CHAPTER 1

The Remote Query Template

With an application built with the Remote Query template, users can send queries to a *remote database* — a database to which the user does not have a direct network connection. Users complete a Query form and route it to a *query processing agent.* The query processing agent is an automatic process that accepts the query, runs it, and sends an answer to the user. Users read data returned by the processing agent in an Answer form. The template uses Mail to exchange information between users and the query processing agent.

The sample data in the Remote Query template is the daily pricing history of a common stock, but you can modify the template to support other databases. In discussing the Remote Query template, this chapter refers to the sample data.

Implementing Remote Queries

Database applications typically require constant, direct, and real-time or immediate connections between users and the database. Such real-time connections require either remote-access services, wide-area networks (WANs), or multiple copies of the data in multiple locations, which may be expensive or impractical for some applications. The Remote Query template helps you develop applications that don't require a real-time connection to the database. For example, the template is appropriate for remote or branch-office users who need to query or update databases, but don't require immediate responses:

u   A remote sales office could use applications developed with the template to request market research information from a remote database.

u   Field representatives could use applications developed with the template to send e-forms that insert or update customer records in a remote database.

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The template relies on the store-and-forward infrastructure of Mail, which is optimized for slow or infrequent links between users, postoffices, and processing agents.

Tools and Skills You Need

To modify the Remote Query template, you need:

u   Microsoft Visual Basic, Professional Edition, version 3.0 or later

You should have intermediate to advanced experience with Visual Basic programming. You should understand how to create a Visual Basic project, set properties for controls, write code to respond to control events, and call functions and procedures. You should also know how to use the grid, masked edit, and 3D controls.

u   Microsoft Electronic Forms Designer version 1.0 or later

You should know how to develop forms that include procedure code.

u   Microsoft Access version 1.0 or later

You should know how to query and edit data with Microsoft Access. To modify the query processing agent, you should also have intermediate experience with Microsoft Access programming.

u   Microsoft Windows for Workgroups version 3.1 or later, which includes Mail

 – Or –

Microsoft Mail for PC Networks version 3.0 or later.

Users of applications that you develop with the template require Mail, the compiled application, and the run-time libraries of Microsoft Visual Basic and Microsoft Electronic Forms Designer. Because only the query processing agent requires access to the RQUERY.MDB database file, users do not require Microsoft Access to compose queries or read answers.

Components of the Remote Query Template

The Remote Query template consists of four components:

1. A Query form in which users compose and send queries.

2. A remote database. The template uses a single database table, the Securities table, which you can replace with a different database. See "Customizing the Remote Query Template" and "Extending the Remote Query template" later in this chapter for more information.

3. A query processing agent that accepts queries, runs them, and sends

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answers to the user. In this template, the query processing agent retrieves data from the Securities table in the RQUERY.MDB file.

4. An Answer form in which users view answers sent by the query processing agent.

These components are contained in two files:

u RQUERY.EXE, which includes the Query and Answer forms, is compiled from the Visual Basic project, RQUERY.MAK. The Query and Answer forms are, respectively, customized versions of the Compose and Read forms in the generic form template in Microsoft Electronic Forms Designer.

u RQUERY.MDB is a Microsoft Access file that includes the query processing agent and a single database table, the Securities table. The agent continuously checks its Mail Inbox for new queries, automatically runs queries, and sends answers to users. The Securities table lists daily pricing history for a common stock.

Distribute RQUERY.EXE to all users who submit queries. Users do not need RQUERY.MDB. Use the query processing agent within RQUERY.MDB only within your information technology department or in other data-processing areas.

For more information about required files and about distributing applications that you develop with the Remote Query template, see "Installing the Remote Query Template for Users" later in this chapter.

For more information about the Securities table, see "Structure of the Remote Query Table" later in this chapter.

How the Remote Query Template Works

The Remote Query template involves three processes:

1. Users compose queries by completing the Query form and sending it to the query processing agent.

2. The query processing agent accepts queries, runs them, and sends answers to users.

3. Users read answers to queries with the Answer form.

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Composing Queries

Users compose queries with the Query form in RQUERY.EXE. The form is automatically addressed to the Mail name of the query processing agent. The name is not visible, and users cannot change the name. In the Query form, users provide criteria by typing a first and last date. The query processing agent returns all rows from the Securities table within this date range. Users can also select or clear the Volume box to include the Volume field, which records total shares traded each day, in the results. Once the criteria are defined, users send Query forms by choosing the Send button.

The Remote Query template is an example of applications which use predetermined criteria. The Query form in the Remote Query template does not allow ad hoc queries. Users cannot specify additional criteria or build queries interactively.

The Query form is based on the generic Compose form of the Electronic Forms Designer. Because the Query form is pre-addressed and sent to a process rather than another user, generic form controls which aren't needed — such as txtSubject, txtNote, lstToRecipients, and lstCcRecipients — have been removed. Controls for addressing, such as the Address and Check Names buttons, have also been removed. Code which refers to the deleted controls has been deleted or commented out.

The cmd_Send procedure addresses the message. The procedure sets the **gMessage.RecipCount** global variable to 1, and sets the **gRecipients()** global variable to the Mail name of your query processing agent. You set the Mail name of your query processing agent in the WGTPLATE.INI file. For more information, see "Identifying Your Query Processing Agent" later in this chapter.

The txtFirstDate_LostFocus and txtLastDate_LostFocus procedures include code to verify that the date typed by the user is a valid date.

Running the Query Processing Agent

The query processing agent in RQUERY.MDB collects query orders from its Mail Inbox, runs the queries, and returns answers to users. The processing agent is designed as an unattended process. It can run continuously on a dedicated system, or you can run it periodically to check for new queries.

**Not
e** The query processing agent queries the Securities database table. Users do not need this agent or the Securities table to compose queries.

The query processing agent was developed with Microsoft Access but uses the

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MAPI for Visual Basic and Microsoft Electronic Forms (MEF) libraries for Visual Basic. The MAPI Library and MEF Library modules in RQUERY.MDB include the declarations for these libraries. You can copy these modules to other Microsoft Access–based applications, but you should not change the modules. The *Microsoft Electronic Forms Designer Developer's Guide* includes a complete technical reference for both MAPI and MEF functions.

The Main function in the Remote Query module runs a continuous loop that scans for new messages. To start the query processing agent, run the QueryProcess macro in RQUERY.MDB. To stop the agent, choose the Stop button on the Query Processing form that appears while the agent is running. The Main function includes a **DoEvents** statement, which allows the Windows operating system to process other pending tasks. Do not delete the **DoEvents** statement, or you will not be able to stop the agent.

The Main function calls the **MAPIFindNext** and **MAPIReadMail** functions to find new messages. The **MAPIFindNext** function call uses the "IPM.MSWGTemplates.RQuery" *MessageClass* parameter, so that it returns only remote query messages. The **MAPIReadMail** function call uses the MAPI_PEEK and MAPI_ENVELOPE_ONLY flags in the *Flags* parameter. The MAPI_PEEK flag ensures that unread messages are not marked as read by **MAPIReadMail**, and the MAPI_ENVELOPE_ONLY flag returns envelope information about the message, such as subject or recipients, but not the message contents. If the message is a remote query message, the Main function calls the ProcessOneMessage procedure, which calls **MAPIReadMail** again with no flags, to retrieve the content of the message.

The ProcessOneMessage procedure reads the message and its MEF package, calls the PrepareData function to execute the query, and sends an answer to the user.

Reading Answers to Queries

Users receive answers from the query processing agent in their Mail Inbox as custom mail messages. When a user opens an answer message, the data from the query processing agent is displayed in a grid in the Answer form of RQUERY.EXE. The user can select cells of the grid and copy them by choosing the Copy Cells button.

The Answer form is based on the generic Read form in the Microsoft Electronic Forms Designer. As with the Compose form, several unnecessary controls have been removed from the Read form.

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Installing the Remote Query Template for Users

When you install the Remote Query template or applications that you develop with the template, you can choose between two locations:

u A network server, where all users who can access the server can use the application.

u The user's local hard disk.

See Chapter 8, "Setting Up the Server and Run-Time Files," and Chapter 9, "Installing and Administering E-Forms," in the *Microsoft Electronic Forms Designer Developer's Guide* for more information about installing your applications.

Tip If you choose to install applications on local hard disks, Microsoft Visual Basic Professional Edition version 3.0 includes a Setup Wizard to help you develop a Setup program for your applications.

Required Files

Tables 14.1 and 14.2 list the required files for the Remote Query template. You must also provide the .INI files (described in the next section), which are created in your Windows directory when you install the Remote Query template.

If you customize or extend the template, your users may need additional files.

Table 1.1   Required Files for Users

Directory	Files	Description
Workgroup Templates directory	RQUERY.EXE	Remote Query Compose and Read forms

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System directory	VBRUN300.DLL	Visual Basic run-time library
	CMDIALOG.VBX	Visual Basic common dialog box control
	GRID.VBX	Visual Basic grid control
	MASKED.VBX	Visual Basic masked edit control
	THREED.VBX	Visual Basic 3D control
	MEFLIB.DLL	MEF run-time library
	MEFLINK.VBX	MEF control
	MAPI.DLL	MAPI library

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Table 14.1   Required Files for Users *(continued)*

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Directory	Files	Description
	FRAMEWRK.DLL	Mail framework library
	MAILSPL.EXE	Mail spooler
	MSSFS.DLL	Mail driver

Table 1.2   Required Files for Query Processing Agent

Directory	Files	Description
Workgroup Templates directory	RQUERY.MDB	Remote Query database
System directory	MEFLIB.DLL	MEF run-time library

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MAPI.DLL	MAPI library
FRAMEWRK.DLL	Mail framework library
MAILSPL.EXE	Mail spooler
MSSFS.DLL	Mail driver

Required Settings

SHARED.INI

If you install your application on a network server, add a custom message declaration to the SHARED.INI file on the server. Follow this example:

```
[Custom Messages]
IPM.MSWGTemplates.RQuery=3.0;;Remote Query Form;;
úMEFLIB.DLL;<MC:IPM.MSWGTemplates.RQuery><ExtsDir>WGTPLATE\RQUERY\
úRQUERY.EXE -MSG <COMMAND> <MESSAGEID>;1122211000000000;
úRemote Query Form (Microsoft Workgroup Templates);;;
```

MSMAIL.INI

If you install your application on a local hard disk, add a custom message declaration to the MSMAIL.INI in the Windows directory. Follow this example:

```
[Custom Messages]
IPM.MSWGTemplates.RQuery=3.0;;Remote Query Form;;
úMEFLIB.DLL;<MC:IPM.MSWGTemplates.RQuery>C:\WGTPLATE\RQUERY\
úRQUERY.EXE -MSG <COMMAND> <MESSAGEID>;1122211000000000;
úRemote Query Form (Microsoft Workgroup Templates);;;
```

WGTPLATE.INI

Provide the Mail name of your query processing agent in the [Remote Query] section in the WGTPLATE.INI file with the following syntax:

RemoteQueryMail=*mail_name*

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For example:

```
[Remote Query]
RemoteQueryMail=Query Agent
```

You can provide each user with a local WGTPLATE.INI or provide a shared WGTPLATE.INI for all users. For more information about WGTPLATE.INI, see Chapter 1, "Getting Started."

Customizing the Remote Query Template

This section discusses the stages of customizing the Remote Query template.

Identifying Your Query Processing Agent

Provide the Mail name of your query processing agent in the [Remote Query] section in the WGTPLATE.INI file with the following syntax:

RemoteQueryMail=*mail_name*

Not e   The Mail name should be unique within your Mail address list (for example, "Remote Query Agent"). The Query form prompts the user to resolve any ambiguous names, which can defeat the route that you established.

Preventing Forward, Reply, and Reply To All commands

You can customize e-forms to prevent users from using the Forward, Reply, and Reply To All commands of Mail. See Chapter 12, "Custom Message Types," in the *Microsoft Electronic Forms Designer Developer's Guide* for more information about the operation map of custom messages installed in MSMAIL.INI or SHARED.INI.

The operation map of the Remote Query template has been set to "1122211000000000", which allows Compose, Read, Print, and Save commands but prevents Forward, Reply, and Reply To All commands.

Localizing the Template for International Users

Captions

Translate the Caption property of all labels, menus, buttons, and forms into your local language. No code in the template depends on any specific text string in any control, so you do not need to change any code.

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Text Strings in RQUERY.MDB

Any text strings that the template reads or modifies are stored in global constants. In the declarations in the Remote Query module in RQUERY.MDB, translate into your local language the following global constants.

Table 1.3   String Global Constants

Global constant	Purpose
WAITING_STRING	Text displayed when the query processing agent is idle.
WORKING_STRING	Text displayed when the agent is processing a query.

Number and Currency Formatting

The template uses only named formats, such as "Currency" or "Standard," to format numbers. These formats are prepared by the Windows operating system according to the user's settings in the Control Panel. The template never uses custom formatting, such as "#,##0.00", so you do not need to change any code.

Structure of the Remote Query Table

RQUERY.MDB includes a sample table of the daily pricing history of a common stock. Replace the table with data relevant to your application. See "Extending the Remote Query Template" later in this chapter for more information. For your convenience, the RQUERY.MDB database file does not implement any security features of Microsoft Access. To prevent users from changing your data with Microsoft Access or other applications, implement additional security within your database files.

Table 1.4   Securities Table

Field name	Data type	Field size	Description

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Field name	Data type	Field size	Description
Ticker	Text	10	Stock identification symbol.

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Table 14.4   Securities Table *(continued)*

Field name	Data type	Field size	Description
Date	Date/Time		Trade date. Only weekdays (Monday through Friday) are listed.
Volume	Number	Long integer	Total shares traded. A value of 0 indicates a weekday holiday.
High	Currency		Highest trade price during the day.
Low	Currency		Lowest trade price during the day.
Close	Currency		Final trading price of the day.

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Extending the Remote Query Template

To extend the Supply Order template so that it better serves your organization's needs, consider the following approaches.

Use a Different Database Format

You can convert the Remote Query database to another format, or access existing databases in your organization. You can use Microsoft Access to access data in a variety of formats, including Microsoft Access, dBASE, and Paradox formats, and from database servers, including SQL Server and Oracle. Additional database drivers may also be available.

Improve Answer Messages

When a query is unsuccessful, the query processing agent returns an empty grid, but no explanation. You can modify the agent to improve its error handling and return meaningful explanations to users.

Change the Data

You can replace the sample data in the application:

1. Create, import, or attach new tables in Microsoft Access.

2. Modify the Query form to allow appropriate criteria.

3. Modify the PrepareData function in the Remote Query module in RQUERY.MDB to process the queries.

4. Modify the Answer form to display the answers.

Allow More Flexible Queries and Answers

You can allow users greater flexibility in composing queries and reading answers. You can provide additional criteria controls on the Query form, and you can allow users to pick fields from a list. You can prepare the Structured Query Language (SQL) for the query in code in the Query form and send the SQL rather than criteria values to the agent.

Return Graphs in the Answer

Microsoft Access includes Microsoft Graph, an object linking and embedding (OLE) server that allows you to graph data. You can modify the query processing

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agent to send a graph to users. To package the graph as an OLE object in a message, you can:

u Use the packaging routines in the Microsoft Electronic Forms Designer. Use the code for OLE controls in the WriteTaggedControls and ReadTaggedControls procedures of the EFORM.BAS module in the generic Electronic Forms Designer template.

 – Or –

u Use MAPI functions directly. Refer to the **MapiFile** data type in the *Microsoft Mail Technical Reference* or the *Microsoft Electronic Forms Designer Developer's Guide*.

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