block queries that exceed the thresholds set by the DB2 administrator
- Enhanced object tracking that allows you to view a detailed run history for all QMF objects so you can locate unused objects and spot potential problem areas
- Control over what tables and QMF objects are displayed when users view lists

### For the enterprise

- DB2 for OS/390 server load balancing
- Web publishing that allows you to convert a standard QMF form to an HTML output format
- Specialized form variables for HTML publishing that let you build advanced web features into your QMF report, such as hyperlink, e-mail link, and embedded images in reports (a report preview is also included)

- Custom edit codes that you can add to QMF (QMF for Windows supplies a sample user edit code routine that formats social security numbers, zip codes, and telephone numbers)
- Euro currency symbol
- Obtaining QMF for Windows Version 6 on CD

For more information about the QMF Family of integrated tools, go to the following QMF web site:

<http://www.ibm.com/qmf>

The information at this web site includes a QMF Family demo and a QMF for Windows try and buy.

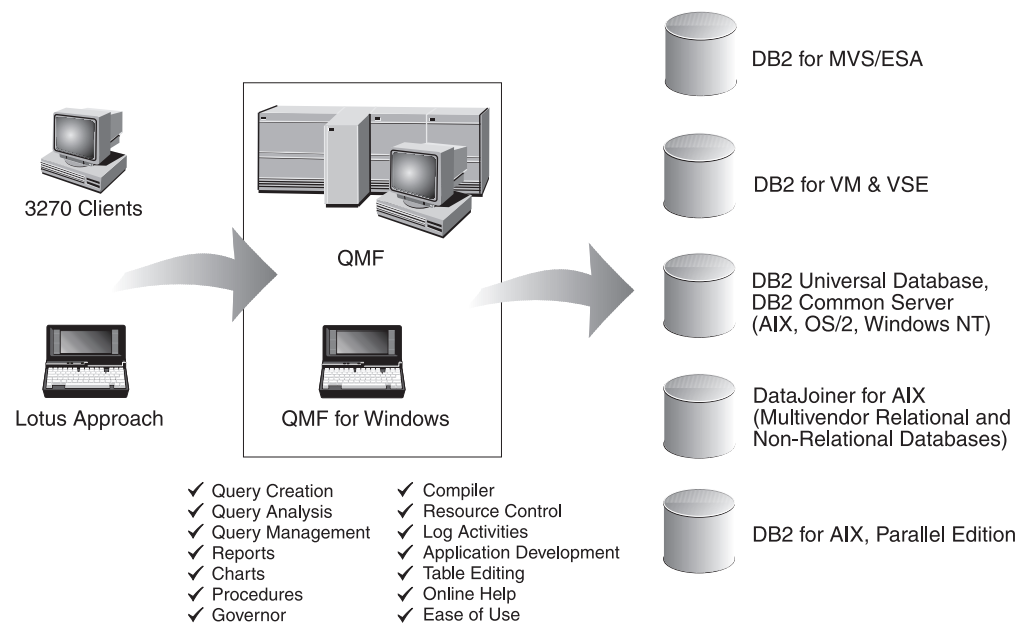


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## Chapter 3. QMF Gives You Broad Data Access

Your organization's relational databases contain a wealth of information. Decision makers, at every level of the organization, need the information from these databases to make important day-to-day decisions quickly.

Companies often spend a lot of time training employees in the practices of data management, security, and integrity. This costs time, money, and resources that are often in short supply. QMF's multi-platform options help you get the most out of your investment no matter where your data is stored. It doesn't matter whether your data is operational or informational (data warehouse or datamart).



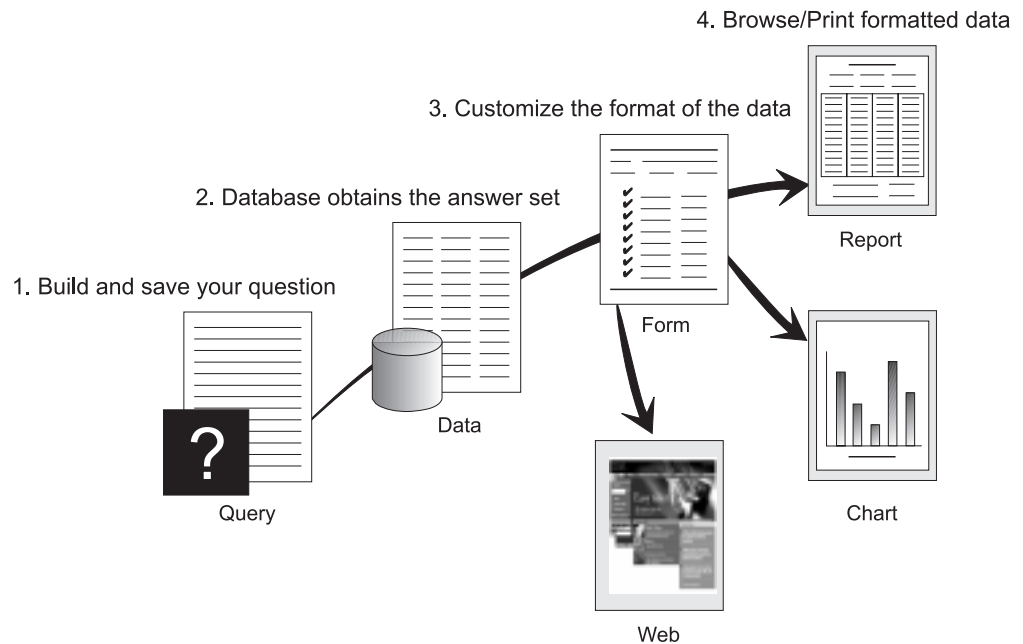




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## Chapter 4. QMF Provides Results in Four Easy Steps

QMF gets the data you need from a relational database and presents it in an effective report or chart. As shown in the illustration below, data access and presentation are as easy as 1–2–3 with QMF objects. After you format your data as desired, you can browse or print it.



(1) When you need information from your database, build and save your question in a QMF query. Your query acts as a request to the database to get specific information. (2) QMF sends the query to the database in structured query language (SQL), and the database creates the answer set. (3) QMF uses a default report format so you can see the results quickly. To see the data in a more tailored format, you can use various form specifications to customize your report. (4) You can then browse, print, chart, or export the formatted results. Or, you can include it in your own custom application.



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## Chapter 5. QMF Offers Different Query Styles

QMF offers three different query styles for users with different skill levels:

### Prompted Query

An easy-to-use query method that prompts you for the necessary information while building a query. The illustration below shows a partial QMF prompted query.

Prompted Query is designed for the beginner and occasional QMF user who wants to build a query but does not know SQL. You do not need to worry about getting syntax or table and column names exactly right. QMF guides you through the steps you need and checks to ensure that the statement you build is valid.

As you build prompted queries, you can use the Show SQL function key from the Prompted Query panel to see the equivalent of your prompted query in SQL. Show SQL is an easy way to learn SQL. In addition, you can build a prompted query and convert it to SQL with the QMF CONVERT command. After you convert a prompted query to SQL, you can choose to add additional SQL capabilities.

PROMPTED QUERY	MODIFIED LINE 1
Tables: Q.STAFF	Row Conditions
Columns: NAME DEPT JOB SALARY COMM	Begin a condition by selecting one column, or by entering an expression or function. 1 to 8 of 8
Row Conditions: > If...	* Q.STAFF 2. ID 3. NAME 4. DEPT 5. JOB 6. YEARS 7. SALARY 8. COMM
*** END ***	Expression (A+B, and so forth)...
	F1=Help F5=Describe F7=Backward F8=Forward F12=Cancel

### Structured Query Language (SQL)

A language that describes your requests for data in the database.

SQL statements consist of verbs and clauses that describe aspects of the data request in more detail. If you are already familiar with SQL, QMF makes it easy for you to issue SQL statements straight to the database by using the SQL Query panel. You can issue any dynamic SQL statement from the query panel. The DRAW command helps by displaying model or prototype SELECT, INSERT, or UPDATE queries. You can build on these queries if you do not know the exact syntax of an SQL statement.

The illustrations below show a simple and a more complex SQL query.

#### Simple SQL Query

```

SQL Query                                MODIFIED LINE 1

SELECT NAME, YEARS, SALARY
FROM Q.STAFF
ORDER BY NAME

```

### Complex SQL Query

```

SQL Query                                MODIFIED LINE 1

(SELECT ID, NAME, SALARY
FROM Q.STAFF
WHERE SALARY>12000
UNION ALL
SELECT ID, NAME, SALARY
FROM Q.STAFF
WHERE DEPT=38)
UNION
SELECT ID, NAME, SALARY
FROM Q.STAFF
WHERE JOB='SALES'

```

### Query-By-Example (QBE)

A graphical method to query, update, delete, or insert data. The illustration below represents Query-By-Example.

QBE minimizes your keystrokes and saves you time when entering a query. Start by using the DRAW command. QMF presents the table and the column names for you. Then, simply enter a single letter beneath each column to indicate the action you want to perform on that column.

Q.STAFF	ID	NAME	DEPT	JOB	YEARS	SALARY	COMM
	P.	P.			P. _Y	P. _S	
CONDITIONS							
_Y = 10 AND _S > 20000							



- Produce address labels, form letters, and complex, detailed reports

When you make changes to a form, you can see the results immediately on the report without having to fetch information from the database repeatedly.

You can toggle back and forth between the form and the report and make changes to the form until it is just the way you want. Then, you can save the form for future use or as a prototype for creating other reports. Just save a new report under a new name.

QMF's user interface is easy to understand and use for formatting a report. The following example shows a typical report form.

Entry areas **A** through **J** correspond to the entry areas on the FORM.MAIN panel in QMF. If all the columns in the form are not visible on the panel, you can scroll forward and backward to see the ones you want.

```

FORM.MAIN                                MODIFIED
COLUMNS:                                Total Width of Report Columns: 23 + (N X 15)
A                                     B C D E F
NUM  COLUMN HEADING                      USAGE  INDENT  WIDTH  EDIT  SEQ
-----
1  DEPT                                GROUP  2      6      L      1
2  JOB                                 ACROSS 2      5      C      2
3  SALARY                              SUM    2     11     D2     3

PAGE:   HEADING  ==> G
        FOOTING  ==> COMPANY NAME
FINAL:  TEXT     ==> H
BREAK1: NEW PAGE FOR BREAK? ==> NO
        FOOTING  ==> DEPT. &2 TOTALS I
BREAK2: NEW PAGE FOR BREAK? ==> NO
        FOOTING  ==>
OPTIONS: OUTLINE? ==> YES      DEFAULT BREAK TEXT? ==> NO J

1=Help    2=Check    3=End    4=Show    5=Chart    6=Query
7=Backward 8=Forward  9=      10=Insert 11=Delete 12=Report
OK, FORM.MAIN is displayed.
COMMAND ==> SCROLL ==> PAGE

```

**QMF forms let you easily create and customize reports.**

With these entry areas, you can do the following:

- A** Assign column headings
- B** Choose how to process columns
- C** Adjust indentation of columns
- D** Adjust width of columns
- E** Specify formatting of columns
- F** Change the sequence of columns
- G** Specify a heading and footing for the top and bottom of each page
- H** Specify the final text at the end of the report
- I** Enter footing text to use when the value in the control column changes
- J** Specify the formatting of repeated values within a control break

## Reports on the World Wide Web

You can specify HTML output for reports you create with QMF. This makes it possible to display your reports in an HTML V3.0 compatible web browser either in an intranet or on the World Wide Web. QMF adds an HTML header to your report and inserts the necessary HTML tags to display the report in its original QMF format in the web browser.

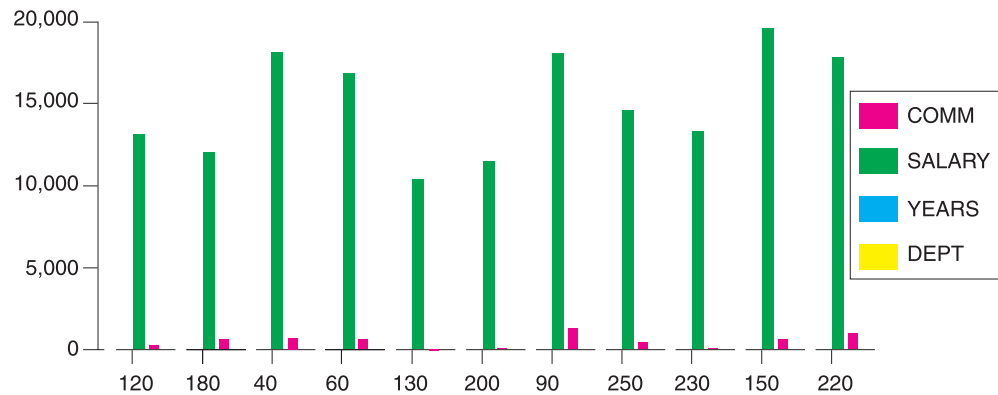
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### Charts for Success

Using QMF with IBM's Graphical Data Display Manager (GDDM) and GDDM's Interactive Chart Utility (ICU), you can choose from this wide variety of charts and graphs for presenting your data:

- Bar
- Pie
- Line
- Tower
- Polar
- Histogram
- Surface
- Scatter

Following is a sample of a chart that you can define and produce using QMF. ***QMF and GDDM ICU provide clear, precise charts.***







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## Chapter 7. QMF Extends its Power to Your Applications

QMF provides two interfaces, a command interface and a callable interface, that allow you to seamlessly integrate the powerful functions of QMF into your existing applications.

QMF offers you a high level of versatility in terms of integrating QMF with your applications. You can build sophisticated application suites by using the callable interface and a variety of supported programming languages.

---

### The Command Interface

QMF provides a command interface to integrate QMF functions into applications you develop. The QMF command interface allows you to use QMF services from an Interactive System Productivity Facility (ISPF) dialog.

Using the QMF command interface with ISPF, you can seamlessly integrate QMF functions within ISPF dialogs so users see only ISPF menus.

---

### The Callable Interface

The callable interface offers you the ability to integrate QMF functions by using different programming languages or ISPF. The languages you can use include COBOL, PL/I, REXX, C, RPG, and Assembler H.

---

### Using REXX in QMF

For more robust programming needs, use QMF with the simple yet versatile and powerful REXX programming language. QMF supports REXX in both the OS/390 and VM environments. REXX is an interpreted programming language that runs immediately without the need for compilation and is directly available from within QMF forms and procedures. Outside QMF, applications written in REXX can use QMF's query and report-writing function through the callable interface.

QMF does not need to be running when a REXX program is started. Through the callable interface, a REXX program can initiate a QMF session. By directing QMF commands to QMF for execution, a REXX program can run queries, create reports, export and import data, or start an interactive table editing session with QMF's Table Editor. A REXX program can end the QMF session and continue processing the information. Using the callable interface, you can also start an application while you are running QMF. Your application can run QMF commands, queries, or procedures and retrieve the results. For example, your application can generate a letter to each employee that is based on a combination of job type and years of service.

---

### Creating QMF Procedures

There are two ways to write QMF procedures to run a series of instructions. Linear procedures contain only QMF commands; procedures with logic use the full power of REXX within the QMF environment.

Following is an example of a QMF procedure that contains REXX statements.  
***It is easy to build a REXX procedure by using QMF!***

```
PROC          MODIFIED LINE 1

/* This procedure checks to see what day it is.  If it's
Monday, it runs a query and prints a report.  If it
isn't, a message is displayed informing the user.  */
signal on error
if date('w') = 'Monday' then
do
  "RUN QUERY MYQUERY (FORM = MYFORM"
  "PRINT REPORT"
  "MESSAGE (TEXT='OK, MONDAY report has been created and sent to printer.'"
end
else
do
  "MESSAGE (TEXT='Sorry, it is not Monday.  Report cannot be created.'"
end
exit 0 /*Exit without errors */
error:
  "MESSAGE (TEXT = '"dsq_message_text"'"
  exit 8 /*Exit with error condition*/
*** END ***
```

You can create procedures with logic that include any REXX command or function and make calls to the operating system or other available environments. In a procedure with logic, you can perform conditional logic, make calculations, or pass commands back to the host environment. You can even include both QMF and REXX variables, so you can change the behavior of your procedure without rewriting it. You just assign new values to the variables by using global variable values, by entering values from the RUN command when the procedure is started, or by prompting the user for input values using REXX Say and Pull statements.

The QMF procedure object helps you automate common tasks or tasks you perform frequently. A QMF procedure can contain many different QMF commands. You can run all of the commands in sequence by simply issuing the RUN PROC command.

Users can even be prompted for variable data while running a procedure to customize the results with very little effort.

Suppose that you need the same type of information or report each week. You can create and save a procedure that uses saved queries, forms, and procedures repeatedly. Or, you can substitute variables to make variations for different results.

The more queries, forms, and reports that you can automate in QMF, the more time you save.

To make things even easier and increase productivity, you can customize a function key to run a procedure with a keystroke.

QMF provides a special procedure that is called a system initialization procedure that allows you to run commands or define global variables when QMF starts up. This allows you to customize default values that QMF uses and run commands or other procedures automatically. You can include any QMF command in the system initialization procedure.

---

## Customizing QMF Commands and Function Keys

QMF supplies several aids that simplify application development. Within applications you develop using QMF, you can customize the QMF command set and function keys to suit the needs of your application users.

Because QMF stores user preferences in a profile for each user, you can customize commands and function keys for individual users.

QMF's powerful command synonym function allows you to rename QMF commands and even create your own installation-specific commands that suit your specific needs. You may have several different types of printers in your installation, and each time you need to print a report or chart, you need to specify the printer name, the length and width of the page, and other parameters that tell the printer what to do with the input. Using QMF, you can create a smart command synonym called PRINT that invokes the proper printing application and routes the output to the appropriate printer with the appropriate page size and parameters.

---

## Customizing Other QMF Functions

The ability to customize does not stop at commands and function keys. You can do the following:

- Change edit codes to format data
- Use the MESSAGE command to define a message that appears on a QMF object panel when your application ends
- Use ISPF, GDDM, or another panel manager to do the following:
  - Create application panels that run complex queries and produce customized reports
  - Create panels that prompt the user for necessary information, such as date and type of report wanted, so that a user with very limited knowledge of QMF can easily use QMF's query and report writing facilities
  - Create panels to provide your application with online help that is similar to the help that is provided by QMF

QMF provides a default governor exit routine that limits processor use for a query, as well as the number of rows that are returned from the database. You can replace this default governor exit routine with your own customized routines to control resource utilization or gather QMF usage information. You can use the QMF HPO/Manager feature for a sophisticated system that includes the following:

- An object manager and governor to track and control QMF session activity
- An online monitor that tracks QMF activities in real time
- A query analyzer
- A preemptive governor

---

## Using Variables in Queries and Forms

Variables allow you to produce a variety of reports with the same form. A query can also use variables to retrieve or change different data each time the same query is run.

A variable is a symbolic name that represents values in a query, form, or procedure. QMF offers two types of variables: *Substitution variables* and *global variables*. You can use both types of variables in queries, forms, and both types of procedures.

Substitution variables keep their values only for the duration of a command; global variables keep their values for the duration of a QMF session.

---

## Chapter 8. QMF's Table Editor Makes Database Updates Easy

Using the QMF interactive Table Editor, you can easily search the database for information and add or update data in the database. The Table Editor has three modes: SEARCH, ADD, or CHANGE.

The Table Editor enables quick searching, adding, deleting, and updating of rows in any accessible table without requiring you to write a unique application. The Table Editor also supports default column values when a default is available. The following is a representative panel.

***The QMF Table Editor lets you make database changes easily.***

```
ADD                                USERID.PERS
                                     1 to 7 of 7
ACCTNO. . . . . (_15002_)
COMPANY . . . . . (_S & J Supply Co._____)
STREET. . . . . (_948 C Street_____)
CITY. . . . . (_Boston_____)
STATE . . . . . (_MA_)
ZIP . . . . . (_06000_)
NOTES . . . . . (_-_____)>
```

Editing data is as easy as typing over the values on the Table Editor panel. Confirmation panels help ensure security and integrity by prompting the user before making updates final. For extra security, you can also use column-level authorization to control exactly which columns of a table a user can view or change.

In QMF for Windows, you can edit a table at a database server by making changes to cells displayed in query results. QMF for Windows determines the table to edit from the SQL text for the query. You can update the results of most queries that you can run with QMF for Windows.



---

## Chapter 9. QMF Provides User Profiles and Online Help

QMF allows you to do the following:

- Personalize both your QMF profile and your system initialization procedure
- Display online help

---

### Personalizing Your QMF Profile and Your System Initialization Procedure

As a QMF user, you can personalize your own QMF profile with individual preferences for working with QMF. For example, you can choose whether you want QMF to convert all input to uppercase letters, and you can specify which language, SQL, QBE, or PROMPTED, you want to use. You can also specify a printer name with print parameters for printing reports and charts. You can change the preferences in your profile as often as you want.

In addition to the QMF profile, QMF provides a system initialization procedure to allow system administrators to set QMF global variables and run QMF commands at start up. You can override the global settings that are defined in this procedure at any time.

---

### Using Help

The online help provided from any QMF panel provides information to support every aspect of QMF.

From the main help menu, you can choose topics such as *What's New*, *Learning about QMF*, *QMF Commands*, and much more. There is no need for lengthy and expensive training. A new user can simply use *Learning about QMF* as a training tool to get up and running quickly, or as a reference at any time during a QMF session.

QMF also provides messages and help for SQL codes. The help for these messages includes both an explanation of the message and a recommended user response.





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## Chapter 10. QMF Provides Performance and Administration Features

To keep your ad hoc query and reporting environment running smoothly, QMF supports your performance management needs and provides features that help you manage and control your QMF query environment.

QMF's governor exit controls the number of rows returned from the database and, in the TSO and CMS environments, the amount of processor time a query can use.

The QMF High Performance Option (HPO) for OS/390 feature builds on QMF's performance and QMF control capabilities. QMF HPO includes these three components:

- QMF HPO/Manager
- QMF HPO/Compiler
- QMF for Windows

QMF for Windows manages your queries from the Windows environment, while QMF HPO/Manager controls queries from the QMF host environment. Together they provide comprehensive governing over QMF tasks submitted in OS/390 and Windows environments.

---

### QMF HPO/Manager

QMF HPO/Manager is a family of utilities for managing and administering QMF. The QMF HPO/Manager comprises these integrated components:

- Governor Module
- Activity Log
- Online Facilities

#### **Governor Module**

Completely replaces the QMF sample governor and is the direct interface into QMF processing for the QMF HPO/Manager. This enhanced governor module is more than a QMF governor because it services the following facilities:

#### **Object Manager**

Tracks QMF session activity. It records information about the commands and objects and writes this information directly to the Activity Log.

Have you ever wanted to know which QMF queries refer to a specific column name before you drop that column from the table? Or, which QMF queries refer to a specific table before you alter that table? Now you can produce lists of QMF objects that are based on the content of the object. Object Manager has a new list filter that allows you to locate queries that contain references to specific table names, column names, SQL verbs, and so on. Object Manager supports the migration and copying of objects from and to QMF Version 6. Specifically, it recognizes and handles the new columns in the OBJECT\_DIRECTORY appropriately.

All Q.PROFILES environment values are supported, including CICS/MVS and CICS/VSE and CMS.

### Governor

Controls QMF session activity. It obtains thresholds and controls from resource groups in the same way as the QMF sample governor, but provides a much wider and more flexible set of controls. These controls enforce proper use of resources in QMF sessions.

### Monitor

Supplies a real-time user interface to QMF session activity information. It accepts administrator commands and passes them to the Governor Module.

### Query Analyzer

Provides preemptive governing capabilities. It traps queries before DB2 processes them, and estimates their resource consumption. Query Analyzer can cancel queries that it judges to be too intensive.

### Activity Log

Provides a repository for QMF session activity and QMF object usage information. The Governor Module writes directly to the Activity Log data sets. You must run a batch job periodically to copy the Activity Log data sets to the Activity Log tables. You can use the Activity Log JCL function to create the JCL to run this batch job.

### Online Facilities

Help organize and simplify the administration and management of QMF HPO. You can review and manipulate QMF objects by using the Object Manager online facilities. Two types of actions are supported: Those that operate on one object and those that can operate on a set of objects.

The QMF HPO/Manager helps you isolate production applications from query and reporting activities. A session activity list (shown below) gives administrators essential facts about database activity, the number of rows that are fetched, and processor time consumption.

### QMF HPO/Manager puts you in control.

```
DB2A -- Session Activity List -----ROW 1 TO 5 OF 5
COMMAND ===>                                SCROLL ==> CSR
RAAM018I--monitor data refreshed
Valid Actions Are...
B  Browse SQL Text
C  Cancel Current Action
rows that are fetched
TSOID : VNRSTRW
Mode  : ONLINE

```

A	Date	Time	Act	Owner	QMF Object	Object	Rows	CPU	C	S
									A	Q
									N	L
-										
	96/09/02	07:47:52	BEG				0		0	
	96/09/02	07:47:52	RUN	VNRSTRW	MODELING		0			
	96/09/02	07:48:01	***	VNRSTRW	MODELING		100	00 00 00 23	0	Y
	96/09/02	07:48:01	***	VNRSTRW	MODELING		1733	00 00 03 69	0	
	96/09/02	07:48:01	***	VNRSTRW	MODELING		3330	00:00:07:20	0	

```
***** BOTTOM OF DATA *****
```

Using the QMF HPO/Manager session activity list, QMF administrators can easily browse the SQL text associated with a query or cancel an active QMF command with database activity.

---

## QMF HPO/Compiler

QMF HPO/Compiler is a family of system utilities for generating, preparing, and running report programs for QMF. The QMF HPO/Compiler feature:

- Reduces resource contention by optimizing resource-intensive queries, forms, and procedures.
- Converts dynamic SQL to static SQL, which helps reduce DB2 catalog contention and DB2 optimization overhead. The compiled applications run faster and more efficiently, lowering your production costs.
- Converts queries, reports, and procedures into efficient OS/VS COBOL and VS COBOL II programs, generating structured, stand-alone, documented source code that is easy to modify and portable to other platforms. Using a COBOL precompiler, you can run the program on a personal workstation for use with DB2 Common Server or other OS/2-based database management systems.

The QMF HPO/Compiler contains these integrated components:

- Program Generator
- End User Facility

### Program Generator

Used by programmers to convert QMF reports (queries, forms, and procedures) into compiled programs. In addition, this facility can automatically register report programs with the End User Facility.

CICS programs are completely pseudo-conversational. They appear to the user as a continuous conversation, but actually consist of multiple tasks. As with TSO programs, you can generate two types of CICS programs:

- Display programs
- Print programs

### End User Facility

Used by end users to run the compiled report programs. When programs are generated and prepared for running, they are automatically registered with the End User Facility. After programs are registered, the nontechnical user interface makes it easy to list, locate, and process reports.

After selecting a report, the end user is prompted to supply any run-time variable values. If the report is to run in batch mode, JCL is automatically generated and optionally submitted. Otherwise, the interactive report is run online in the appropriate environment, TSO or CICS.

---

## QMF for Windows

QMF for Windows is a component of QMF HPO. You can also order it as a QMF feature for OS/390, VM, or VSE, or as a direct feature of DB2 for OS/390.

### QMF for Windows Benefits

QMF for Windows provides benefits for the user, the developer, the database administrator, and the enterprise.

**For users**

- Point-and-click your way to robust business reports
- Publish reports to the Web
- Automate tasks with QMF procedures
- Integrate data with favorite Windows applications, such as spreadsheets and analysis tools
- Launch QMF for Windows from within Lotus 1-2-3 and Microsoft Excel
- Query multiple database servers simultaneously
- Export data easily to desktop databases
- Use query results to create DB2 tables
- Create new or edit DB2 data directly in the Table Editor
- Share reports, queries, and forms among all the QMF end-user platforms: Windows, OS/390, MVS, VM, or VSE
- Experience outstanding data throughput and reliability at your Windows desktop

**For administrators**

- Maintain comprehensive governing control over database resource consumption and user actions
- Automatically limit runaway queries, database updates, access to specific database servers, rows fetched, and much more
- Schedule governing limits by user group and time of day / day of week
- Maintain existing DB2 security and authorizations
- Connect users to multiple DB2 database platforms without database gateways, middleware, or ODBC drivers
- Access heterogeneous data through IBM's DataJoiner
- Get up and running in minutes with native support for TCP/IP connectivity in DB2 Version 5 or later
- Extend advanced database techniques like static SQL and uncommitted read to Windows
- Reduce TSO, CMS, and CICS host logons
- Give users the flexibility of supporting their other favorite Windows tools
- Use the QMF for Windows API to leverage desktop development tools (such as application macros, Visual Basic, Powerbuilder, and more)
- Rapidly build robust custom applications - Easily place QMF capabilities, commands, and host QMF objects in the hands of Windows-based users
- Add additional users any time through server-based licensing

**For the enterprise**

- Year 2000 ready
- Quickly extend QMF investment to new user environments
- Establish an enterprise-wide standard for operational reporting with a multi-platform product family
- Provide controlled, enterprise-wide access to DB2 S/390 and DB2 UDB workstation platforms (and many other enterprise databases when using IBM's DataJoiner)

- Distribute mission-critical DB2 capabilities to desktops throughout the enterprise - Leverage high-performance DRDA architecture that supports:
- Centralized administration and control
  - Local or remote 16- and 32-bit Windows clients
  - Large-scale report publishing to Web servers
  - TCP/IP or SNA environments for DB2 S/390 and DB2 UDB workstation database platforms



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## Chapter 11. QMF Accommodates Your International Business Needs

QMF can accommodate business needs distributed all over the world. There are 14 languages from which you can choose (see the map below). The number of national languages you can select depends on the platform under which you are running QMF. Each language is a separately-orderable feature called a National Language Feature, or NLF. An NLF enables users to enter QMF commands, view help and other information, and perform QMF tasks in a language other than English.

For applications that call QMF running from an NLF session, bilingual forms and bilingual commands are supported. This allows wider portability of forms and applications among the QMF national languages.

In a QMF NLF session, you can choose to save or export a form in either the language of the current QMF session or in English. A QMF session running in another national language can import a form that was saved in English. QMF translates the form into the presiding language of that session. QMF supports the double-byte character set.

Regardless of the presiding NLF language, you can issue QMF commands in English by setting the QMF command language global variable. This global variable acts as a switch that lets you issue commands either in the presiding language of the QMF session that you are running or in English.

***QMF takes you around the world!***







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## Chapter 12. Product Specifications

The following are minimum requirements for supporting QMF and its family of products. For further information, please contact your IBM representative or the IBM Support Service Center (toll-free) at 1-800-237-5511 in the United States or any of its territories.

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### Prerequisite Knowledge

The *Using QMF* book contains basic QMF information. You should understand the concepts in that guide before you use QMF. *Using QMF* contains the steps necessary to get started with QMF and the descriptions of how to use SQL queries. It also contains detailed scenarios that show how to build queries and forms step by step. In addition, it contains detailed information about Query-By-Example.

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### Machine Requirements

Server hardware requirements are the same as those required to run DB2 PE, DB2 Common Server, DataJoiner, or DB2 UDB.

Workstation hardware requirements are the same as those needed to run the Windows software as described in "Software Requirements".

QMF for Windows for DB2 workstation databases requires approximately 10MB of free disk space on each Windows workstation, and about the same memory as needed by a typical Windows suite application.

### DASD or Tape

QMF can access all storage devices that the operating system and DB2 or SQL/DS supports.

### Data Communications Devices

QMF can display on all terminals that GDDM supports.

### Virtual Storage Considerations

Storage requirements vary depending on the operating environment. See the *QMF Licensed Program Specifications*, or consult your IBM representative for hardware and software requirements.

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### Software Requirements

Prerequisite products for supporting QMF vary by operating system. Your IBM representative can help you determine if you have the correct hardware and software to support QMF and related IBM products.

QMF for Windows runs on:

- Microsoft Windows 3.1

- Microsoft Windows for Workgroups 3.1 or 3.11
- Microsoft Windows 95 or Windows 98
- Microsoft Windows NT
- WIN-OS/2 environment under OS/2

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## Operating Environment for QMF HPO Features

The QMF HPO/Compiler for MVS runs only under TSO/ISPF, but generates programs that run under TSO/ISPF, batch, or CICS.

The QMF HPO/Manager for MVS runs only under TSO/ISPF (with the exception of the enhanced Governor Module supplied with the feature, which runs under TSO/ISPF, batch, or CICS). See your IBM representative for specific recommendations on using QMF HPO/Manager.

The 16-bit version of QMF for Windows runs in Microsoft's Windows 3.1 and Windows for Workgroups 3.1 or 3.11. The 32-bit version of QMF for Windows runs in Microsoft's Windows 95, Windows 98, and Windows NT 3.51 or 4.0.

The 16-bit version can run as a Win-OS/2 application under OS/2 Warp when communications options are installed. QMF for Windows 16-bit and 32-bit versions can connect from the Windows environments via TCP/IP to versions of DB2 that support native TCP/IP connectivity, such as DB2 V5 and the DB2 Universal Database family. For versions of DB2 that do not provide native support for TCP/IP, additional SNA connectivity software products are required. See *Getting Started with QMF for Windows* for more information about the QMF for Windows operating system and its connectivity requirements.

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## Products Required for Supporting Remote Unit of Work

Remote unit of work support is not available in all environments in which QMF operates. Contact your IBM representative for information about whether your current environment supports remote unit of work.

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## Chapter 13. Customer Service and Technical Support

Central service for QMF and its features is provided through the IBM Support Service Center. The toll-free numbers are 1-800-237-5511 and 1-800-IBM-4YOU in the United States or any of its territories.



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Query Management Facility  
Introducing QMF  
Version 6

Publication No. GC26-9576-00

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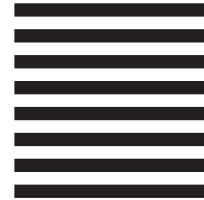
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