

Query Management Facility™



# Introducing QMF

*Version 7 Release 2*



Query Management Facility™



# Introducing QMF

*Version 7 Release 2*

**Note!**

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

**Third Edition (April 2002)**

This edition applies to Query Management Facility, a feature of Version 7 Release 1 of DB2 Universal Database Server for OS/390 (DB2 UDB for OS/390), 5675-DB2 , and of Query Management Facility, a feature of Version 7 Release 1 of DATABASE 2 Server for VM and VSE (DB2 for VM and VSE), 5697-F42, and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces and makes obsolete the previous edition, GC27-0714-01.

© **Copyright International Business Machines Corporation 1983, 2002. All rights reserved.**

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

---

# Contents

The QMF library. . . . .	v	Chapter 8. QMF's Table Editor Makes Database Updates Easy . . . . .	23
Chapter 1. Overview of QMF . . . . .	1	Chapter 9. QMF Provides User Profiles and Online Help. . . . .	25
Chapter 2. What's New in QMF Version 7 Release 2 . . . . .	5	Chapter 10. QMF Provides Performance and Administration Features. . . . .	27
Chapter 3. QMF Gives You Broad Data Access. . . . .	9	Chapter 11. QMF Accommodates Your International Business Needs . . . . .	33
Chapter 4. QMF Provides Results in Four Easy Steps . . . . .	11	Chapter 12. Product Specifications . . . . .	35
Chapter 5. QMF Offers Different Query Styles . . . . .	13	Chapter 13. Customer Service and Technical Support . . . . .	37
Chapter 6. QMF Creates Reports and Charts to Fit Many Business Needs . . . . .	15	Appendix. Notices . . . . .	39
Chapter 7. QMF Extends its Power to Your Applications . . . . .	19		



---

## 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.

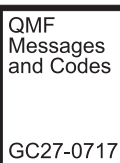
---

### Evaluating



---

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



---

### Using



---

### Application programming



---

### Online libraries







---

## 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 Internet that you can view with your favorite web browser.

As companies have taken advantage of the productivity benefits offered through QMF, they have identified the need for performance management tools within the QMF environment. QMF HPO for OS/390® and z/OS™ is provided to enhance performance management and to facilitate the administration of QMF. This set of integrated performance tools consists of three features: QMF HPO/Manager, QMF HPO/Compiler and QMF for Windows.

With QMF for Windows you can reuse existing QMF host objects (queries, forms and procedures) or create new objects from the Windows environment. You can also integrate query results with a variety of Windows desktop tools, such as spreadsheets and desktop databases.

QMF runs on the OS/390 and z/OS, VM®, and VSE™ platforms. QMF for Windows runs on Microsoft® Windows® 95, 98, ME, NT, XP, and 2000.

---

### Data access

Users can access a wide variety of data sources with QMF, including operational or warehouse data from many platforms: DB2 for OS/390 and z/OS, 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.

---

## 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
- Compile queries and reports into COBOL programs for improved performance

QMF HPO 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:

- Scheduling by time of day or day of week
- Fetching the maximum number of rows
- 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 varied 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 Windows OLE 2 desktop tool, such as a Lotus<sup>®</sup> 1-2-3<sup>®</sup>@server or Microsoft<sup>®</sup> Excel<sup>®</sup> 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

---

## **Application development**

Application developers can use QMF or QMF for Windows to prototype and build applications rapidly. Benefits can include higher productivity, increased efficiency, and lower costs.

---

## **QMF for Windows try and buy**

When you purchase and install DB2, you can choose to install QMF for Windows Version 7.2 for a trial period. QMF for Windows can be downloaded as a 60-day try and buy from the QMF web site: [www.ibm.com/qmf](http://www.ibm.com/qmf).



---

## Chapter 2. What's New in QMF Version 7 Release 2

QMF Version 7.2 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.

Beginning with Version 6 and continuing with Version 7.2, QMF, QMF HPO, and QMF for Windows are features of DB2 on the z/OS platforms.

---

### QMF Version 7.2 Enhancements

QMF Version 7.2 includes enhancements for data distributed data across the enterprise, for DB2 feature integration, and for ease of use. New features and support include:

#### End user enhancements

- The QMF LIST TABLES command has been enhanced to work with authority groups defined by DB2 secondary authorization IDs.
- The QMF Installation User Exit Facility, DSQUOPTS, has been added so that QMF users can override default values for global variables DSQEC\_SHARE and DSQEC\_DISABLEADM.
- The QMF CONNECT command now provides uniform support of DB2 for OS/390 USERID and PASSWORD across three QMF platforms: VM, VSE, OS/390 and z/OS.
- Users are now prompted before discarding modifications in QUERY, PROC, FORM, and PROFILE objects. This is based on the new global variables (see Administrator Enhancements below). If changes are in danger of being discarded, the user is prompted for confirmation.
- Support has been added for several new DB2 UDB for OS/390 and z/OS Version 7.1 SQLCODES.

#### Administrator enhancements

- New global variables DSQAO\_QMFADM and DSQEC\_DISABLEADM have been added to aid QMF Administrator in status checking and function disabling.
- New global variables DSQEC\_PROTECT\_QUERY, DSQEC\_PROTECT\_PROC, and DSQEC\_PROTECT\_ENABLE have been added to provide protection for modifications in QUERY, PROC, FORM, and PROFILE objects.
- DB2 for OS/390 and z/OS installations can benefit from the introduction and formalization of a new QMF user exit library,

QMF720.SDSQEXIT. The QMF user exit library can be used to store the user modified version of DSQUOPTS, local user time and date exits, QMF edit codes, and QMF callable interface programs.

- IBM License Manager (ILM) for QMF Version 7.2 on OS/390 has been enabled. The applicability of this support is dependent upon the availability of the z/OS IBM License Manager component.
- QMF on VM, VSE and z/OS can now connect to DB2 for Linux/390 as an application server.
- A new job has been added to OS/390 and to VM to create or recreate all QMF Views on any supported DB2 database. This will also create the appropriate QMF List Views to enable DB2 secondary authorization IDs.

### **Application enabling**

- The SET GLOBAL command has been expanded to allow PROCEDURE author to set the value of a global variable to the value of another global variable.
- A new @IF REXX function has been added to FORM.CALC, FORM.CONDITIONS, and FORM.COLUMNS definitions to provide an extended ability to conditionally alter the display of data and improved NULL, Overflow, and Undefined processing. This spreadsheet-like function provides QMF report authors with extended control over report output that is based on input values.

### **Publications**

The three *Installing and Managing QMF* manuals (OS/390, VM, and VSE) have been combined into one book. The installing parts remain separate by platform in the front of the book, while the managing parts in the second half of the book have been merged.

---

## **New member of the QMF Version 7.2 family**

QMF Spatial Viewer is the new member of QMF Version 7.2

### **QMF Spatial Viewer**

QMF Spatial Viewer provides an interface to DB2 Spatial Extender whereby QMF for Windows allows the user to see the results of a query using ESRI's imbedded ArcMap technology. Geographic Information Systems (GIS) data stored in DB2 Spatial Extender Version 7.2 EE or EEE can now be accessed directly from QMF for Windows to see the data with map overlays corresponding to each query.

---

## **QMF HPO Version 7.2**

QMF HPO Version 7.2 enhancements include:

- Enhanced tracking of QMF objects to support very large numbers of simultaneous QMF users
- Preemptive governing of QMF processes based on estimated ASU time
- Preemptive governing of QMF batch processes by the QMF HPO/Manager
- Binding of programs generated by QMF HPO/Compiler into packages in addition to or instead of plans

---

## QMF for Windows Version 7.2 Enhancements

QMF for Windows Version 7.2 enhancements include:

### User interface

- QMF for Windows now natively supports multiple display options for query results, including aggregation, grouping, and formatting. The options are all available via drag-and-drop and right-click menus.
- The resulting display options can be converted to QMF form definitions.
- An enhanced object list window, with a Windows-style tree control, allows for more intuitive navigation and location of QMF objects.
- Job schedules (by calendar, time of day, and more) may now be created from within QMF for Windows.
- Java based querying from a browser is available with Java servlet support.
- QMF Report Center (previously a separate download named "Personal Portal") now ships with QMF for Windows as an optional install.
- The option to use DB2 Forms (if installed) is available when the QMF for Windows Table Editor is invoked.
- More command icons are available to customize the toolbar.
- DB2 passwords can now be "remembered" when running on Windows NT.
- Query results may be sorted on more than one non-contiguous column, and by day-of-week or month-of-year order.
- QMF for Windows objects are now integrated with the Data Warehouse Center object library.

### Database connectivity for distributed applications

- Support for stored procedures that return multiple results sets via the CLI interface
- Large object support
- Enhanced support for DB2 for OS/390 data sharing

- Display of CLI-specific information when there is a CLI connection to the server
- New trace options include CLI, TCP/IP, embedded SQL, SQLAM, REXX, CPI-C, and DDM

### **QMF host support**

- All types of QMF host procedures are now supported, including procedures with REXX logic.
- A new docking toolbar is available for entering and issuing single QMF commands.
- Form Conditions and Form Column Definitions are now supported.
- The RESET GLOBAL command is now supported.
- PF keys are now defined to match the key definitions in QMF host.

### **National language support**

- Nineteen language translations now include Belgian French, Canadian French, Portuguese, Swiss Italian, Arabic (with bidi support), and Traditional Chinese.
- UNICODE

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

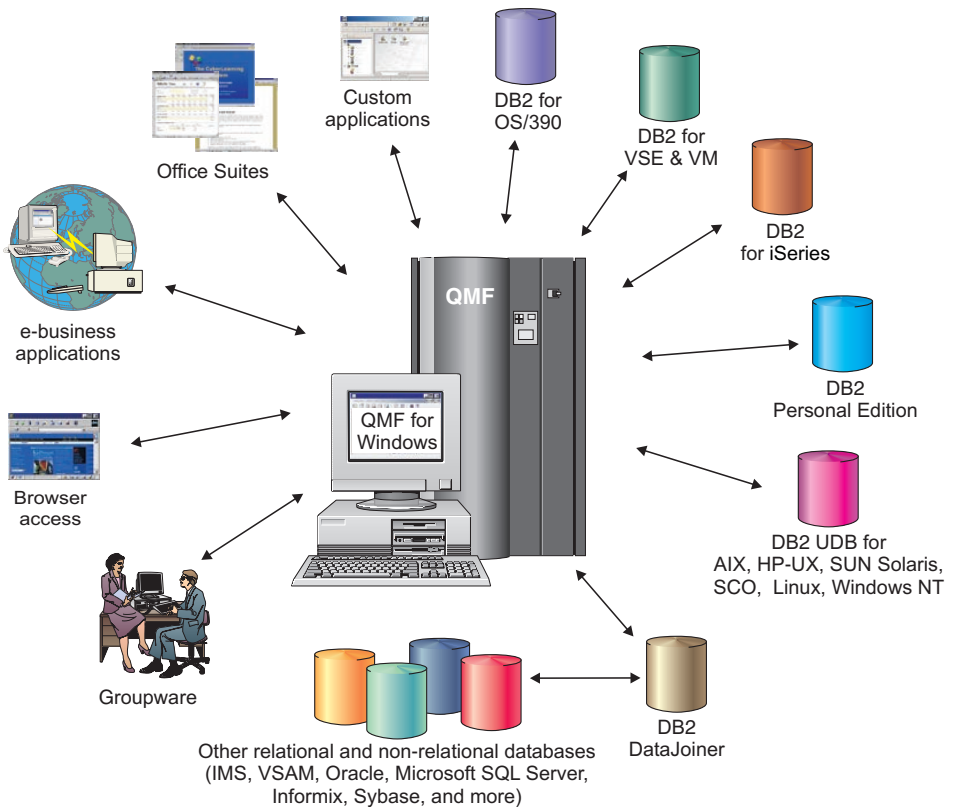
<http://www.ibm.com/qmf>

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



## Chapter 3. QMF Gives You Broad Data Access

Thousands of companies across many industries have based their business intelligence on QMF. QMF lets you create and share mission-critical business knowledge throughout the enterprise and deploy robust, reliable, and scalable business intelligence. You can access any DB2 data or beyond with DB2 DataJoiner, and integrate it with Windows desktop tools or the Internet. QMF's multi-platform options help you to get the most out of your investment no matter where your data is stored. It does not matter whether your data is operational or informational (data warehouse or datamart).

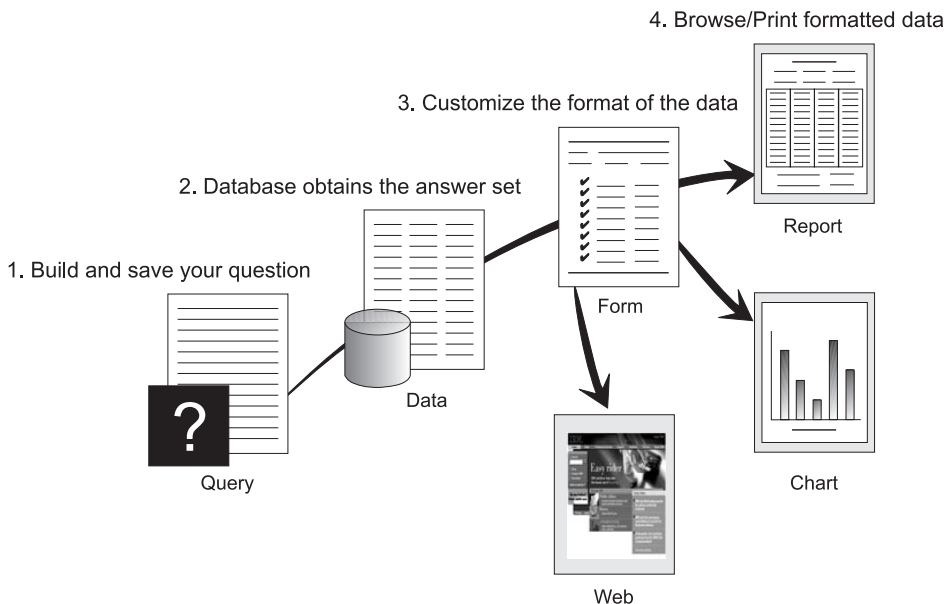




---

## 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 simple 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 that 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.



---

## 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. QMF guides you through the steps you need and checks to ensure that the statement you build is valid.

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 to the database by using the SQL Query panel. You can issue any dynamic SQL

statement from the query panel. The DRAW command displays 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 query and a complex 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. Begin your query by using the DRAW command. QMF presents the table and its column names for you. Then, 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.
CONDITIONS							
	_Y = 10 AND _S > 20000						

## Chapter 6. QMF Creates Reports and Charts to Fit Many Business Needs

Use QMF to present your data effectively and quickly in a wide variety of reports and charts. QMF provides extensive control over how you place or present your data.

### Reports for success

QMF lets you determine what is important for your reports and gives you the capability to format it the way you want. A sample of a report that you can produce using the form function in QMF is shown below.

REPORT	LINE 1	POS 1
<----- JOB ----->		
<-- CLERK --> <--- MGR ---> <-- SALES --> <-- TOTAL -->		
	SUM	SUM
DEPT	SALARY	SALARY
-----	-----	-----
10	\$83,463.45	\$83,463.45
15	\$24,766.70	\$61,929.33
20	\$27,757.35	\$64,286.10
38	\$24,964.50	\$77,285.55
42	\$22,014.50	\$58,369.05
51	\$27,829.80	\$86,090.80
66	\$10,988.00	\$86,076.20
84	\$13,030.50	\$66,147.00
=====	=====	=====
	\$151,351.35	\$583,647.48
	\$217,863.80	\$214,432.33
COMPANY NAME		

### Customized reports

Creating custom reports with QMF is easy; you can start with a template report that has default column headings and a tabular layout. Tailor the default report with QMF forms that control different detail areas of the report.

Using QMF forms, you can do the following tasks:

- Group information into categories
- Generate summary columns
- Add page headings and footings
- Change column headings
- Perform calculations on your data and display the results

- Display data as freeform text
- Place tabular data from one row on more than one line
- Combine text lines with tabular data
- Produce address labels, form letters, and detailed reports

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

You can save the form for future use, or as a prototype for creating another report; just save the report under a new name.

The following example shows a typical QMF 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

```

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 Internet

You can specify HTML output for reports that you create with QMF. This allows you to display your reports in an HTML compatible web browser either in an intranet or on the Internet. QMF adds an HTML header and inserts tags to display the report in its original QMF format in the web browser.

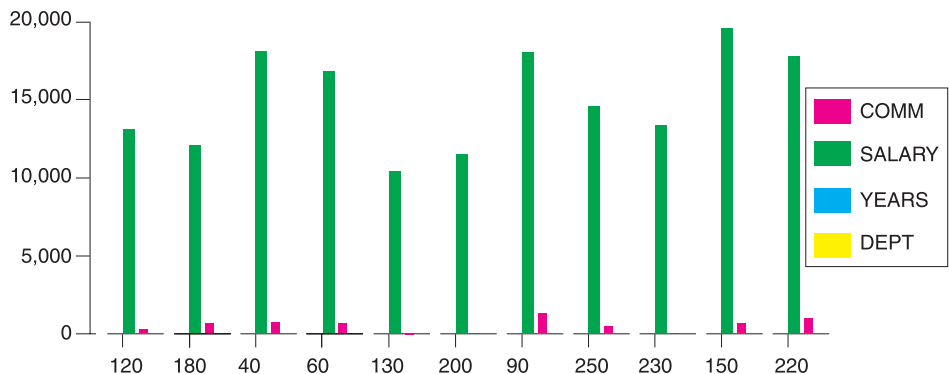
---

## Charts for success

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

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

Here is a sample chart that you can define and produce using QMF:





---

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

QMF provides two interfaces, a command interface and a callable interface, that allow you to integrate QMF functions into your existing applications. You can build sophisticated application suites by using the callable interface and a variety of supported programming languages.

---

### Command interface

The command interface allows you to use QMF services from an Interactive System Productivity Facility (ISPF) dialog. You can integrate QMF functions within ISPF dialogs so users see only ISPF menus.

---

### Callable interface

The callable interface lets you 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 the simple, but powerful, REXX programming language. QMF supports REXX in both the OS/390 and z/OS, and VM environments. REXX is an interpreted programming language. It runs immediately without 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; a REXX program can initiate a QMF session through the callable interface. By directing 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

Linear procedures and procedures with logic are two ways to run a series of instructions in QMF. 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.

```
PROC      MODIFIEDLINE1

/* 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. Assign new values to the variables 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. A QMF procedure can contain many different QMF commands. You can run all of the commands in sequence by issuing the RUN PROC command.

Users can be prompted for variable data while running a procedure to customize the results.

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. To make things 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. It allows you to customize default values that QMF uses and run commands or other procedures automatically when QMF starts up. You can include any QMF command in the system initialization procedure.

---

## Customizing QMF commands and function keys

Within applications you develop using QMF, you can customize the QMF command set and function keys to suit the needs of your application users. You can store customized commands and function keys for individual users in their profiles.

QMF's powerful command synonym function allows you to rename QMF commands and create your own installation-specific commands to suit your specific needs. A user with several different printers in his installation must specify the printer name, length and width of the page, and other parameters each time he needs to print a report or chart. Using QMF, he can create a command synonym called PRINT that invokes the proper printing application and routes the output to the appropriate printer with the specified page size and parameters.

---

## Customizing other QMF functions

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

- 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 tasks:
  - 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 to gather QMF usage information. You can use the QMF HPO/Manager feature for a sophisticated system that includes the following features:

- 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 using 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 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

You can easily search the database for information and add or update data in the database by using the QMF interactive Table Editor. 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 screen shows a representative panel.

```
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 any 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

This chapter tells you to how to personalize your QMF profile and system initialization procedure, and display online help.

---

### Personalizing your QMF profile and your system initialization procedure

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.

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 QMF.

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

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



---

## Chapter 10. QMF Provides Performance and Administration Features

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 and z/OS feature builds on QMF's performance and QMF control capabilities.

QMF for Windows manages your queries from the Windows environment, while QMF HPO/Manager controls queries from the QMF host environment.

---

### 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

This 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

The Object Manager tracks QMF session activity. It records information about the commands and objects and writes this information directly to the Activity Log.

You can now 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 to and from and QMF Version 7.2. It recognizes and appropriately handles the new columns in the OBJECT\_DIRECTORY.

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

### **Governor**

The 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 the proper use of resources in QMF sessions.

### **Monitor**

The 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**

The 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 resource intensive.

### **Activity Log**

The 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**

The 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.

```

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
                                           C S
A Date      Time      Act Owner      Object      Object      Rows      CPU      A Q
-----
96/09/02 07:47:52 BEG
96/09/02 07:47:52 RUN VNRSTRW MODELING      0          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 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 performs these tasks:

- 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 database management systems.

The QMF HPO/Compiler contains a program generator and an end user facility:

### Program Generator

The program generator is 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 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 and print programs.

### **End User Facility**

The end user facility is used to run 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 Internet
- Automate tasks with QMF procedures
- Integrate data with 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
- Create DB2 tables using query results
- Create new or edit DB2 data directly in the Table Editor
- Share reports, queries, and forms among all the QMF enduser platforms: Windows, OS/390 or z/OS, MVS, VM, or VSE

#### **For administrators**

- Maintain comprehensive governing control over database resource consumption and user actions

- Limit runaway queries, database updates, access to specific database servers, rows fetched, and 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
- Extend advanced database techniques like static SQL and uncommitted read to Windows
- Reduce TSO, CMS, and CICS host logons
- Use the QMF for Windows API to leverage desktop development tools (such as application macros, Visual Basic, Powerbuilder, and more)
- Build robust custom applications quickly - 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**

- Extend QMF investment to new user environments quickly
- 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:
- Maintain 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





---

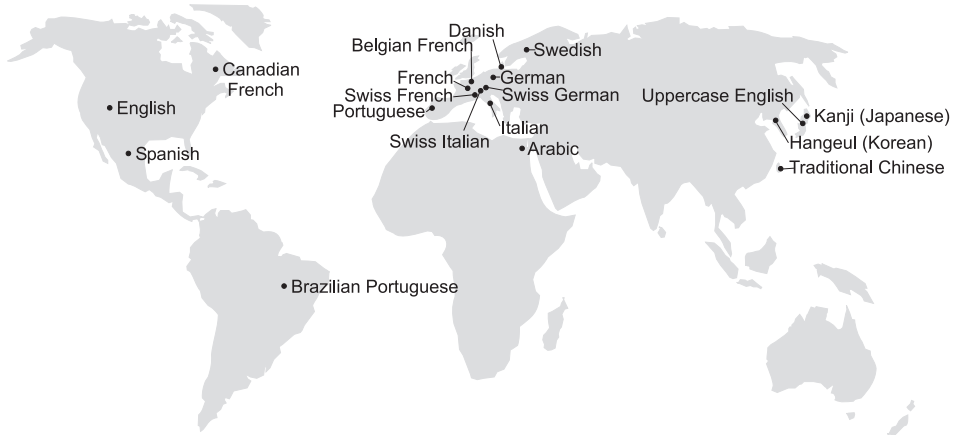
## Chapter 11. QMF Accommodates Your International Business Needs

QMF can accommodate business needs distributed all over the world. There are 19 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 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.





---

## 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.

---

### 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 necessary steps to get started with QMF and descriptions of how to use SQL queries. It contains detailed scenarios that show you how to build queries and forms, and it contains detailed information about Query-By-Example.

---

### Machine requirements

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

Workstation hardware requirements are the same as the requirements needed to run the Windows software as described in “Software requirements” on page 36.

QMF for Windows for DB2 workstation databases requires approximately 10 MB 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 support.

### 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.

---

## 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 95
- Microsoft Windows 98
- Microsoft Windows NT
- Microsoft Windows 2000
- Microsoft Windows ME
- Microsoft Windows XE

---

## 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.

---

## **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.



---

## Appendix. Notices

This information was developed for products and services offered in the U.S.A. IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing  
IBM Corporation  
North Castle Drive  
Armonk, NY 10594-1785  
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation  
Licensing  
2-31 Roppongi 3-chome, Minato-ku  
Tokyo 106, Japan

**The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:**  
INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will

be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this publication to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is as your own risk.

Licenses of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation  
J74/G4  
555 Bailey Avenue  
San Jose, CA 95161-9023  
U.S.A.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this information and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.



All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

#### COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrates programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

---

## Trademarks

The following terms are trademarks of the IBM Corporation in the United States or other countries or both:

ACF/VTAM	IMS
Advanced Peer-to-Peer Networking	iSeries
AIX	Language Environment
AIX/6000	MVS
C/370	MVS/ESA
CICS	MVS/XA
CICS/ESA	OfficeVision/VM
CICS/MVS	OS/390
CICS/VSE	PL/I
COBOL/370	PROFS
DATABASE 2	QMF
DataJoiner	RACF
DB2	S/390
DB2 Universal Database	SQL/DS
Distributed Relational Database Architecture	Virtual Machine/Enterprise Systems Architecture
DRDA	Visual Basic
DXT	VM/XA
GDDM	VM/ESA
IBM	VSE/ESA
IBMLink	VTAM
	z/OS

Java or all Java-based trademarks and logos, and Solaris are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Lotus and 1-2-3 are trademarks of Lotus Development Corporation in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks or registered trademarks of Microsoft Corporation.

Other company, product, and service names, which may be denoted by a double asterisk (\*\*), may be trademarks or service marks of others.

---

# Readers' Comments — We'd Like to Hear from You

Query Management Facility™  
Introducing QMF  
Version 7 Release 2

Publication No. GC27-0714-02

Overall, how satisfied are you with the information in this book?

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Overall satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How satisfied are you that the information in this book is:

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Accurate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to find	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Well organized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Applicable to your tasks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please tell us how we can improve this book:

Thank you for your responses. May we contact you?  Yes  No

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

---

Name

---

Address

---

Company or Organization

---

Phone No.



Fold and Tape

Please do not staple

Fold and Tape



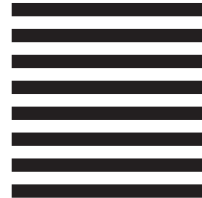
NO POSTAGE  
NECESSARY  
IF MAILED IN THE  
UNITED STATES

# BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

IBM CORPORATION  
Department HHX/H3  
555 Bailey Ave.  
San Jose, CA  
U.S.A.  
95141-1003



Fold and Tape

Please do not staple

Fold and Tape





Program Number: 5675-DB2  
5697-F42

Printed in U.S.A.

GC27-0714-02

