
Liant Software Corporation

RM/InfoExpress[®]

User's Guide

First Edition

LIANT

This manual is a user's guide for Liant Software Corporation's RM/InfoExpress file management system for Microsoft 32-bit Windows and UNIX clients communicating with UNIX and Windows servers using TCP/IP (Transmission Control Protocol/Internet Protocol) on a network. It is assumed that the reader is familiar with RM/COBOL and various local area networks (LANs) and wide area networks (WANs).

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Preface

Welcome to RM/InfoExpress

RM/InfoExpress is a file management system designed to optimize RM/COBOL data file access on various local area networks (LANs) and wide area networks (WANs). Implementation is available for TCP/IP (Transmission Control Protocol/Internet Protocol).

The *RM/InfoExpress User's Guide* is intended for commercial application developers who have a basic understanding of RM/COBOL, Microsoft Windows, UNIX, and TCP/IP. The information in this preface outlines the contents of this manual, defines typographic and programming conventions used in the documentation, and provides information about registering your product and obtaining technical support. The new features and significant changes in this release are also discussed.

What's New

Note The RM/InfoExpress version number refers to the RM/InfoExpress server; RM/InfoExpress client(s) do not have version numbers.

The following summarizes the major new enhancements in RM/InfoExpress for TCP/IP version 9:

- The RM/InfoExpress server File Manager has been updated to RM/COBOL version 9 compatibility. (For further information, see “What’s New” in Chapter 1: *Introduction*, of the *RM/COBOL User's Guide*.)
- The RM/InfoExpress server display main screen now shows the server uptime (in days) at the end of the date and time line. It can also now display 999,999,999,999 (one trillion—U.S.—minus one) total messages after which the count wraps back to zero. See [Server Display Commands](#) on page 43.
- The Windows server (**rmsrvtcp.exe**) now uses WinSock 2. In particular, this allows a much larger connection queue (WinSock 1 had a maximum backlog of 5), which should avoid error 10061.

- The Windows server installation creates a Windows Firewall Exception, if applicable, for the RM/InfoExpress TCP port number 21069. If you change the port number (which is *not* recommended), you must change both the **services** file and the Windows Firewall configuration.

For information on the significant enhancements in previous releases of RM/InfoExpress, see [Appendix G: Summary of Enhancements](#) (on page 111).

About Your Documentation

The RM/InfoExpress for TCP/IP documentation consists of a user's guide, which is available in Adobe Portable Document Format (PDF) on the product CD, and on the Liant Web site at <http://www.liant.com/docs>.

Note Viewing a PDF file requires Adobe Acrobat Reader. You can download the latest version of Adobe Acrobat Reader free at the Adobe Web site at <http://www.adobe.com>.

This user's guide is divided into the following parts:

Chapter 1—Installation and Verification lists hardware and software requirements, and provides procedures for installing RM/InfoExpress for TCP/IP on both clients and servers for a specific LAN or WAN type. Also included are procedures for verifying that both client and server software are properly installed and communicating with one another.

Chapter 2—Configuring and Running the RM/InfoExpress Server describes the procedures required to configure and run RM/InfoExpress servers for UNIX and Windows.

Chapter 3—Using RM/InfoExpress with RM/COBOL for Windows Programs describes how to access the RM/InfoExpress Windows client program, how RM/COBOL for Windows programs point to network data files, and explains how to execute RM/COBOL for Windows programs for use with RM/InfoExpress.

Chapter 4—Using RM/InfoExpress with RM/COBOL for UNIX Programs describes how to access the RM/InfoExpress UNIX client program, how RM/COBOL for UNIX programs point to network data files, and how to execute RM/COBOL for UNIX programs for use with RM/InfoExpress.

Chapter 5—RM/InfoExpress Server Operations describes the RM/InfoExpress server commands. This chapter also describes the information displayed by the server during RM/InfoExpress execution.

Chapter 6—File Security on the RM/InfoExpress UNIX Server describes the implementation of file security on the RM/InfoExpress UNIX server.

Appendix A—Messages lists and defines the information and error messages that may be generated during an RM/InfoExpress session.

Appendix B—Limits and Ranges lists the logical and physical limits and ranges of RM/InfoExpress.

Appendix C—Troubleshooting RM/InfoExpress describes problems that you may encounter during an RM/InfoExpress session and provides solutions.

Appendix D—Configuring RM/InfoExpress describes various configuration parameters for RM/InfoExpress client and server components.

Appendix E—RM/InfoExpress Security Parameter File Update Utility describes how to use the utility program (**ixsecure.cob**) to update the parameter file (**ixpwwfile**) with security-related information that is used by the server to authenticate the clients.

Appendix F—Using RM/InfoExpress with Relativity describes how to access Relativity files using RM/InfoExpress.

Appendix G—Summary of Enhancements reviews the new features and enhancements that were added to earlier releases of RM/InfoExpress.

The *RM/InfoExpress User's Guide* also includes an index.

Related Publications

The following documents contain information necessary for a complete understanding of RM/InfoExpress for TCP/IP as used in conjunction with a specific operating system and a local area network (LAN) or wide area network (WAN):

- *RM/COBOL User's Guide*
- *Relativity Installation Guides*

Contact the appropriate vendor for other publications:

Microsoft products are available from Microsoft Corporation.

Conventions and Symbols

The following symbols and conventions are used or followed throughout this manual.

1. Text that you enter or that is displayed on your screen is indented and appears in a monospaced font. This type style is also used for sample command lines, program code and file listing examples, and sample sessions.
2. Variable information, for which you substitute a specific value, is printed in italics. For example:

```
runcobol name [options]
```

Italic type also identifies the titles of other manuals and the chapter names in this guide, and occasionally it is used for emphasis.

3. Program names, directory names, filenames, and commands appear in bold type and lowercase text. You can type program names, directory names, filenames, and commands in uppercase or lowercase letters, except where otherwise stated.

Bold type is also used for emphasis on some types of lists, and for anything you must type exactly as it appears.

4. Key combinations are connected by a plus sign (+), for example, Ctrl + X. This notation indicates that you press and hold down the first key while you press the second key. For example, “press Ctrl + X” indicates to press and hold down the Ctrl key while pressing the X key. Then release both keys.
5. RM/COBOL Compile and Runtime Command line options may be specified either with or without a hyphen. If any option on a command line is preceded by

a hyphen, then a leading hyphen is required for all options. When assigning a value to an option, the equal sign is optional if leading hyphens are used.

6. In this document, the term “Windows” refers to the following Microsoft 32-bit Windows operating systems: Windows 98 or 98 Special Edition (SE), Windows Millennium Edition (Me), Windows NT 4.0, Windows 2000, Windows XP, and Windows Server 2003.

As you read through this manual, note that Liant may use two shorthand notations when referring to these operating systems. The term “Windows 9x class” refers to the Windows 98 or Windows Me operating systems. The term “Windows NT class” refers to the Windows NT 4.0, Windows 2000, Windows XP, or Windows Server 2003 operating systems.

Registration

Please take a moment to fill out and mail (or fax) the registration card you received with RM/InfoExpress. You can also complete this process by registering your Liant product online at: <http://www.liant.com>.

Registering your product entitles you to the following benefits:

- **Customer support.** Free 30-day telephone support, including direct access to support personnel and 24-hour message service.
- **Special upgrades.** Free media updates and upgrades within 60 days of purchase.
- **Product information.** Notification of upgrades or revisions to RM/InfoExpress when they are released.

You can also receive up-to-date information about Liant Software and all its products via our Web site. Check back often for updated content.

Technical Support

Liant Software Corporation is dedicated to helping you achieve the highest possible performance from the RM/COBOL family of products. The technical support staff is committed to providing you prompt and professional service when you have problems or questions about your Liant products.

These technical support services are subject to Liant’s prices, terms, and conditions in place at the time the service is requested.

While it is not possible to maintain and support specific releases of all software indefinitely, we offer priority support for the most current release of each product. For customers who elect not to upgrade to the most current release of the products, support is provided on a limited basis, as time and resources allow.

Support Guidelines

When you need assistance, you can expedite your call by having the following information available for the technical support representative:

1. Company name and contact information.
2. Liant product serial number (found on the media label, registration card, or product banner message).
3. Product version number.
4. Operating system and version number.
5. Hardware, related equipment, and terminal type.
6. Exact message appearing on screen.
7. Concise explanation of the problem and process involved when the problem occurred.

Test Cases

You may be asked for an example (test case) that demonstrates the problem. Please remember the following guidelines when submitting a test case:

- The smaller the test case is, the faster we will be able to isolate the cause of the problem.
- Do not send full applications.
- Reduce the test case to one or two programs and as few data files as possible.
- If you have very large data files, write a small program to read in your current data files and to create new data files with as few records as necessary to reproduce the problem.
- Test the test case before sending it to us to ensure that you have included all the necessary components to recompile and run the test case. You may need to include an RM/COBOL configuration file.

When submitting your test case, please include the following items:

1. **README text file that explains the problems.** This file must include information regarding the hardware, operating system, and versions of all relevant software (including the operating system and all Liant products). It must also include step-by-step instructions to reproduce the behavior.
2. **Program source files.** We require source for any program that is called during the course of the test case. Be sure to include any copy files necessary for recompilation.
3. **Data files required by the programs.** These files should be as small as possible to reproduce the problem described in the test case.

Chapter 1: Installation and Verification

This chapter lists the hardware and software needed to use RM/InfoExpress for TCP/IP (Transmission Control Protocol/Internet Protocol), detailing the differences between the server and client program requirements. Chapter 1 also provides instructions for setting up and installing RM/InfoExpress on Windows and UNIX, and outlines procedures for verifying that RM/InfoExpress is properly installed.

System Requirements

This section describes the platform-specific system requirements necessary for installing RM/InfoExpress server and clients. The version of RM/InfoExpress that you have purchased is for a particular combination of hardware and operating systems. Several items listed below vary depending on the actual version of the product that you have purchased.

Before you can use RM/InfoExpress, your personal computer configuration must meet or exceed the requirements set forth in this section.

RM/InfoExpress Server Program

RM/InfoExpress supports two types of server programs: one for Microsoft 32-bit Windows servers and one for UNIX (or UNIX-based) operating systems.

The RM/InfoExpress Windows server software consists of the following:

- **rmsrvtcp.exe**, the main program
- **rmdistcp.exe**, the server display (or screen handler) program

The RM/InfoExpress UNIX server software consists of the following:

- **rmservtcp**, the main program
- **rmdisptcp**, the server display (or screen handler) program
- **ixsecure.cob**, a file security parameter file update utility program

Table 1 lists the system requirements to install the RM/InfoExpress server programs on Microsoft Windows and UNIX.

Table 1: Installation System Requirements on Windows and UNIX

Microsoft Windows (Intel Pentium)	
Operating System	Minimum System Requirements
Windows 2000 Server (SP3 or later) Windows Server 2003	<ul style="list-style-type: none"> • Pentium III or higher, 600 MHz. • 4MB hard disk space. • 128 MB for Windows 2000 and Windows Server 2003. • CD-ROM drive and one 3.5" double-sided, high-density floppy disk drive. • SVGA or higher resolution monitor. • Mouse or other pointing device. • Network interface card.
UNIX	
Operating System	Minimum System Requirements
Digital UNIX (Tru64) HP-UX IBM AIX Intel UNIX System V Release 4 Linux SCO OpenServer 5 SCO UnixWare 7 and OpenServer 6 (SCO SVR5) Sun Solaris	<ul style="list-style-type: none"> • Hard disk. The amount of hard disk space required is version-specific. • Memory. The amount of memory depends on the specific version of the product that you have purchased. • CD-ROM drive and one 3.5" double-sided, high-density floppy disk drive. • Terminal. A terminal with a minimum capacity of 80 columns. • Network interface card.

RM/InfoExpress Client Program

The RM/InfoExpress client program (**rmtcp32.dll** on Windows or **librminfox.so** on UNIX) is optionally installed by the default setup procedure for RM/COBOL for Windows and by default with RM/COBOL for UNIX. The hardware and software system requirements are exactly the same as the system requirements for the RM/COBOL runtime system (**runcobol**) version 9 or later.

Setup and Installation

The section includes setup guidelines and instructions for installing the RM/InfoExpress server and client components.

The RM/InfoExpress for TCP/IP media contains a number of individual files and programs. The media contains a README file, which lists the actual files and programs delivered. For a list of known problems and recovery tips, refer to the section “Problems in This Release” in the README file.

Note The RM/InfoExpress server software should be installed only on the machine on which it is to run. If appropriately licensed, the RM/COBOL runtime system with the RM/InfoExpress client software may be stored on a UNIX machine or a Windows server machine.

RM/InfoExpress Servers

This section describes how to set up and install the RM/InfoExpress server software on 32-bit Windows servers and UNIX server machines.

Setting Up RM/InfoExpress Servers on Windows and UNIX

Before you install the RM/InfoExpress server program, you must first ensure that the complete TCP/IP package has been installed and set up on your Windows and UNIX server machines.

Make certain that the **hosts** and **services** files are included. On Windows, these files are usually in the `\windows-directory\system32\drivers\` directory, where *windows-directory* is the name of the directory where Windows is installed. On UNIX, the files are usually named `/etc/hosts` and `/etc/services`.

- The **hosts** file lists the IP (Internet Protocol) addresses and host name(s) of all machines (clients and servers) that are connected to your network. As an alternative to using a **hosts** file on every machine, you can use DSN (Domain Name Service). One machine or a few machines run DNS; all of the other machines on the network access DNS to resolve names to IP addresses.

CAUTION On some machines, the RM/InfoExpress server program may terminate with a “Signal (11) caught” (segmentation fault) error message when accessed by a client if the `/etc/hosts` file on the server machine does not contain the entries required by RM/InfoExpress. The client would most likely receive a “COBOL I/O error 30, Runtime Library error 12006.” The solution to the problem is to add the entries to the `/etc/hosts` file.

- The **services** file lists the service name and port number/protocol of all available services. The `rmaddsvc` program will update the **services** file during setup in order to add the following line:

```
RMFileServer 21069/tcp
```

No other line may contain RMCFileServer (in any mixture of uppercase or lowercase letters), and no other line may contain the port number 21069. If port number 21069 is already in use, select another unused port number. We recommend that you choose a port number between 5000 and 32000.

Note The user must ensure that the RMCFileServer line in the **services** file is identical on every machine (clients and servers) on the network.

Installing RM/InfoExpress Server on Windows

You can install the RM/InfoExpress server program on Windows from the product CD or download the software from the Liant Electronic Software Delivery (ESD) Web site. (Note that you must have an Internet connection and an Internet browser installed to proceed with this latter method of installation.)

To verify that the installation was successful, see [Verifying the RM/InfoExpress Server](#) (on page 17) and [Verifying RM/InfoExpress Windows Client and Server Communication](#) (on page 19).

To install the RM/InfoExpress server program on Windows:

1. Log in as Administrator.
2. Close any other applications that may be running.
3. Insert the delivered media in the appropriate CD-ROM drive.
4. Do one of the following:
 - If the installation program starts automatically, proceed to Step 5.
 - If the installation program does not start automatically, click Start on the task bar and then click Run. In the Run dialog box, in Open type

`X:setup`

where *X* is the letter assigned to the CD-ROM drive where you inserted the media. Click **OK**. Continue to follow these instructions.

5. Follow the instructions presented by the installation program.
6. When the Liant License dialog box opens, enter the complete filename of the license file, **liant.lic**, which contains the license certificate for this product. (This license file is included on the license diskette that came as part of the installation media). If your machine has a diskette drive, insert the license diskette into drive A and continue to follow the instructions presented on your screen.

Note that if you are using a drive other than A, you must be sure to correct the location of the license file in the Liant License File dialog box. If necessary, the **liant.lic** license file can be copied to a location on a hard drive and that location can be specified during installation.

7. Continue to follow the instructions and prompts on your screen to complete the installation process.

Depending on your system configuration, you may be prompted to reboot your system when the installation has completed.

Note The RM/InfoExpress server is installed and run as a Windows service.

Installing RM/InfoExpress Server on UNIX

You can install the RM/InfoExpress server program from the product CD or download the software from the Liant Electronic Software Delivery (ESD) Web site. (Note that you must have an Internet connection and an Internet browser installed to proceed with this latter method of installation.)

To verify that the installation was successful, see [Verifying the RM/InfoExpress Server](#) (on page 17) and [Verifying RM/InfoExpress UNIX Client and Server Communication](#) (on page 23).

There are four main steps to installing the RM/InfoExpress server program on UNIX:

1. [Loading the license file](#) (see the following topic).
2. [Loading the distribution media](#) (on page 14).
3. [Performing the installation](#) (on page 15).
4. [Unloading the distribution media](#) (on page 15).

Loading the License File

The Liant license file is a normal text file distributed on an MS-DOS-formatted diskette. Not all UNIX operating systems, however, can read an MS-DOS-formatted diskette, and not all UNIX server machines have diskette drives. To make the license file available to the RM/InfoExpress server for UNIX installation script, two techniques are provided:

1. Mounting the diskette as an MS-DOS file system.
2. Transferring the Liant license file via FTP from a Windows client.

Mounting the Diskette as an MS-DOS File System

Use this option to load the license file if the UNIX operating system supports MS-DOS file systems and your hardware has a diskette drive installed. Instructions for specific platforms and versions of UNIX are provided.

- **Digital UNIX (Tru64), HP-UX, IBM AIX, and Intel UNIX System V Release 4.** These platforms do not support mounting MS-DOS diskettes. To transfer the license file to the UNIX server, see the instructions described in [Transferring the Liant License File via FTP from a Windows Client](#) (on page 13).

- **Linux**

- a. Insert the diskette into the diskette drive.
- b. Log in as root and enter:

```
mount -t msdos /dev/fd0H1440 /mnt/floppy
```

- c. Copy the license file to the /tmp directory:

```
cp /mnt/floppy/liant.lic /tmp/liant.lic
```

- d. Dismount the diskette with the following command and then remove the diskette from the diskette drive:

```
umount /mnt/floppy
```

- **SCO OpenServer 5**

- a. Insert the diskette into the diskette drive.
- b. Log in as root and enter:

```
mount -f DOS,lower /dev/fd0 /floppy
```

Note It may be necessary to create the mount directory, /floppy, before executing this command.

- c. Copy the license file to the /tmp directory:

```
cp /floppy/liant.lic /tmp/liant.lic
```

- d. Dismount the diskette with the following command and then remove the diskette from the diskette drive:

```
umount /floppy
```

- **SCO UnixWare 7 and OpenServer 6 (SCO SVR5)**

- a. Insert the diskette into the diskette drive.
- b. Log in as root and enter:

```
mount -F dosfs /dev/dsk/f0q18dt /Disk_A
```

- c. Copy the license file to the /tmp directory:

```
cp /Disk_A/liant.lic /tmp/liant.lic
```

- d. Dismount the diskette with the following command and then remove the diskette from the diskette drive:

```
umount /Disk_A
```

- **Sun Solaris**

- a. Insert the diskette into the diskette drive.
- b. Log in as root and enter:

```
volcheck
```

- c. Copy the license file to the /tmp directory:

```
cp /floppy/liant/liant.lic /tmp/liant.lic
```

- d. Dismount the diskette with the following command and then remove the diskette from the diskette drive:

```
eject floppy
```

Transferring the Liant License File via FTP from a Windows Client

To transfer the Liant license file from a Windows client to the UNIX server, use one of the many graphical FTP utilities available on Windows and transfer the **liant.lic** file as a text file. You can also follow this procedure:

1. On the Windows client, insert the diskette into the diskette drive.

These instructions assume that this is drive A. If it is another drive, change the drive letter to the appropriate letter in the remaining instructions.

2. Open an MS-DOS Prompt window by clicking **Start** on the task bar, point to **Programs**, and then click **MS-DOS Prompt**.
3. Connect to the UNIX server by entering:

```
ftp UnixServerName
```

where *UnixServerName* is the network name of your UNIX server.

4. Change the directory to the /tmp directory:

```
cd /tmp
```

5. Specify a text file transfer:

```
ascii
```

6. Send the license file to the UNIX server:

```
send A:\LIANT.LIC liant.lic
```

7. Disconnect from the UNIX server:

```
bye
```

8. Close the MS-DOS Prompt window with the following command and then remove the diskette from the diskette drive:

```
Exit
```

Loading the Distribution Media

To load the distribution media on the UNIX machine:

1. Insert the RM/InfoExpress server for UNIX CD in the appropriate CD-ROM drive.
2. Log in as root.
3. Enter the appropriate mount command for your system. See the examples listed below.

Note 1 In the list that follows, the standard mount directory names are used where the UNIX operating system has such a standard. If the operating system does not follow a standard, the name */cdrom* is used. In such cases, it will be necessary to either create the directory */cdrom* or substitute the preferred mount directory name for */cdrom*.

Note 2 The device names below are examples. The actual device name is dependent on the hardware configuration of your UNIX server. It may be necessary to substitute the proper value for your system. Consult your UNIX System Administrator for more details.

<u>System</u>	<u>Mount Command</u>
Digital UNIX (Tru64)	<code>mount -t cdfs -o ro,noversion /dev/rz4c /cdrom</code>
HP-UX	<code>mount -F cdfs -o ro,cdcase /dev/dsk/c0t4d0 /cdrom</code>
IBM AIX	<code>mount -o ro -v cdrfs /dev/cd0 /cdrom</code>
Intel UNIX System V Release 4	<code>mount -o ro -F cdfs /dev/cdrom/c0t4l0 /cdrom</code>
Linux	<code>mount -o ro -t iso9660 /dev/cdrom /mnt/cdrom</code>
SCO OpenServer 5	<code>mount -o ro -f ISO9660,lower /dev/cd0 /cdrom</code>
SCO UnixWare 7 and OpenServer 6 (SCO SVR5)	<code>mount -F cdfs -o ro /dev/cdrom/clb0t0l0 /CD-ROM_1</code>
Sun Solaris	If Solaris does not automatically load the CD-ROM, log in as root and enter: <code>volcheck</code>

Performing the Installation

After the CD-ROM has been successfully mounted, you will need to do the following:

1. Change the directory to the mount point for the CD-ROM. For example, enter:

```
cd /cdrom
```

2. From the mount point, execute the installation script using the following command:

```
sh ./install.sh
```

3. The installation script prompts you for all the information that it needs before beginning the actual installation. Answer the prompts of the installation script accordingly.

Messages are displayed periodically indicating the status of the installation.

Unloading the Distribution Media

To unload (remove) the distribution media from the hardware:

1. Enter the appropriate command for your system. See the examples listed below.
2. Remove the distribution media from the CD-ROM drive.

<u>System</u>	<u>Umount Command</u>
Digital UNIX (Tru64) HP-UX IBM AIX Intel UNIX System V Release 4 SCO OpenServer 5	<code>umount /cdrom</code>
Linux	<code>umount /mnt/cdrom</code>
SCO UnixWare 7 and OpenServer 6 (SCO SVR5)	<code>umount /CD-ROM_1</code>
Sun Solaris	<code>eject cdrom</code>

RM/InfoExpress Clients

This section describes how to set up and install the RM/InfoExpress client software on Windows and UNIX workstations.

Setting Up RM/InfoExpress Clients on Windows and UNIX

In order for RM/InfoExpress clients to access the RM/InfoExpress server, you must make sure that you have installed and configured the TCP/IP communication protocol package correctly on 32-bit Windows and UNIX client workstations.

For both Windows and UNIX implementations, you may need to modify the **hosts** file and **services** file:

- The **hosts** file lists the IP (Internet Protocol) addresses and host name(s) of all machines (clients and servers) that are connected to your network. As an alternative to using a **hosts** file on every machine, you can use DNS (Domain Name Service). One machine or a few machines run DNS; all of the other machines on the network access DNS to resolve names to IP addresses.
- The **services** file lists the service name and port number/protocol of all available services.

On Windows, you must locate and edit the **services** file for your Windows Sockets implementation to add the following line, whereas on UNIX, the **rmaddsvc** program will automatically update the services file during setup:

```
RMFileServer 21069/tcp
```

Verify that no other line contains RMFileServer (in any mixture of uppercase or lowercase letters) and that no other line contains the port number 21069. If port number 21069 is already in use, select another unused port number. We recommend that you choose a port number between 5000 and 32000.

Note The user must ensure that the RMFileServer line in the **services** file is identical on every machine (clients and servers) on the network.

Installing RM/InfoExpress Clients on Windows and UNIX

The RM/InfoExpress Windows 32-bit client program (**rmtcp32.dll**) is installed by default by the setup procedure for RM/COBOL for Windows if you chose the typical installation procedure. If you did not initially install it, run the RM/COBOL setup procedure again and choose to install only the RM/InfoExpress Client option. If you wish to run the client verification program, choose the Verification Suite option also. To verify that the installation was successful, see [Verifying the RM/InfoExpress Windows Client](#) (on page 19).

The RM/InfoExpress UNIX client program (**librminfo.so**) is installed by default with RM/COBOL for UNIX. The RM/COBOL for UNIX runtime uses the **librminfo.so** support module (a shared object) to provide access to the RM/InfoExpress server. To verify that the installation was successful, see [Verifying RM/InfoExpress UNIX Client and Server Communication](#) (on page 23).

Verification

For both the RM/InfoExpress client and server software components, the first step in system verification is to confirm that the TCP/IP network software is running correctly on the client machine as well as the server machine.

For RM/InfoExpress client verification, follow all the vendor's recommendations making sure you have properly configured the TCP/IP network and that the software is running correctly. System utilities, such as **ping**, can help ensure proper configuration and/or communication between the client and server machines.

Verifying the RM/InfoExpress Server

The following procedures verify that the RM/InfoExpress server programs have been installed correctly for 32-bit Windows and UNIX operating systems and that they can run properly.

Note Only one RM/InfoExpress server program may be active on any given server machine.

Windows Server

The RM/InfoExpress server for Windows is installed as, and is intended to be run as, a Windows service, under the direction of the Windows Service Control Manager (SCM). Initially, the server is configured to be started and stopped manually. However, it can easily be reconfigured to start automatically when Windows is initialized, as described in [Configuring the RM/InfoExpress Windows Server Program](#) (on page 30).

Note For information on specifying server configuration options on Windows, see the following topics:

- [Windows Server Command Line Options](#) (on page 31)
- [Windows Server Display Command Line Option](#) (on page 32)
- [Appendix D: Configuring RM/InfoExpress](#) (on page 87)

To start the RM/InfoExpress server for Windows:

1. Click **Start** on the task bar.
2. On Windows 2000 Server and Windows Server 2003, start the Windows Service Control Manager:
 - a. Click **Run**.
 - b. In the Run dialog box, in Open, type the following and then click **OK**:

```
services.msc
```

- c. Select **RM/InfoExpress Server** in the list of services.
- d. To start the service, press the **Start the service** link located to the left, or right-click over the service name and select **Start** from the pop-up menu.

These actions will launch the RM/InfoExpress server program for Windows, which initially runs under the System account and has access to any resources that this account is permitted to use. (Most systems log on to a System account, rather than a user account.) To change the account under which the server program runs, see [Configuring the RM/InfoExpress Windows Server Program](#) (on page 30).

3. In the RM/InfoExpress folder, double-click the **rmdistcp** icon to start the RM/InfoExpress server display program.

The RM/InfoExpress server main screen appears, as illustrated in [Figure 3: Server Display Main Screen](#) (on page 43). The server is ready to process requests from client machines.

Note The RM/InfoExpress Windows server display program, **rmdistcp.exe**, monitors the server activity and does not affect the communication between the client and server.

If the server main screen does not appear, check that no other RM/InfoExpress server program is already running on the machine. If other messages appear, contact Liant technical support services.

Note The RM/InfoExpress Windows server program can also be launched in user mode using the icon created by default in the RM/InfoExpress program folder. To start the server, simply double-click on the RM/InfoExpress Windows server icon. The server will run using the current account and will be terminated when you log out. When launched in this mode, there is also a small, 10- to 20-second delay before the server becomes active.

UNIX Server

On the UNIX server machine, start the RM/InfoExpress UNIX server and server display programs, **rmservertcp** and **rmdisptcp**, by entering the following commands:

```
/usr/rminfo/rmservertcp  
/usr/rminfo/rmdisptcp -t
```

The RM/InfoExpress server main screen appears, as illustrated in [Figure 3: Server Display Main Screen](#) (on page 43). The server is ready to process requests from client machines. If the server main screen does not appear, check that no other RM/InfoExpress server program is already running on the machine. If other messages appear, contact Liant technical support services.

Note For information on specifying server configuration options on UNIX, see the following topics:

- [UNIX Server Command Line Options](#) (on page 26)
- [UNIX Server Display Command Line Option](#) (on page 27)
- [Appendix D: Configuring RM/InfoExpress](#) (on page 87)

Verifying the RM/InfoExpress Windows Client

If you choose both the RM/InfoExpress Client and Verification Suite options when installing RM/COBOL for Windows, a program-item icon labeled **ixverify** is created in the RM/COBOL program folder. Choose this icon to invoke the RM/InfoExpress Windows client verification program. The RM/InfoExpress Client WinSock Info message box appears in the center of the screen, as illustrated in Figure 1.



Figure 1: RM/InfoExpress Client WinSock Info Message Box

If no message box appears, the RM/InfoExpress Windows client software is not properly installed or started. Check that the RM/InfoExpress Windows client DLL file (**rmtcp32.dll**) exists in your application installation directory.

Note This client verification does not attempt to connect to any server. It simply verifies that the Windows Sockets implementation is sufficient to allow the RM/InfoExpress Windows client DLL to be loaded and run.

Verifying RM/InfoExpress Windows Client and Server Communication

The following procedures verify that the RM/InfoExpress Windows client program can correctly communicate with the RM/InfoExpress server program using the TCP/IP communication protocol. We recommend that you first read Chapter 3: *Installation and System Considerations for Microsoft Windows*, in the *RM/COBOL User's Guide*, for more information.

1. Start the RM/InfoExpress server program running on the server machine, as described in [Verifying the RM/InfoExpress Server](#) (on page 17).
2. Select the RM/COBOL folder from the Windows desktop.
3. Copy the RM/COBOL Runtime folder icon to a new icon:
 - a. Choose the RM/COBOL Runtime icon by clicking the mouse pointer on the icon.
 - b. Right-click the RM/COBOL Runtime icon and choose the Copy option from the menu.
 - c. Move the mouse pointer to a new location, right-click, and choose the Paste option from the menu.

Note An alternative procedure to Steps 3 (b) and (c) is to hold down the Ctrl key and the mouse button simultaneously while dragging the icon to a new location. Then select the copied icon by clicking on it.

4. Modify the properties of the copied icon:
 - a. Right-click on the copy of the RM/COBOL Runtime icon and choose the Rename option from the menu.
 - b. Type a new name for the icon (for example, IXDEMO) and press Enter.
 - c. Right-click on the renamed copy of the RM/COBOL Runtime icon and choose the Properties option from the menu. The Properties dialog box is displayed.
 - d. Select the Shortcut tab.
 - e. Press End to enter input at the end of the existing command and then press Backspace to erase the question mark.
 - f. Do one of the following:

- For a UNIX server, enter the following:

```
\\server\usr\rminfo\infoxdmo x=rmtcp32.cfg
```

- For a Windows server, enter the following:

```
\\server\infoxdmo x=rmtcp32.cfg
```

Note You may type either backslashes (\) or forward slashes (/) to separate the edgenames of the path, but do not mix them. Notice the double backslashes or double forward slashes at the beginning. Substitute the actual machine name of your server machine (where the RM/InfoExpress server program is running as described in Step 1) for *server*. This name is usually displayed as Machine ID at the bottom of the server main screen, but it is whatever name is specified in your **hosts** file or known to your DNS that maps to the IP address of the UNIX server machine.

- Under UNIX, the rest of the path name assumes that RM/InfoExpress was installed into **/usr/rminfo** during the server installation procedure. If it was installed elsewhere, substitute the correct path name.
- Under Windows, RM/InfoExpress is normally installed in the **\Program Files\Liant\RMInfoExpress** directory, which is the server's current directory.

Step 4 (f) also adds a configuration record file to the **runcobol** command. This configuration record file (**rmtcp32.cfg**) is used by ixverify. It must reside in the directory named in the Working Directory text box shown in the Program Item Properties dialog box. This file should contain the following information:

```
EXTERNAL-ACCESS-METHOD CREATE-FILES=YES NAME=RMTCP32 OPTIONS=' I '
```

If you make an error, click Cancel and return to the beginning of Step 4.

- g. Click OK or press Enter to complete the modification. The dialog box closes and the new icon appears.

5. Run the new icon by double-clicking on it or pressing Enter with the icon selected.
6. The RM/InfoExpress Client WinSock Info message box appears on the screen, as described in [Verifying the RM/InfoExpress Windows Client](#) (on page 19).

Note This message box is displayed because the OPTIONS='I' keyword is specified on the EXTERNAL-ACCESS-METHOD configuration record in the **rmtcp32.cfg** file. In a production environment, omit OPTIONS='I' so that the message box will not appear.

7. Click OK or press Enter to acknowledge the message box.

The **infoxdmo** verification program window displays the following information:

```
RM/InfoExpress Verification Program
  1. RM/COBOL                               File Test
  2. RM/InfoExpress                           File Test
  3. Exit Program
                                           Enter test number
```

- a. If a return code 252 error (STOP sign) box is displayed, the **infoxdmo** verification program could not be loaded from the server.
 - b. If a “COBOL I/O error 30, Runtime Library error 11004” is displayed, the server name has probably been entered incorrectly. Click OK or press Enter. Return to Step 5 and then specify the correct server name in Step 6. If the server name was correct, check that the **hosts** file (or DNS) contains the server name and that the **services** file contains the proper [RMCFilerServer line](#) (see page 16).
 - c. If “COBOL procedure error 204” is displayed, the server name is correct but the remaining path is incorrect. Click OK or press Enter. Return to Step 5 and then specify the correct path name in Step 6.
 - d. Other return code values and other error codes are described in the *RM/COBOL User's Guide*, and in [Appendix A: Messages](#) (on page 67), of this manual. If an error message occurs, check the following:
 - 1) The status of the RM/InfoExpress server. (Is it still running?)
 - 2) The path name on the server machine of the **infoxdmo** verification program.
 - 3) The server name in your **hosts** file.
 - 4) The RMCFilerServer line in your **services** file.If you cannot determine the cause of the problem and correct it, contact Liant technical support services.
8. At the “Enter test number” prompt, type 2 and press Enter. The following prompt appears:

```
Enter remote directory where files are to be created.
```

9. Enter the name of the directory on the RM/InfoExpress server where the files are to be created. For example:

```
\\server\usr\rminfo
```

The directory must already exist on the server machine, and the RM/InfoExpress server user must have read and write permissions to it.

The **infoxmo** verification program creates one indexed file (**inxfl**) and performs five tests: write sequential, read sequential, read random, rewrite random, and delete random. Timing information for each test is shown.

10. When the five tests are complete, the “Type any key to continue . . .” prompt appears. At this point, RM/InfoExpress Windows client and server communication verification is successfully complete.

You may run other tests in the verification program, run test number 2 specifying a different server, or exit the program.

Verifying the RM/InfoExpress UNIX Client

To verify that the RM/InfoExpress UNIX client shared object program can be loaded, execute the RM/COBOL runtime with the `-v` option to display the banner with a list of support modules loaded by the RM/COBOL runtime system.

```
runcobol xxx -v
```

The shared object, **librminfo.so**, should be listed under the “Dynamic libraries loaded” section, as illustrated below.

```
RM/COBOL Runtime - Version nn.nn for IBM AIX.  
RM/COBOL Runtime System issued to any Company Name.  
Configured for one user.  
Copyright (c) 1985-2nnn by Liant Software Corp. All rights reserved.  
Registration Number: 8C-1000-15537-0001  
  
RM/COBOL: Dynamic libraries loaded:  
($EXEDIR=.)  
$EXEDIR/librmterm.so - Terminfo Terminal Interface - Version nn.nn.  
$EXEDIR/librminfo.so - RM/InfoExpress Client - Version nn.nn.
```

If the **librminfo.so** shared object does not appear in the Dynamic libraries loaded list, then the RM/InfoExpress client is not properly installed. Check that the RM/InfoExpress client shared object (**librminfo.so**) exists in the same directory as the RM/COBOL runtime (**runcobol**).

Verifying RM/InfoExpress UNIX Client and Server Communication

The following procedures verify that the RM/InfoExpress UNIX client program can correctly communicate with the RM/InfoExpress server program using the TCP/IP communication protocol. We recommend that you first read Chapter 2: *Installation and System Considerations for UNIX*, in the *RM/COBOL User's Guide*, for more information.

1. Start the RM/InfoExpress server program running on the server machine, as described in [Verifying the RM/InfoExpress Server](#) (on page 17).
2. Run the verification program, **infoxdmo**, using the RM/InfoExpress UNIX client program, **librminfox.so**, by entering the following command:

```
runcobol infoxdmo
```

The shared object, **librminfox.so**, will be loaded automatically by the RM/COBOL runtime system (**runcobol**).

3. Check that your **PATH** environment variable is set to point to the directory where **librminfox.so** and **runcobol** are installed, and the **RUNPATH** environment variable is pointing to the directory where **infoxdmo.cob** is present.

Note The **infoxdmo.cob** utility program may reside on your UNIX or Windows server machine. You can load the program across the network by specifying the server path in the **RUNPATH** environment variable. For example: **RUNPATH=//server/path**. Remember, however, when setting environment variables on UNIX, you must use forward slashes; for example, **RUNPATH=\\server\path**. Under UNIX, backslashes are treated as escape characters.

The **infoxdmo** verification program window displays the following information:

```
RM/InfoExpress Verification Program
  1. RM/COBOL                               File Test
  2. RM/InfoExpress                           File Test
  3. Exit Program
                                           Enter test number
```

- a. If a “COBOL I/O error 30” is displayed, look at the explanation in [Appendix A: Messages](#) (on page 67), or in the *RM/COBOL User's Guide* for the corresponding error.
- b. For any RM/InfoExpress error, check the following:
 - The status of the RM/InfoExpress server. (Is it still running?)
 - The server name in your **hosts** file.
 - The **RMCFilerServer** entry in your **services** file.

If you cannot determine the cause of the problem and correct it, contact Liant technical support for assistance.

4. At the “Enter test number” prompt, type 2 and press Enter. The following prompt appears:

```
Enter remote directory where files are to be created.
```

5. Enter the name of the directory on the RM/InfoExpress server where the files are to be created. For example:

```
//server/usr/rminfo
```

Note You may type either backslashes (\) or forward slashes (/) to separate the edgenames of the path, but do not mix them. Notice the double backslashes or double forward slashes at the beginning. Substitute the actual machine name (in uppercase) of your server machine (where the RM/InfoExpress server program is running as described in Step 1) for *server*. This name is usually displayed as Machine ID at the bottom of the server main screen, but it is whatever name is specified in your **hosts** file or known to your DNS that maps to the Internet Protocol address of the server machine.

The directory must already exist on the server machine and the RM/InfoExpress server must have read and write permissions to it.

The **infoxmo** verification program creates one indexed file (**inxfl**) and performs five tests: write sequential, read sequential, read random, rewrite random, and delete random. Timing information for each test is shown.

6. When the five tests are complete, the “Type any key to continue...” prompt appears. At this point, RM/InfoExpress client and server communication verification is complete.

You may run other tests in the verification program, run test number 2 specifying a different server, or exit the program.

Chapter 2: Configuring and Running the RM/InfoExpress Server

This chapter describes the procedures required to configure and run (start) the RM/InfoExpress servers for UNIX and Windows.

Server Configuration Options

RM/InfoExpress server configuration options can be set either in the server configuration file (**rmixsrvr.ini**) or on the command line. The command line specification overrides the configuration file setting. While Liant recommends that you specify the configuration options in the server configuration file, the ability to specify configuration options on the command line ensures backward compatibility with previous releases, and enables special, temporary invocations of the server without affecting the settings in the configuration file. For example, there may be times when it would be helpful to specify the `-d` option in order to create a debug file to send to Liant technical support services.

All command line options have a configuration file equivalent. However, starting with version 2.1, all new program options must be specified in the configuration file. There is no command line equivalent.

For more information, see [Appendix D: Configuring RM/InfoExpress](#) (on page 87).

Starting the RM/InfoExpress UNIX Server Program

On the UNIX server machine, start the RM/InfoExpress UNIX server and server display (screen handler) programs, **rmservertcp** and **rmdisptcp**, by entering:

```
/usr/rminfox/rmservertcp [-option]  
/usr/rminfox/rmdisptcp [-option]
```

Note 1 The RM/InfoExpress UNIX server display program, **rmdisptcp**, monitors the server activity and does not affect the communication between the client and server. On some machines, the server daemon may take a few seconds to initialize the underlying network. If the server display (**rmdisptcp**) is invoked immediately after the server is started, the server display program will wait until the network initialization is complete.

Note 2 If you start **rmservertcp** in a UNIX window opened using a telnet session on your workstation, then you may not be able to close the telnet session until the server is terminated. Always start the server from a terminal connected to the UNIX machine.

The RM/InfoExpress server main screen appears, as illustrated in [Figure 3: Server Display Main Screen](#) (on page 43). The server is ready to process requests from client machines. If the server main screen does not appear, follow the instructions in [Verifying the RM/InfoExpress Server](#) (on page 17).

The following sections describe the server program and server display program command line options.

UNIX Server Command Line Options

Command line options of the RM/InfoExpress UNIX server program (**rmservertcp**) can be any of the following:

- **-c n|u|l**. Indicates how the cases of path names from the clients are converted. The **-c** option has three values:
 - **-c n**. Indicates that no filename mapping is performed. This is the default value.
 - **-c u**. Indicates that the entire filename is mapped to uppercase before the Open request is attempted. The option may be specified as **-c upper**, if desired.
 - **-c l**. Indicates that the entire filename is mapped to lowercase before the Open request is attempted. The option may be specified as **-c lower**, if desired.

Note The **-c** command line option is equivalent to the `ConvertFileName` configuration option, which is discussed in [UNIX Server-Specific Configuration Options](#) (on page 97). The command line option overrides the configuration option.

- **-d *pathname***. This option causes the file *pathname* to be created and trace information to be written into it. After the RM/InfoExpress server program is terminated, send this file to Liant technical support services for further investigation. Use this option only when you are investigating a problem with

the help of Liant technical support services. Under normal conditions, using this option affects server operations negatively.

Note The `-d` command line option is equivalent to the `InfoxDebug` configuration option, as described in [Common Configuration Options](#) (on page 89). The command line option overrides the configuration option.

- **-k *dddd***. Indicates the maximum number of clients to be served. If more clients are to be served, the server should be brought down and started again. The default value is 50. This value cannot be greater than the number of clients for which the server is licensed.

Note The `-k` command line option is equivalent to the `UseCount` configuration option, which is described in [Common Server-Specific Configuration Options](#) (on page 94). The command line option overrides the configuration option.

- **-p *nnnnn***. Indicates the common buffer pool size. Do not change the default value for this parameter unless instructed by Liant technical support services.

Note The `-p` command line option is equivalent to the `FileBufferPool` configuration option, as explained in [Common Server-Specific Configuration Options](#) (on page 94). The command line option overrides the configuration option.

- **-z *nnnnn***. Indicates the maximum amount of data that can be handled by the TCP `send` function. The default value is system-dependent and has been set by Liant. Do not specify this parameter unless instructed to do so by Liant technical support services.

Note The `-z` command line option is equivalent to the `MaxSendSize` configuration option, which is discussed in [Common Configuration Options](#) (on page 89). The command line option overrides the configuration option.

UNIX Server Display Command Line Option

The following is an option for the RM/InfoExpress UNIX server display (screen handler) program, `rmdisptcp`:

- **-t**. Indicates that the user is requesting to terminate the server or communication to a particular client. If this option is not specified, the user can terminate only the server display program. Because the server display program does not support any configuration file, this option must be specified on the command line.

For example, the following command will allow the user to terminate the server program:

```
rmdisptcp -t
```

Starting and Stopping the RM/InfoExpress Windows Server Program

On the Windows server machine, it is necessary to start the Windows Service Control Manager (SCM) in the Windows Control Panel to run the RM/InfoExpress server software. Initially, the server is configured to be started and stopped manually. However, it can easily be reconfigured to start automatically when Windows is initialized, as described in [Configuring the RM/InfoExpress Windows Server Program](#) (on page 30).

Note See the description of the [server and server display program command line options](#) for Windows beginning on page 31.

Starting the Server

To stop the RM/InfoExpress server for Windows:

1. Click **Start** on the task bar.
2. On Windows 2000 Server and Windows Server 2003, start the Windows Service Control Manager:
 - a. Click **Run**.
 - b. In the Run dialog box, in **Open**, type the following and then click **OK**:

```
services.msc
```

- c. Select **RM/InfoExpress Server** in the list of services.
- d. To start the service, press the **Start the service** link located to the left, or right-click over the service name and select **Start** from the pop-up menu.

These actions will launch the RM/InfoExpress server program for Windows, which initially runs under the System account and has access to any resources that this account is permitted to use. (Most systems log on to a System account, rather than a user account.) To change the account under which the server program runs, see [Configuring the RM/InfoExpress Windows Server Program](#) (on page 30).

3. In the RM/InfoExpress folder, double-click on the **rmdistcp** icon to start the RM/InfoExpress server display program.

The RM/InfoExpress server main screen appears, as illustrated in [Figure 3: Server Display Main Screen](#) (on page 43). The server is ready to process requests from client machines. (The RM/InfoExpress Windows server display program, **rmdistcp.exe**, monitors the server activity and does not affect the communication between the client and server.)

Note Beginning in version 8, the **-t** command line option is automatically added to the server display program icon. The **-t** option allows you to terminate a server or the communication to a particular client when the server display program is terminated.

If the server main screen does not appear, check that no other RM/InfoExpress server program is already running on the machine. If other messages appear, contact Liant technical support services.

Note The RM/InfoExpress Windows server program also can be launched in user mode using the icon created by default in the RM/InfoExpress program folder. To start the server, simply double-click on the RM/InfoExpress Windows server icon. (You may wish to add command line options to the Target command line in the Shortcut tab of the Properties dialog box for the icon, or you may use the command line options from a DOS command line. For more information about Windows shortcuts, see “Creating a Windows Shortcut” in Chapter 3: *Installation and System Considerations for Microsoft Windows*, in the *RM/COBOL User’s Guide*.) The server will run using the current account and will be terminated when you log out. When launched in this mode, there is also a small, 10- to 20-second delay before the server becomes active.

Stopping the Server

To stop the RM/InfoExpress server for Windows:

1. Start the Windows Service Control Manager (SCM) and find the server in the list of services, as described previously.
2. On Windows 2000 Server and Windows Server 2003, click the **Stop the service** link located to the left, or right-click over the service name and click **Stop** from the pop-up menu.

The RM/InfoExpress server will terminate.

Note The server can also be terminated from within the RM/InfoExpress server display program (**rmdistcp.exe**) when that program is started with the -t option. When halted in this manner, it is possible that the Windows Service Control Manager (SCM) will not detect that the server has terminated. To restart the server, first stop the service and then start the service again, using the methods described in the previous topic.

Configuring the RM/InfoExpress Windows Server Program

It is possible to configure the RM/InfoExpress Windows server program to load automatically when Windows is started and to run under a specific log on account. Instructions follow for both configurations.

Starting the Server Automatically

To configure the RM/InfoExpress server to load automatically when Windows is started:

1. Start the Windows Service Control Manager and find the server in the list of services, as described in [Starting and Stopping the RM/InfoExpress Windows Server Program](#) (on page 28).
2. On Windows 2000 Server and Windows Server 2003, right-click over the service name and select **Properties** from the pop-up menu.
3. Under Startup Type, select **Automatic**.

The server will now be loaded automatically the next time Windows is started.

Running Under a Specific Log On Account

To configure the server to run under a specific account, take the following steps:

1. Start the Windows Service Control Manager and find the server in the list of services, as described in [Starting and Stopping the RM/InfoExpress Windows Server Program](#) (on page 28).
2. On Windows 2000 Server and Windows Server 2003, right-click over the service name and select Properties from the pop-up menu.
3. In the Properties dialog box, select the **Log On** tab.
4. Under the **Log On As** option, select either the **Local System Account** option to run the server under the default account, or enter the name and password of a selected account to run under another account.

Note Most services log on to a System account, rather than a user account.

Windows Server Command Line Options

Command line options for the RM/InfoExpress Windows server program (**rmsrvtcp.exe**), when launched from the icon or from a DOS command line, can be any of the following:

- **-d *pathname***. This option causes the file *pathname* to be created and trace information to be written into it. After the RM/InfoExpress server program is terminated, send this file to Liant technical support services for further investigation. Use this option only when you are investigating a problem with the help of Liant technical support services. Under normal conditions, using this option affects server operations negatively.

Note The -d command line option is equivalent to the InfoxDebug configuration option, as described in [Common Configuration Options](#) (on page 89). The command line option overrides the configuration option.

- **-k *dddd***. Indicates the maximum number of clients to be served. If more clients are to be served, the server should be brought down and started again. The default value is 50. This value cannot be greater than the number of clients for which the server is licensed.

Note The -k command line option is equivalent to the UseCount configuration option, which is described in [Common Server-Specific Configuration Options](#) (on page 94). The command line option overrides the configuration option.

- **-p *nnnnn***. Indicates the common buffer pool size. Do not change the default value for this parameter unless instructed by Liant technical support services.

Note The -p command line option is equivalent to the FileBufferPool configuration option, as explained in [Common Server-Specific Configuration Options](#) (on page 94). The command line option overrides the configuration option.

- **-z *nnnnn***. Indicates the maximum amount of data that can be handled by the TCP **send** function. The default value is system-dependent and has been set by Liant. Do not specify this parameter unless instructed to do so by Liant technical support services.

Note The -z command line option is equivalent to the MaxSendSize configuration option, which is discussed in [Common Configuration Options](#) (on page 89). The command line option overrides the configuration option.

Windows Server Display Command Line Option

The following is an option for the RM/InfoExpress Windows server display (screen handler) program, **rmdistcp.exe**:

- **-t.** Indicates that the user is requesting to terminate the server or communication to a particular client. If this option is not specified, the user can terminate only the screen display program. Because the server display program does not support any configuration file, this option must be specified on the command line.

For example, the following command will allow the user to terminate the server program:

```
rmdistcp.exe -t
```

Chapter 3: Using RM/InfoExpress with RM/COBOL for Windows Programs

This chapter describes the procedures required to use RM/InfoExpress for TCP/IP with RM/COBOL for Windows programs, including how to access the RM/InfoExpress Windows client program, how RM/COBOL for Windows programs point to network data files, and how to execute RM/COBOL for Windows programs for use with RM/InfoExpress.

Note For information on how to start the RM/InfoExpress server programs on either Windows or UNIX, refer to the appropriate sections in [Chapter 2: Configuring and Running the RM/InfoExpress Server](#) (on page 25).

Accessing the RM/InfoExpress Windows Client Program

The RM/InfoExpress Windows client program is **rmtcp32.dll**. The program is invoked automatically by the RM/COBOL runtime system program for Windows (**runcobol**) when an EXTERNAL-ACCESS-METHOD record, specifying NAME=RMTCP32, is included in the RM/COBOL configuration file. See the EXTERNAL-ACCESS-METHOD configuration record section in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*, for more information.

Note The OPTIONS='I' keyword, which causes an informative message box to appear, normally should not be specified on the EXTERNAL-ACCESS-METHOD configuration record. Other client-specific configuration options are described in [Appendix D: Configuring RM/InfoExpress](#) (on page 87).

Pointing to Network Data Files

This section describes several different methods that can be used in an RM/COBOL for Windows program to specify the path names of remote network data files, which are to be accessed by RM/InfoExpress.

Specifying Synonyms

Generally, RM/COBOL programs contain synonyms in the *file-access-name* field of the SELECT clause. For example:

```
SELECT INX-FILE ASSIGN TO RANDOM, "inxfl"
```

The synonyms are mapped to the actual path name before executing the RM/COBOL program.

Synonym specification depends on the operating system on which the runtime system application and the RM/InfoExpress client software are running. If you are using RM/COBOL for Windows 9x or Windows NT class, synonyms are specified by setting properties.

For example, to access a file on a UNIX server from a Windows 9x-class or Windows NT-class client, set the following synonym:

```
inxfl=\\Unix_server\usr\infox\inxfl
```

In this example, the synonym **inxfl** points to a file **inxfl** in directory **infox** of directory **usr** on a UNIX server, **Unix_server**. It is also possible to use DOS environment variables (created with the DOS SET command) as synonyms if the Windows runtime system is started with a command line from a DOS box running under Windows. For more information, refer to the "Directory Search Sequences" section in Chapter 3: *Installation and System Considerations for Microsoft Windows*, of the *RM/COBOL User's Guide*.

Here are three examples using synonyms:

Example 1

```
inxfl=\\Unix_server\usr\infox\inxfl
```

Example 2

```
relfl=Q:\usr\infox\relfl
```

Example 3

```
inxfl=\\Win_server\SharedFiles\inxfl
```

where:

inxfl and **relfl** (specified on the left side of the SET expression) are both synonyms.

Unix_server is the name of the UNIX server accessed by RM/InfoExpress, as shown in the **hosts** file or as known by DNS.

Q is a drive letter mapped to a UNIX server.

\usr\infox\inxfl and **\usr\infox\relfl** are the path names on the server.

Win_server is the name of the Windows server, as shown in the **hosts** file or as known by DNS.

SharedFiles is the share name known to the Windows server running on *Win_server*.

In Examples 1 and 3, RM/InfoExpress is able to process the **inxfl** file because the path name begins with double backslashes (\\). It could also begin with double forward slashes (/).

In Example 2, RM/InfoExpress is unable to process the **relfl** file because it is not using the appropriate naming convention. Processing, however, is handled through conventional network access.

Thus, for RM/COBOL files specified by filename only, you may access server files by using a synonym that points to a server directory.

Specifying RUNPATH Environment Variables

Specifying an RM/InfoExpress server in one of the RUNPATH components causes RM/COBOL to access the file using RM/InfoExpress. For example:

```
RUNPATH=C:\prog;N:\data;\\Unix_server\usr\data;  
\\Win_server\Shares\data
```

causes RM/COBOL to search for a file first in the directory **prog** on the local disk C; then in the directory **data** on the network drive **N**: (assuming that drive N is mapped to a network volume) using conventional network access; next in the subdirectory **data** of directory **usr** on the server **Unix_server** using RM/InfoExpress; and lastly, in the directory **data** in whatever directory is associated with the **Shares** share name on **Win_server** using RM/InfoExpress.

For more information on the RUNPATH environment variable specification, refer to the “Locating RM/COBOL Files” section in Chapter 3 of the *RM/COBOL User’s Guide*.

Specifying Explicit Path Names in the RM/COBOL Program

You must change the path name in the SELECT clause of the RM/COBOL program for filenames that include drive specifiers, computer names, or directory paths, and that do not already point to a server directory. For example:

```
SELECT DATA-FILE ASSIGN TO RANDOM,  
"\\Unix_server\usr\infox\data.fil"
```

This type of path name specification makes the program less portable, however, because whenever the location of the file **data.fil** changes (from one server to another), you must recompile the source program.

Specifying Complete Path Names Using RM/COBOL Data-Names

Some RM/COBOL programs use data-names to change path names dynamically. For example, the SELECT statement:

```
SELECT INX-FILE ASSIGN TO RANDOM, DATA-FIL
```

In this example, DATA-FIL is the data-name defined in the DATA DIVISION, and it contains the complete path name of the file at the time the file was opened. These data-names must include the name of a UNIX machine or the Windows server on which an RM/InfoExpress server is running. For example, DATA-FIL could contain the following:

```
\\Unix_server\usr\infox\data.fil
```

Executing RM/COBOL Programs

Execute your RM/COBOL program by entering the following command line, as described in the “System Configuration” section of Chapter 3: *Installation and System Considerations for Microsoft Windows*, of the *RM/COBOL User's Guide*.

```
runcobol name [option]
```

where:

name points to RM/COBOL object files.

option is any valid RM/COBOL Runtime Command option.

Before executing the **runcobol** command, set up the environment to create and access files on the server machine, and create a configuration file to define the external access method.

Execute the RM/COBOL verification suite for Windows, as described in Chapter 5: *System Verification*, of the *RM/COBOL User's Guide*.

Chapter 4: Using RM/InfoExpress with RM/COBOL for UNIX Programs

This chapter describes the procedures required to use RM/InfoExpress with RM/COBOL for UNIX programs, including how to access the RM/InfoExpress UNIX client program, how RM/COBOL for UNIX programs point to network data files, and how to execute RM/COBOL for UNIX programs for use with RM/InfoExpress.

Note For information on how to start the RM/InfoExpress server programs on either UNIX or Windows, refer to the appropriate sections in [Chapter 2: *Configuring and Running the RM/InfoExpress Server*](#) (on page 25).

Accessing the RM/InfoExpress UNIX Client Program

The RM/InfoExpress client shared object for UNIX is named **librminfo.so**.

By specifying the keyword NAME=NONE on the EXTERNAL-ACCESS-METHOD record in the configuration file , you can bypass the RM/InfoExpress UNIX client code in **librminfo.so**. See the EXTERNAL-ACCESS-METHOD configuration record section in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*, for more information.

Pointing to Network Data Files

This section describes several different methods that can be used in an RM/COBOL for UNIX program to specify the path names of remote network data files, which are to be accessed by RM/InfoExpress.

Specifying Synonyms

Generally, RM/COBOL programs contain synonyms in the *file-access-name* field of the SELECT clause. For example:

```
SELECT INX-FILE ASSIGN TO RANDOM, "inxfl"
```

The synonyms are mapped to the actual path name before executing the RM/COBOL program.

Synonym specification depends on the operating system on which the runtime system application and the RM/InfoExpress client software are running. For example, to access a file on a UNIX server from a UNIX client, execute the following command (assuming Bourne shell) prior to invoking the client:

```
inxfl=//UNIX_SERVER/usr/infox/inxfl; export inxfl
```

In this example, the synonym **inxfl** points to a file **inxfl** in directory **infox** of directory **usr** on a UNIX server, **UNIX_SERVER**. See also the description of synonyms in the “Directory Search Sequences” section in Chapter 2: *Installation and System Considerations for UNIX*, of the *RM/COBOL User’s Guide*.

Specifying RUNPATH Environment Variables

Specifying an RM/InfoExpress server in one of the RUNPATH components causes RM/COBOL to access the file using RM/InfoExpress. For example:

```
RUNPATH=/usr/local/infox://UNIX_SERVER/usr/data://  
Win_server/Shares/data
```

causes RM/COBOL to search for a file first in the directory **/usr/local/infox** on the local disk using conventional network access; then in the directory **data** in directory **usr** on **UNIX_SERVER** using RM/InfoExpress; and lastly, in the directory **data** in whatever directory is associated with the **Shares** share name on **Win_server** using RM/InfoExpress.

For more information on the RUNPATH environmental variable specification, refer to the “Locating RM/COBOL Files” section in Chapter 2 of the *RM/COBOL User’s Guide*.

Specifying Explicit Path Names in the RM/COBOL Program

For filenames that include directory paths and that do not already point to a server directory, you must change the path name in the SELECT clause of the RM/COBOL program. For example:

```
SELECT DATA-FILE ASSIGN TO RANDOM,  
       "//UNIX_SERVER/usr/infox/data.fil"
```

This type of path name specification makes the program less portable, however, because whenever the location of the file **data.fil** changes (from one server to another), you must recompile the source program.

Specifying Complete Path Names Using RM/COBOL Data-Names

Some RM/COBOL programs use data-names to change path names dynamically. For example, the SELECT statement:

```
SELECT INX-FILE ASSIGN TO <RANDOM> DATA-FIL
```

In this example, DATA-FIL is the data-name defined in the DATA DIVISION, and it contains the complete path name of the file at the time the file was opened. These data-names must include the name of a UNIX machine or the Windows server on which an RM/InfoExpress server is running. For example, DATA-FIL could contain the following:

```
//UNIX_SERVER/usr/infox/data.fil
```

Executing RM/COBOL Programs

Execute your RM/COBOL program by entering the following command line on the terminal of your UNIX client machine:

```
librminfox name [option]
```

where:

name points to RM/COBOL object files.

option is any valid RM/COBOL Runtime Command option.

Before executing the **librminfox** command, set up the environment to create and access files on the server machine.

Execute the RM/COBOL verification suite for UNIX, as described in Chapter 5: *System Verification*, of the *RM/COBOL User's Guide*.

Chapter 5: RM/InfoExpress Server Operations

The RM/InfoExpress user interface is implemented for UNIX character-based terminals and the Windows console interface. The RM/InfoExpress server display (screen handler) program examines information and data from the server and client, and updates the screen once every second.

CAUTION Multiple server display applications, with screens other than the main screen displayed, may affect the server performance. As long as the server display program is running with its main menu selected, it does not noticeably affect the server performance.

Keyboard Functions

The following list describes the keys used in the RM/InfoExpress server display program.

Key	Action
<i>n N</i>	Any command or response may be selected by pressing the first character of the command. Case is not important. For example: S for Select file, t for Terminate, or a number, if appropriate.
Escape (Esc)	Selects No in response to a query from the command line. Also backtracks through a menu path.
Home	Returns to the RM/InfoExpress server display main screen.
Up Arrow	Moves the cursor up during client or file selection.
Down Arrow	Moves the cursor down during client or file selection.
Left Arrow	Moves the cursor left during the selection of menu commands and responses.
Right Arrow	Moves the cursor right during the selection of menu commands and responses.
Page Up (PgUp) or Ctrl+B	Scrolls the screen up to examine and review client and file information.
Page Down (PgDn) or Ctrl+F	Scrolls the screen down to examine and review client and file information.
Enter	Chooses the currently highlighted item for command and response selection, and for individual client or file selection.

Server Display Screen Format

Except for the main screen (illustrated on the following page), each RM/InfoExpress server display program screen has the same basic format, as illustrated in Figure 2.

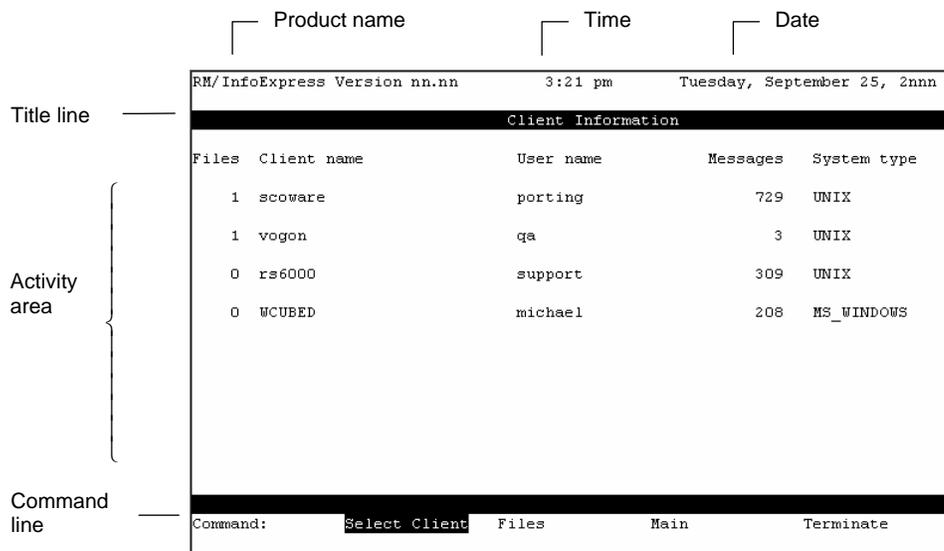


Figure 2: Server Display Screen Format

The elements of the RM/InfoExpress server display screen are described as follows:

- **Activity area.** The activity area contains information related to the current activity or server display screen.
- **Command line.** The command line, located at the bottom of the screen, shows command names, user prompts, or user queries.
- **Date.** The date area displays the current system date.
- **Product name.** The product name displays the product name and version information.
- **Time.** The time area displays the current system time.
- **Title line.** The title line displays the name of the server display screen.

Server Display Commands

The first screen you see when you start the RM/InfoExpress server display program is the RM/InfoExpress main screen, as illustrated in Figure 3.

```
LIANT SOFTWARE CORPORATION

RM/InfoExpress Version nn.nn
Copyright 1986-2nnn All Rights Reserved
Liant Software Corporation
Registration Number: 9D-0090-10016-0016

2:53 pm Sunday, July 31, 2nnn Up 10 days

Active clients          4
Open files              2
Dynamic load           0.0 %
Messages processed     1,296

Machine ID: MyCOMPUTER
Command:  Clients      Files      Log      Terminate
```

Figure 3: Server Display Main Screen

The RM/InfoExpress server display main screen lists the current time, date, the uptime (in days), and identifies the RM/InfoExpress server machine (in the Machine ID field). It also provides an overview of current network activity, including the following:

- The Active clients field indicates the total number of clients currently connected to this RM/InfoExpress server. Other programs using RM/COBOL are not shown.

Note that the active client count on the main screen of the server display program sometimes shows a value that is more than the number of clients actually connected. This behavior is most noticeable when sessions are established and released rapidly.

- The Open files field records a count of the number of files currently open.
- The Dynamic load field shows the percentage of CPU utilization by the server.
- The Messages processed field indicates the number of client requests honored by the server.

The command line at the bottom of the server display main screen contains the following command options:

- **Clients.** This command lists all clients and reports on specific clients. Clients may be selected any time the Clients field appears in the command line. See [Client Information](#) (on page 44).
- **Files.** This command lists all currently open files and reports on specific files. Files may be selected any time the Files field appears in the command line. See [File Information](#) (on page 46).
- **Log.** This command provides access to two sub-screens: Open Log and Error Log. Select log information from a command line or by pressing the letter **L** at

any time. See [Open Log Information](#) (on page 47) and [Error Log Information](#) (on page 48).

- **Terminate.** This command provides a number of termination modes. Terminate may be selected any time the Terminate field appears in the command line. See also [Termination of Communication Activity](#) (on page 50).

Each command and its associated screens, prompts, and queries are described in the following sections. To return to the server display main screen from any of the following screens, press the letter **M** or choose **Main** from the command line.

Client Information

The Client Information screen, illustrated in Figure 4, appears when you choose the **Clients** command from the RM/InfoExpress server display main screen.

```
RM/InfoExpress Version nn.nn      3:21 pm      Tuesday, September 25, 2nnn
Client Information
Files  Client name      User name      Messages      System type
  1  scoware           porting        729           UNIX
  1  vogon            qa             3             UNIX
  0  rs6000           support        309           UNIX
  0  WCUBED           michael        208           MS_WINDOWS
Command:  Select Client  Files      Main      Terminate
```

Figure 4: Client Information Screen

The Client Information screen lists all active clients by name, the number of files each client has open, the total number of messages processed for each client, and the type of operating system on which the client is running. Whenever there are more clients or files than can be displayed on a single screen, a message appears on the screen advising that Page Up or Page Down may be used to request the previous or next screen.

Use the command **Select Client** to select a particular client in order to see information that is more detailed. Press Enter or the letter **S** to choose the **Select Client** command. The following prompt appears on the command line:

```
Select Client to display (using PgUp, PgDn, or Arrow keys)
```

Use Page Up, Page Down, or the arrow keys to select a client and press Enter. The Client Files screen appears, as illustrated in Figure 5.

```
RM/InfoExpress Version nn.nn      3:22 pm      Tuesday, September 25, 2nnn
Client Files
qa@vogon has 1 files open:      3 messages
ORG OPEN  ACCESS  FILENAME
INX I-O   Dynamic  c:\rminfox\rmqa\INXFA
Command:  Clients  Files  Main  Terminate
```

Figure 5: Client Files Screen

The Client Files screen shows the total number of files currently opened by the client, and the total number of messages passed between the client and the server. For each open file, the Client Files screen also shows the following information.

- The ORG column indicates the file organization:
 - INX (Indexed)
 - SEQ (Sequential)
 - REL (Relative)
- The OPEN column indicates the type of open mode:
 - I-O (Input/Output)
 - Input
 - Output
 - Extend
- The ACCESS column indicates the type of access:
 - Dynamic
 - Sequent(ial)
 - Random
- The FILENAME column indicates the absolute path name.

File Information

The File Information screen, illustrated in Figure 6, appears when you choose the **Files** command from the RM/InfoExpress server display main screen.

```
RM/InfoExpress Version nn.nn          3:23 pm          Tuesday, September 25, 2nnn
-----
File Information
-----
Open count  File name
-----
          1  c:\rminfo\rmqa\INXFA
          1  d:\rminfo\PINXFL
-----
Command:  clients          Select File          Main          Terminate
```

Figure 6: File Information Screen

The File Information screen lists the absolute path name for each file and the number of times each file has been opened. Whenever there are more clients or files than can be displayed on a single screen, a message appears on the screen advising that Page Up or Page Down may be used to request the previous or next screen.

Use the command **Select File** to select a particular file in order to see information that is more detailed. Press Enter or type the letter **S** to choose the **Select File** command. The following prompt appears on the command line:

```
Select file to display (using PgUp, PgDn or Arrow keys)
```

Use Page Up, Page Down, or the arrow keys to select a file and press Enter. The File Clients screen appears, as illustrated in Figure 7.

```

RM/ InfoExpress Version nn.nn      3:24 pm      Tuesday, September 25, 2nnn
-----
File Clients
-----
c:\rminfox\rmqa\INXFA open   1 times:

    qa@vogon

-----
Command:  Clients      Files      Main      Terminate
    
```

Figure 7: File Clients Screen

The File Clients screen shows the number of clients that have opened this file since the server was initiated and lists the clients that currently have the file open.

Open Log Information

The Open Log screen, illustrated in Figure 8, appears when you choose the **Log** command from the RM/InfoExpress server display main screen, and then choose the **Open Log** command or press the letter **O**. The Open Log screen displays information about a maximum of 24 previous opens by the server, beginning with the latest open.

```

RM/ InfoExpress Version nn.nn      3:25 pm      Tuesday, September 25, 2nnn
-----
Open Log
-----
Client/User  File name                Error      Exist?   Org Time
-----
scoware      d:\rminfox\PINXFL        Yes        Yes      INX 15:15:51
porting
WCUBED       c:\rminfox\seqf1        Yes        Yes      SEQ 15:15:15
michael
WCUBED       c:\rminfox\seqf1        Yes        Yes      SEQ 15:15:15
michael
WCUBED       c:\rminfox\seqf1        Yes/No     Yes      SEQ 15:15:15
michael
WCUBED       c:\rminfox\seqf1        35,01     Yes      SEQ 15:15:15
michael
HEADY        d:\rminfox\inxfl        35,01     Yes      INX 15:12:33
rs6000
support      c:\rminfox\relf1        Yes        Yes      REL 15:10:19
rs6000
support      c:\rminfox\relf1        Yes        Yes      REL 15:10:16
PgDn (Ctrl-F) for more
-----
Command:  Main      Freeze      Unfreeze      Toggle
    
```

Figure 8: Open Log Screen

Note On Open Log and Error Log (see page 48) screens, filenames up to 32 characters long and client names up to 12 characters long can be displayed without loss of information. If necessary, use the DotsBias option, described in [Common Server-Specific Configuration Options](#) (on page 94), to control which part of longer filenames is lost. To navigate to the Error Log screen from this location, press the Esc key (to go back to the previous screen), followed by the letter E.

The command line provides three commands: **Freeze**, **Unfreeze**, and **Toggle**. To choose a command, use the arrow keys or press the first letter of the desired command.

The **Freeze** command temporarily suspends the updating of the Open Log screen for that particular server display application. However, it does not affect the logging of the new opens into the data structures by the server.

The **Unfreeze** command causes the server display program to update the Open Log screen with the information from the server data structures.

The **Toggle** command causes the information on the Open Log screen to be displayed in a different form, illustrated in Figure 9, which is useful for Liant technical support.

RM/InfoExpress Version nn.nn					3:25 pm	Tuesday, September 25, 2nnn
Open Log						
Client/User	File name	Error	Flags	Org	Time	
scoware	d:\rminfox\PINXFL		00,C9,28	INX	15:15:51	
porting						
WCUBED	c:\rminfox\seqf1		80,59,0C	SEQ	15:15:15	
michael						
WCUBED	c:\rminfox\seqf1		80,49,08	SEQ	15:15:15	
michael						
WCUBED	c:\rminfox\seqf1		80,60,09	SEQ	15:15:15	
michael						
WCUBED	c:\rminfox\seqf1	35,01	80,61,09	SEQ	15:15:15	
michael						
HEADY	d:\rminfox\inxfl	35,01	80,E1,09	INX	15:12:33	
rs6000						
support	c:\rminfox\relf1		80,FD,0C	REL	15:10:19	
rs6000						
support	c:\rminfox\relf1		80,C9,08	REL	15:10:16	
PgDn (Ctrl-F) for more						
Command: Main Freeze Unfreeze Toggle						

Figure 9: Open Log Screen (Toggled)

Error Log Information

The Error Log screen, illustrated in Figure 10, appears when you choose the **Log** command from the RM/InfoExpress server display main screen, and then choose the **Error Log** command or press the letter **E**. The Error Log screen displays a maximum of 24 errors, beginning with the most recent error. It also lists the name of the client for which the error was issued, the error code detected by the server, the time the error occurred, the location within the RM/InfoExpress server code at which the error occurred, and an explanation (or status) of the error.

RM/InfoExpress Version nn.nn					3:28 pm	Tuesday, September 25, 2nnn
Error Log						
Client/User	Error	Time	Loc	Command/Filename		
scoware	10	15:26:34	17	Read Next Record		
porting				d:\rminfo\x\PINXFL		
vogon	10	15:26:13	17	Read Next Record		
qa				c:\rminfo\x\rmqa\INXFA		
WCUBED	35,01	15:15:15	17	Open Output, File must exist		
michael				c:\rminfo\x\seqfl		
HEADY	35,01	15:12:33	17	Open Output, File must exist		
				d:\rminfo\x\inxfl		
rs6000	35,01	15:10:16	17	Open Output, File must exist		
support				c:\rminfo\x\relfl		
rs6000	30,12,3	15:09:45	17	Open Output, File may/may not exist		
support				C:\Program Fil...ss\cdrvie\relfl		
rs6000	35,01	15:09:45	17	Open Output, File must exist		
support				C:\Program Fil...ss\cdrvie\relfl		
					PgDn (Ctrl-F) for more	
Command:	<u>M</u> ain	Freeze	Unfreeze	Toggle		

Figure 10: Error Log Screen

Note On Error Log and Open Log (see page 47) screens, filenames up to 32 characters long and client names up to 12 characters long can be displayed without loss of information. If necessary, use the DotsBias option, described in [Common Server-Specific Configuration Options](#) (on page 94), to control which part of longer filenames is lost. To navigate to the Open Log screen from this location, press the Esc key (to go back to the previous screen), followed by the letter O.

The command line provides three commands: **Freeze**, **Unfreeze**, and **Toggle**. To choose a command, use the arrow keys or press the first letter of the desired command.

The **Freeze** command temporarily suspends the updating of the Error Log screen for that particular server display application. However, it does not affect the logging of the new errors into the data structures by the server.

The **Unfreeze** command causes the server display program to update the Error Log screen with the information from the server data structures.

The **Toggle** command causes the information on the Error Log screen to be displayed in a different form, illustrated in Figure 11, which is useful for Liant technical support.

RM/InfoExpress Version nn.nn		3:28 pm		Tuesday, September 25, 2nnn	
Error Log					
Client/User	Error	Time	Loc	F&P	Message
scoware	10	15:26:34	17	01 FF 12 00 00 01 0A 03 01 06 19 01 82 1E	
porting				01 19 05 04 BC OF 6B 00 07 10 53 68 61 72	
vogon	10	15:26:13	17	01 FF 12 00 00 01 0A 03 01 06 19 01 82 1E	
qa				01 28 05 04 CC OF 6B 00 0F 6B 00 24 06 00	
WCUBED	35,01	15:15:15	17	01 FF 24 00 00 01 01 03 01 02 0A 01 1E 0D	
michael				01 08 0E 01 08 16 04 80 61 09 00 06 0D 5C	
HEADY	35,01	15:12:33	17	01 FF 34 00 00 01 01 03 01 06 0A 01 1E 0D	
				01 08 0E 01 08 12 08 03 00 00 03 00 09	
rs6000	35,01	15:10:16	17	01 FF 24 00 00 01 01 03 01 04 0A 01 1E 0D	
support				01 08 0E 01 08 16 04 80 E1 09 00 06 0D 2F	
rs6000	30,12,3	15:09:45	17	01 FF 24 00 00 01 01 03 01 04 16 04 80 E0	
support				09 00 0A 01 1E 0D 01 08 0E 01 08 06 0D 2F	
rs6000	35,01	15:09:45	17	01 FF 24 00 00 01 01 03 01 04 0A 01 1E 0D	
support				01 08 0E 01 08 16 04 80 E1 09 00 06 0D 2F	

PgDn (Ctrl-F) for more

Command:	Main	Freeze	Unfreeze	Toggle
----------	------	--------	----------	--------

Figure 11: Error Log Screen (Toggled)

Termination of Communication Activity

The **Terminate** command provides access to a variety of termination nodes.

When you select the **Terminate** command from anywhere within the RM/InfoExpress server program, the Terminate command line appears, as illustrated in Figure 12.

Terminate:	Display	Client	Server
------------	---------	--------	--------

Figure 12: Terminate Command Line

The **Terminate** commands are described in the next sections.

Note To avoid terminating the RM/InfoExpress server program accidentally, the default behavior of the RM/InfoExpress server display program has changed. When you start the screen display program, you can terminate only the screen display program itself, not the server program or communication to a particular client. The Terminate command line on the server display main screen will show only the Display command. However, if the **-t** option is specified on the command line for the server display program, then you may also terminate the server or communication to a particular client. The illustration in Figure 12 and the following discussion assume that the **-t** option is specified for the screen display program. For more information, see [UNIX Server Display Command Line Option](#) (on page 27) and [Windows Server Display Command Line Option](#) (on page 32).

Termination of Server Display

It is possible to temporarily terminate the screen interface (server display program) in order to increase the processing power of the server. Press the letter **D** to choose the **Display** command from the Terminate command line. The server display program will be terminated without affecting the server or any clients.

Termination of Client Communications

Termination of communications between the client and server should be requested only if the particular client is interfering with other clients on the network (for instance, a runaway program has left a record locked). Keep in mind that any access to open files will result in I/O errors on shared files on the terminated client. This action does not remove the client program.

Press the letter **C** to choose the **Client** command from the Terminate command line. The **Client Information screen** (see page 44) appears with the following prompt at the command line:

```
Select Client to terminate (using PgUp, PgDn or Arrow Keys)
```

Use Page Up, Page Down, or the arrow keys to select a client and press Enter. The **Client Files screen** appears (see page 45) with the following prompt at the command line:

```
Terminate selected Client? No Yes
```

Press the letter **Y** to terminate communication. Press Enter or Escape or the letter **N** to cancel the command.

Note The use of the server display (screen handler) program is for administrative purposes only. When invoked multiple times, only one administrator should perform operations such as terminating clients.

Termination of the Server

To terminate the server, press the letter **S** from the Terminate command line. The following command line appears, as illustrated in Figure 13.



```
Quit: When Idle In a while Now
```

Figure 13: Quit Command Line

The **Quit** commands are described in the following sections.

Quit When Idle

Press the letter **W** to choose the **When Idle** command. The following prompt appears:

```
Quit when idle?
```

Press the letter **N** or press Escape to cancel the command. Otherwise, when all clients are idle, the following prompt appears:

```
Terminate Server Now? No Yes
```

Press the letter **Y** to terminate the server immediately. Press the letter **N**, Escape, or Home to cancel the command.

Quit in a While

Press the letter **I** to choose the **In A While** command. The following command line appears, as illustrated in Figure 14.

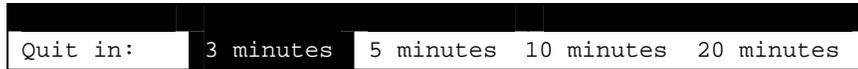


Figure 14: Quit in a While Command Line

When you choose one of the time options, the number of minutes will decrement as the specified time elapses. You can cancel the termination at any time by pressing the letter **N** or Escape. Otherwise, when all clients are idle, the following prompt appears:

```
Terminate Server Now? No Yes
```

Press the letter **Y** to terminate the server immediately. Press the letter **N**, Escape, or Home to cancel the command.

Quit Now

Press the letter **N** to choose the **Now** command. The following prompt appears:

```
Terminate Server Now? No Yes
```

Press the letter **Y** to terminate the server immediately. Press the letter **N**, Escape, or Home to cancel the command.

The recommended way to terminate the server is by using the command sequence (Terminate, Server, Now, Yes) of the screen display (screen handler) program when no active client is connected.

WARNING Never attempt to terminate one or more RM/InfoExpress UNIX server processes using the **kill** command. This may cause the server to terminate without cleaning up resources and closing open files. For example, using the **kill** command causes the server to exit without removing the IPC (Inter Process Communications) objects, such as shared memory segments and semaphores. As a result, when the server is started next time, it fails with server error code 1 (RMIX_API_ERR_SERVER_ALREADY_EXISTS). For more information, see [Removing IPC Objects After Server Failure](#) (on page 85) in Appendix C: *Troubleshooting*.

Chapter 6: File Security on the RM/InfoExpress UNIX Server

An important consideration in RM/InfoExpress is protecting the system and its data from unauthorized access. This chapter describes the implementation of file security on the RM/InfoExpress UNIX server and the authentication procedures performed by the server on various clients to grant access to the files on the server.

UNIX System Security

The basic security features of UNIX operating systems allow a user of a UNIX server to belong to one of three categories of file access: Owner, Group, and Others. Each category of users can have different access permissions to files. The possible file access permissions are read, write, and execute. For example, if only the Owner of the file has write permission, the UNIX operating system will prevent any other user from writing to the file.

On a standalone UNIX server, the operating system validates the authenticity of the user at login time using information stored in the system password file and other security files. In a networked, client/server environment, however, users may log in to the UNIX server from remote, non-UNIX clients. To validate users on these clients, UNIX uses other security database files such as `.rhosts` or `hosts.equiv`. For more information, see [.rhosts File Entry](#) (on page 56).

Note The RM/InfoExpress UNIX server software does not look at `hosts.equiv`, nor does it use the `ruserok` function.

When a user on a remote client logs in to the UNIX server, the networking software on the client passes information to the server about that user, including the server user name, password, and client machine name. After the user has been authenticated, the user on the remote client is allowed to access the files on the server as one of the local users of that server. For more information on file security provided by the UNIX operating system, refer to your UNIX system documentation.

RM/InfoExpress File Security

The implementation of file security in RM/InfoExpress uses the UNIX system security philosophy to protect the files on the RM/InfoExpress UNIX server from unauthorized access by users on client machines. To be able to use the file security features of RM/InfoExpress, a security parameter file, **ixpwwfile**, must be created on each client machine and each UNIX server using the utility program, **ixsecure.cob**. For more information on this utility, see [Appendix E: RM/InfoExpress Security Parameter File Update Utility](#) (on page 101).

On a client machine, **ixpwwfile** contains information needed to connect the RM/InfoExpress client to different RM/InfoExpress UNIX servers. Similarly, on the server, **ixpwwfile** is created by the server administrator and contains information that permits different clients to be connected to this server. Only the server administrator should have read and write permissions to the server security parameter file.

The client passes information obtained from **ixpwwfile** to the server when a session is established. The server validates this information against the server's version of **ixpwwfile**.

RM/InfoExpress UNIX Server Security Levels

The RM/InfoExpress UNIX server can be invoked at one of six security levels using the configuration option, `ServerSecurityLevel=number`, where *number* has a value in the range of 0 through 5. These six security levels are described in Table 2. Refer also to [Appendix D: Configuring RM/InfoExpress](#) (on page 87), for more information about server configuration.

If the `ServerSecurityLevel` option is absent in the configuration file, the server runs in “compatibility mode”; that is, the server behaves like a version 2.0 RM/InfoExpress UNIX server. See [Server Compatibility with Older and Newer Clients](#) (on page 58).

Note Older RM/InfoExpress clients can only connect to RM/InfoExpress servers running at security levels “compatible”, 0, or 1.

At other security levels, the server performs various tests on the client to validate its authenticity to access files on the server. These tests become more stringent as the security level increases, which means that starting the server at level 5 provides the highest level of security to files on the server.

When the RM/InfoExpress UNIX server is run with security enabled, the server-user-name passed from the client is used, if possible, as the User ID while accessing files. If the server-user-name is not present (as is the case for older versions of the RM/InfoExpress client) or invalid, the server will either run the process with the default server user or disallow the client connection to the server. Only servers running at security level 0 or 1 will use the default server user. A server running at security level 0 or 1 will terminate with an error if the default server user is invalid. Servers running at security level 2 or higher will disallow the client connection unless the server-user-name is present and valid. See [Setting Up the Network to Run RM/InfoExpress with Security Enabled](#) (on page 58) for more information.

The RM/InfoExpress UNIX server security levels are summarized in Table 2. Terminology used in the table is defined following the table.

Table 2: RM/InfoExpress UNIX Server Security Levels

Server Security Level	Requires	To
0	A valid server-user-name.	Verify that server-user-name is valid. If validation fails, server runs the process as the default server user.
1	A valid server-user-name. An appropriate entry in the .rhosts file	Verify that server-user-name and .rhosts entry are valid. If validation fails, server runs the process as the default server user.
2	A valid server-user-name. An appropriate entry in the .rhosts file.	Verify that server-user-name and .rhosts entry are valid. If validation fails, client connection is disallowed.
3	A valid server-user-name. An appropriate entry in the ixpfile file. The correct user password. The password is normally obtained from ixpfile on the client.	Verify that server-user-name and password are valid. If validation fails, client connection is disallowed.
4	A valid server-user-name. An appropriate entry in the .rhosts file. An appropriate entry in the ixpfile file. The correct user password. The password is normally obtained from ixpfile on the client.	Verify that server-user-name, .rhosts entry, ixpfile entry, and password are valid. If validation fails, client connection is disallowed.
5	A valid server-user-name. An appropriate entry in the .rhosts file. An appropriate entry in the ixpfile file. The correct user password. The user must enter the password on the client.	Verifies that server-user-name, .rhosts entry, ixpfile entry, and password entered by the user are valid. If validation fails, client connection is disallowed.

Server-User-Name

In Table 2, a “valid server-user-name” means that the **ixpwwfile** file on the client contains an entry specifying the name of the server machine, the name of the client machine, and a valid user-name to be used on the server. For more information, see [ixpwwfile File Entry](#) (on page 56).

Default Server User

At security level 0 or 1, the server allows the client to run as a default user on the server when the client fails to meet the security requirements of the server. Normally, the default server user will be allowed to access files that do not require high levels of security. The default server user, which must be a valid user on the server, is specified using the configuration parameter, `DefaultServerUser`. For more information about this parameter, refer to [UNIX Server-Specific Configuration Options](#) (on page 97). See also the discussion of compatibility of older clients with the new server in [Server Compatibility with Older and Newer Clients](#) (on page 58).

.rhosts File Entry

The **.rhosts** file, present in each user’s home directory on the server, is used by the UNIX operating system to validate the permissions of clients who try to access the files on the server owned by the local user. This ASCII file contains information about the client machine and one of its users. The following is a template for an entry line in the **.rhosts** file:

```
machine-name [user-name]
```

where *machine-name* is the node name of a client machine, and *user-name* is the name of the user on that machine who, when connected to the server, will obtain the owner’s permissions on files owned by the local user. If *user-name* is not found on the entry, all the users on the client machine have permission to access files.

Note *user-name* refers to the name used on the client machine, not on the server machine. The *user-name* may match the name used on the server machine, or it may be different.

An “appropriate entry in the **.rhosts** file” in Table 2 means that the **.rhosts** file exists in server-user-name’s home directory, the **.rhosts** file owner is server-user-name, only the owner has write permissions (that is, the file permissions must be “rw-r--r--”), and a line exists in the **.rhosts** file specifying client machine-name and, optionally, the client user-name.

ixpwwfile File Entry

To successfully establish a session with the server running at one of the six security levels, clients must pass certain information to the server at the time the session is established. This information is created and stored in an **ixpwwfile** security parameter file for each client and each server system.

Each record in the **ixpwwfile** security parameter file consists of four fields:

```
{server-machine-name, client-machine-name, server-user-name, password}
```

where *server-machine-name* is the name of the machine running the RM/InfoExpress UNIX server with which the client (*client-machine-name*) will establish the session. *server-user-name* is the name of the user on the server by which the client is known. *password* is the password string of the user (*server-user-name*) on the server.

For information about how to run the utility program to create and update **ixpwwfile**, refer to [Appendix E: RM/InfoExpress Security Parameter File Update Utility](#) (on page 101).

An “appropriate entry in the **ixpwwfile** file” in Table 2 means that the **ixpwwfile** file on the server (pointed to in the **rmixsrvr.ini** configuration file) contains an entry specifying the *server-machine-name*, *client-machine-name*, and *server-user-name*. Note that the *password* should not be present in the entry on the RM/InfoExpress server. The *password* is ignored.

User Password

In Table 2, “correct user password” means that the password sent by the client matches the UNIX system password for *server-user-name* on the server.

Additional Parameters Needed for Non-UNIX Clients

Every UNIX and 32-bit Windows machine on the network is recognized by its node name. There is, however, no concept of a node name on a machine running the Windows 3.1 operating system. For proper recognition, workstations running Windows 3.1 must define the *client-machine-name* using the ClientName configuration parameter.

Note This discussion of the ClientName configuration parameter is for backward-compatibility issues only as this option was provided for 16-bit Windows clients. RM/InfoExpress no longer supports this option.

Client Validation by the Server at Different Security Levels

At the time the connection between the client and the server is established, each client passes information obtained from the **ixpwwfile** security parameter file and the configuration file to the RM/InfoExpress UNIX server. The server then validates this information using the UNIX security database files such as **etc/passwd**, **\$HOME/.rhosts**, and so forth, and the **ixpwwfile** security parameter file on the server.

Server Compatibility with Older and Newer Clients

The following server and client compatibility issues are discussed below.

Older Clients with the New Server

Earlier versions of RM/InfoExpress clients can communicate with the new server running in “compatibility mode” (that is, no security level specified or at security levels 0 or 1). These clients run as the default server user. When the server security level is 2 or greater, however, the server rejects the client connections. One of the following error messages is displayed:

```
RMIX_ERR_SERVER_USERNAME_PARAM_NOT_FOUND
```

- or -

```
RMIX_ERR_USER_PASSWORD_NOT_FOUND
```

New Clients with an Older Server

New versions of RM/InfoExpress clients can communicate with older (pre-2.1) versions of the RM/InfoExpress UNIX server without any problem. The information passed by the new client at the time the session is established will be ignored by the older server.

Setting Up the Network to Run RM/InfoExpress with Security Enabled

The following sections provide instructions for setting up each of the six levels of file security on the RM/InfoExpress UNIX server. (The setup differences between server security levels are summarized in [Table 3](#) on page 66.) In these procedures, two UNIX machines are connected to a network and are known on that network as *serverU* and *clientU*. A third machine running Windows, known on the network as *clientW*, is also connected on the same network.

A UNIX user running RM/COBOL with the RM/InfoExpress client on machine *clientU* wants to access data files on the RM/InfoExpress server running on machine *serverU*. On the client machine, the user logs in as *clientUser1*, but on the server machine, the user logs in as *serverUser1* with password *pass1*. (Note that *serverUser1* may be the same as or different from *clientUser1*.)

Similarly, a Windows user running RM/COBOL with the RM/InfoExpress client on machine *clientW* wants to access data files on the RM/InfoExpress server running on machine *serverU*. On the client machine, the user is known as *clientUser2*, but on the server machine the user is known as *serverUser2* with password *pass2*. (Note that *serverUser2* may be the same as or different from *clientUser2*.)

It is assumed that the following software is installed and available:

- RM/COBOL with the RM/InfoExpress client on the UNIX client machine (in directory **/usr/rmcobol**) and on the Windows client machine (in directory **c:\rmcobol**)
- RM/COBOL on the UNIX server machine (in directory **/usr/rmcobol**)
- RM/InfoExpress server on the UNIX server machine (in directory **/usr/rminfo**)

The following notes apply to the procedures for setting up RM/InfoExpress to run at each of the six security levels:

Note 1 “create an **ixpwwfile**” means to run **runcobol ixsecure.cob** with your current directory set to where you want the **ixpwwfile** security parameter file to reside or with the **IXPWWFILE** environment variable pointing to the path.

Normally, **ixpwwfile** on the UNIX server is maintained by the RM/InfoExpress server administrator, and only such file is present on the UNIX server machine, generally in the **/usr/rminfo** directory. The **ixpwwfile** file on a Windows client machine is normally maintained by the owner of the Windows machine and resides in the RM/COBOL install directory, **c:\rmcobol**. On a UNIX client machine, each RM/InfoExpress client has his own copy of **ixpwwfile**. The client or server configuration file (either **rmixclnt.ini** or **rmixsrvr.ini**) can be used to configure other locations for **ixpwwfile**. The environment variable **IXCONFIG** may be used to specify the location and path name of the configuration file on UNIX.

RM/COBOL with the RM/InfoExpress client will look for **ixpwwfile** in the location specified by the **IxPwFile** option in the Security section of the client configuration file. If the **IxPwFile** option is not present in the configuration file, then RM/COBOL with the RM/InfoExpress client will attempt to open file **ixpwwfile** in the current working directory.

If the server security level is 3 or 4, passwords may be stored in the client **ixpwwfile**; therefore, it should reside in a secure place (with appropriate owner and restrictive permissions on UNIX).

Note 2 “create a *filename.ini* file” means to use a text editor of your choice to create the appropriate configuration file:

- **/usr/rminfo/rmixsrvr.ini** for a UNIX server.
- **c:\windows\rmixclnt.ini** for a Windows client.
- **/usr/rmcobol/rmixclnt.ini** for a UNIX client, if only a single client configuration file is to be used when no user passwords are required in the security parameter file. If multiple configuration files are required so that each UNIX user can be responsible for the UNIX system password stored in a tradition **ixpwwfile** file, then the configuration file should be placed in the current working directory or located using the **IXCONFIG** environment variable.

Note 3 “create a **.rhosts** file” means to use a text editor of your choice to create a file named **.rhosts** in the home directory of *serverUser*. The owner of the file must be *serverUser* and only the owner can have write permission. The **.rhosts** file entry is the following:

```
clientU clientUser
```

clientUser is optional; if not present, any client user-name on machine *clientU* is allowed. *clientUser* is a client user-name, not a server-user-name such as

serverUser. Although *clientUser* and *serverUser* are often the same user-name, this is not required.

Note 4 Notation of the form:

```
serverU/clientU/serverUser1/pass1
```

will be used to indicate an **ixpfile** entry with *serverU* as the server-machine-name, *clientU* as the client-machine-name, *serverUser1* as the server-user-name, and *pass1* as the UNIX system password for the UNIX user ID *serverUser1*. The password will only be present for security levels 3 and 4.

Setup for Running RM/InfoExpress at Server Security Level 0

1. Create an **ixpfile** file (see [Appendix E](#) on page 101) on each of the two client machines, *clientU* and *clientW*.

- a. On machine *clientU*, create an **ixpfile** file and enter:

```
serverU / clientU / serverUser1
```

- b. On machine *clientW*, create an **ixpfile** file and enter:

```
serverU / clientW / serverUser2
```

2. Create a configuration (.INI) file (see [Appendix D](#) on page 87) on each of the three machines, *clientU*, *clientW*, and *serverU*.

- a. On machine *clientU*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpfile=<path>
```

- b. On machine *clientW*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpfile=<path>
```

- c. On machine *serverU*, create **rmixsrvr.ini** and enter:

```
[Security]  
ServerSecurityLevel=0  
DefaultServerUser=<server-user-name>
```

3. Start the RM/InfoExpress server on machine *serverU*, as described in [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26).
4. Run the application on machines *clientU* and *clientW*.

Setup for Running RM/InfoExpress at Server Security Level 1

1. Create an **ixpwwfile** file (see [Appendix E](#) on page 101) on each of the two client machines, *clientU* and *clientW*.

- a. On machine *clientU*, create an **ixpwwfile** file and enter:

```
serverU / clientU / serverUser1
```

- b. On machine *clientW*, create an **ixpwwfile** file and enter:

```
serverU / clientW / serverUser2
```

2. Create a configuration (.INI) file (see [Appendix D](#) on page 87) on each of the three machines, *clientU*, *clientW*, and *serverU*.

- a. On machine *clientU*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- b. On machine *clientW*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- c. On machine *serverU*, create **rmixsrvr.ini** and enter:

```
[Security]  
ServerSecurityLevel=1  
DefaultServerUser=<server-user-name>
```

3. Create two **.rhosts** files (see page 56) on machine *serverU*.

- a. Log in as *serverUser1*, create **\$HOME/.rhosts** and enter:

```
clientU clientUser1
```

- b. Log in as *serverUser2*, create **\$HOME/.rhosts** and enter:

```
clientW clientUser2
```

4. Start the RM/InfoExpress server on machine *serverU*, as described in [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26).

5. Run the application on machines *clientU* and *clientW*.

Setup for Running RM/InfoExpress at Server Security Level 2

1. Create an **ixpwwfile** file (see [Appendix E](#) on page 101) on each of the two client machines, *clientU* and *clientW*.

- a. On machine *clientU*, create an **ixpwwfile** file and enter:

```
serverU / clientU / serverUser1
```

- b. On machine *clientW*, create an **ixpwwfile** file and enter:

```
serverU / clientW / serverUser2
```

2. Create a configuration (.INI) file (see [Appendix D](#) on page 87) on each of the three machines, *clientU*, *clientW*, and *serverU*.

- a. On machine *clientU*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- b. On machine *clientW*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- c. On machine *serverU*, create **rmixsrvr.ini** and enter:

```
[Security]  
ServerSecurityLevel=2
```

3. Create two **.rhosts** files (see page 56) on machine *serverU*.

- a. Log in as *serverUser1*, create **\$HOME/.rhosts** and enter:

```
clientU clientUser1
```

- b. Log in as *serverUser2*, create **\$HOME/.rhosts** and enter:

```
clientW clientUser2
```

4. Start the RM/InfoExpress server on machine *serverU*, as described in [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26).
5. Run the application on machines *clientU* and *clientW*.

Setup for Running RM/InfoExpress at Server Security Level 3

1. Create an **ixpwwfile** file (see [Appendix E](#) on page 101) on each of three machines, *clientU*, *clientW*, and *serverU*.

- a. On machine *clientU*, create an **ixpwwfile** file and enter:

```
serverU / clientU / serverUser1 / pass1
```

- b. On machine *clientW*, create an **ixpwwfile** file and enter:

```
serverU / clientW / serverUser2 / pass2
```

- c. On machine *serverU*, create an **ixpwwfile** and enter:

```
serverU / clientU / serverUser1  
serverU / clientW / serverUser2
```

2. Create a configuration (.INI) file (see [Appendix D](#) on page 87) on each of the three machines, *clientU*, *clientW* and *serverU*.

- a. On machine *clientU*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- b. On machine *clientW*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- c. On machine *serverU*, create **rmixsrvr.ini** and enter:

```
[Security]  
ixpwwfile=<path>  
ServerSecurityLevel=3
```

3. Start the RM/InfoExpress server on machine *serverU*, as described in [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26).
4. Run the application on machines *clientU* and *clientW*.

Setup for Running RM/InfoExpress at Server Security Level 4

1. Create an **ixpwwfile** file (see [Appendix E](#) on page 101) on each of three machines, *clientU*, *clientW*, and *serverU*.

- a. On machine *clientU*, create an **ixpwwfile** file and enter:

```
serverU / clientU / serverUser1 / pass1
```

- b. On machine *clientW*, create an **ixpwwfile** file and enter:

```
serverU / clientW / serverUser2 / pass2
```

- c. On machine *clientW*, create an **ixpwwfile** file and enter:

```
serverU / clientU / serverUser1  
serverU / clientW / serverUser2
```

2. Create a configuration (.INI) file (see [Appendix D](#) on page 87) on each of the three machines, *clientU*, *clientW*, and *serverU*.

- a. On machine *clientU*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- b. On machine *clientW*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- c. On machine *serverU*, create **rmixsrvr.ini** and enter:

```
[Security]  
ixpwwfile=<path>  
ServerSecurityLevel=4
```

3. Create two **.rhosts** files (see page 56) on machine *serverU*.

- a. Log in as *serverUser1*, create **\$HOME/.rhosts** and enter:

```
clientU clientUser1
```

- b. Log in as *serverUser2*, create **\$HOME/.rhosts** and enter:

```
clientW clientUser2
```

4. Start the RM/InfoExpress server on machine *serverU*, as described in [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26).

5. Run the application on machines *clientU* and *clientW*.

Setup for Running RM/InfoExpress at Server Security Level 5

1. Create an **ixpwwfile** file (see [Appendix E](#) on page 101) on each of three machines, *clientU*, *clientW*, and *serverU*.

- a. On machine *clientU*, create an **ixpwwfile** file and enter:

```
serverU / clientU / serverUser1
```

- b. On machine *clientW*, create an **ixpwwfile** file and enter:

```
serverU / clientW / serverUser2
```

- c. On machine *clientW*, create an **ixpwwfile** file and enter:

```
serverU / clientU / serverUser1  
serverU / clientW / serverUser2
```

2. Create a configuration (.INI) file (see [Appendix D](#) on page 87) on each of the three machines, *clientU*, *clientW*, and *serverU*.

- a. On machine *clientU*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- b. On machine *clientW*, create **rmixclnt.ini** and enter:

```
[Security]  
ixpwwfile=<path>
```

- c. On machine *serverU*, create **rmixsrvr.ini** and enter:

```
[Security]  
ixpwwfile=<path>  
ServerSecurityLevel=5
```

3. Create two **.rhosts** files (see page 56) on machine *serverU*.

- a. Log in as *serverUser1*, create **\$HOME/.rhosts** and enter:

```
clientU clientUser1
```

- b. Log in as *serverUser2*, create **\$HOME/.rhosts** and enter:

```
clientW clientUser2
```

4. Start the RM/InfoExpress server on machine *serverU*, as described in [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26).

5. Run the application on machines *clientU* and *clientW*. The appropriate password entry dialog box is displayed.

Setup Differences Between Server Security Levels

Table 3 summarizes the differences between the setup procedures for each server security level and the setup for the next higher level.

Note The entry in `ServerSecurityLevel=number` in step 2c of each setup procedure is incremented by one, beginning with level 1.

Table 3: Summary of Setup Differences Between Server Security Levels

Server Security Levels	Setup Differences
0 and 1	Setup for level 1 adds step 3, which is the requirement for .rhosts files on the server machine.
1 and 2	Setup for level 2 does not support older clients (such as 16-bit Windows clients). The <code>DefaultServerUser=<server-user-name></code> entry in level 1 step 2c is not needed because the server at level 2 refuses the connection rather than running as <code><server-user-name></code> .
2 and 3	Setup for level 3 uses passwords rather than .rhosts files. Steps 1a and 1b requires the entry of passwords in the client <code>ixpwfile</code> entries, and level 3 step 1c is added because the server requires <code>ixpwfile</code> entries (passwords are not needed here) for the clients that will connect to it. Level 3 step 2c adds the <code>ixpwfile=<path></code> entry so that the server can access the ixpwfile file created by level 3 step 1c. Level 2 step 3, which is the .rhosts file requirement, is not needed at level 3.
3 and 4	Setup for level 4 adds step 3, which is the requirement for .rhosts files on the server machine.
4 and 5	Setup for level 5 does not require passwords in steps 1a and 1b for the client <code>ixpwfile</code> entries because the server forces clients to make the user enter the password via a dialog box on the client machine.

Appendix A: Messages

This appendix lists the error messages that can occur while RM/InfoExpress is being used.

Error Message Types

Errors that can occur when using RM/InfoExpress fall into two categories:

- **COBOL errors**, which do not start with the value 30. These errors are described in the appropriate RM/COBOL user's guide.
- **Non-COBOL permanent errors**, which have the following format:

30, error type, error code

where:

error type is used to identify the software that generates the error.

error code is the number returned by that software.

Table 4 lists each error type, the error codes that can occur with each type, and the possible source of the error code for errors generated by RM/InfoExpress. Other error codes associated with error types such as UNIX and Windows can be found in the appropriate vendor documentation.

A complete description of each error type can be found in [Permanent Error Types](#) (on page 69). A complete [description of possible error codes](#) begins on page 70.

Note 1 For more information on error messages, refer to “Error Message Types” and “Error Message Formats” in Appendix A: *Runtime Messages*, in the *RM/COBOL User's Guide*.

Note 2 Earlier versions of RM/InfoExpress usually returned two errors: 255 for network-specific errors and 254 for errors detected by RM/InfoExpress. In this version of RM/InfoExpress, errors are returned as they occur, along with the appropriate error code.

Table 4: Error Types and Associated Error Codes

Permanent Error Type (Number and Description)	Possible Error Code (Number/Description)	Possible Error Code (Source)
15 - RM/InfoExpress Server Error	1 - 13	RM/InfoExpress API
	21 - 59	RM/InfoExpress
	12xxx	RM/InfoExpress Windows Sockets Interface
	4xx - 5xx	RM/InfoExpress BSD Sockets Interface
16 - RM/InfoExpress Client Error	21 - 59	RM/InfoExpress
	12xxx	RM/InfoExpress Windows Sockets Interface
	4xx - 5xx	RM/InfoExpress BSD Sockets Interface
21 - RM/InfoExpress WinSock Error	10xxx - 11xxx	Windows Sockets

Permanent Error Types

Error type 15: RM/InfoExpress Server Error

This type of error is generated by the RM/InfoExpress server when it encounters an error within its code. Errors such as incorrect File Access Protocol (FAP) message received from the client, out-of-memory, and so forth, fall into this category.

Possible error codes for error type 15 are described in the following topics:

- [RM/InfoExpress API-Generated Error Codes](#) (on page 70)
- [RM/InfoExpress-Generated Error Codes](#) (on page 72)
- [RM/InfoExpress Windows Sockets Interface Error Codes](#) (on page 79)
- [RM/InfoExpress BSD Sockets Interface Error Codes](#) (on page 80)

Error type 16: RM/InfoExpress Client Error

This type of error is generated by the RM/InfoExpress client when it encounters an error within its code. Errors such as incorrect File Access Protocol (FAP) message received from the RM/COBOL program (**runcobol**), incorrect FAP response from the server, out-of-memory, and so forth, fall into this category.

Possible error codes for error type 16 are described in the following topics:

- [RM/InfoExpress-Generated Error Codes](#) (on page 72)
- [RM/InfoExpress Windows Sockets Interface Error Codes](#) (on page 79)
- [RM/InfoExpress BSD Sockets Interface Error Codes](#) (on page 80)

Error type 21: RM/InfoExpress WinSock Error

Error type 21 is generated by RM/InfoExpress when either the Windows client program or the Windows server program receives an error from the underlying Windows Sockets software. Possible error codes are described in [RM/InfoExpress WinSock Error Codes](#) (on page 77).

RM/InfoExpress API-Generated Error Codes

Error codes 1 through 13 are common to the server program, the server display (screen handler) program, and the API application.

Error code 1: RMIX_API_ERR_SERVER_ALREADY_EXISTS

Failure Definition: Indicates that the server being started encounters a server already running in the system, or at least one of its components is present in the system.

Action: For RM/InfoExpress running on UNIX, this error occurs if the server invoked previously is not terminated, or it is terminated improperly. If the server has been terminated improperly, remove the related IPC (Inter Process Communications) objects (shared memory, key starting with 0x49584D and semaphore, key starting with 0x495853, displayed using the `ipcs` command) using the UNIX command `ipcrm`.

Error code 2: RMIX_API_ERR_OUT_OF_MEMORY

Failure Definition: Indicates that there is not enough memory available in the system for RM/InfoExpress (server or server display programs) to continue.

Action: Bring down all the connected clients, bring down the server, and make more memory available before starting the server again.

Error code 3: RMIX_API_ERR_TOO_MANY_USERS

Failure Definition: Indicates that too many server display programs are being invoked. The limit is nine for UNIX and Windows.

Action: Close any unnecessary server display applications.

Error code 4: RMIX_API_ERR_NOT_AUTHORIZED

Failure Definition: Indicates that the application using the server API attempted either to open the server database with a mode other than `O_RDONLY`, or it used an unauthorized API. This message may also indicate that the server display executable is corrupted.

Action: In case of a corrupted server display executable, install RM/InfoExpress again.

Error code 5: RMIX_API_ERR_SERVER_NOT_PRESENT

Failure Definition: Indicates that either the application using the server API or the server display application is being started without the server having been started.

Action: Start the server and then start the application.

Error code 6: RMIX_API_ERR_CLIENT_ID_NOT_FOUND

Failure Definition: Indicates a malfunction of either the server or the server display program.

Action: Bring down all the connected clients, terminate the server, and restart.

Error code 7: RMI_X_API_ERR_TOO_MANY_CLIENTS

Failure Definition: Indicates that the server has run out of free slots for remote clients.

Action: Bring down unused client connections to release some slots on the server. Alternatively, you can also perform one of the following:

- Edit the server configuration file, **rmixsrvr.ini**, to include the UseCount option. For more information, see [Common Server-Specific Configuration Options](#) (on page 94).
- Bring down all the connected clients, terminate the server, and restart with the -k command line option. For more information, see [Chapter 2: Configuring and Running the RM/InfoExpress Server](#) (on page 25).

Error code 8: RMI_X_API_ERR_TOO_MANY_FILES

Failure Definition: Indicates that the server has run out of the free slots for open files.

Action: Close inactive open files from the client applications. Alternatively, edit the server configuration file, **rmixsrvr.ini**, to include the FileCount option. For more information, see [Common Server-Specific Configuration Options](#) (on page 94).

Error code 9: RMI_X_API_ERR_CLIENT_NOT_FOUND

Failure Definition: Indicates a server malfunction.

Action: Bring down all the connected clients, terminate the server, and restart.

Error code 11: RMI_X_API_ERR_FILE_NOT_FOUND

Failure Definition: Indicates a malfunction of either the server or the server display program.

Action: Bring down all the connected clients, terminate the server, and restart.

Error code 12: RMI_X_API_ERR_SERVER_APPLICATION_MISMATCH

Failure Definition: Indicates that either the server display or the server API application that is being started does not match the server running in the system.

Action: Use a matching server display. Also, make sure that the server display and the server belong to same release, even though they support the same protocol.

Error code 13: RMI_X_API_ERR_SERVER_DATABASE_NOT_OPEN

Failure Definition: Indicates a malfunction of either the server or the server display program.

Action: Bring down all the connected clients, terminate the server, and restart.

RM/InfoExpress-Generated Error Codes

Error codes 21 through 59 are common to the client, the server, and the server display.

Error code 21: RMIX_ERR_INVALID_FAP_MESSAGE

Failure Definition: Indicates an RM/InfoExpress system error.

Action: Contact Liant technical support for assistance.

Error code 22: RMIX_ERR_FILE_HANDLE_NOT_FOUND

Failure Definition: Indicates an RM/InfoExpress system error.

Action: Contact Liant technical support for assistance.

Error code 23: RMIX_ERR_OUT_OF_MEMORY

Failure Definition: Indicates that there is not enough memory available in the system for RM/InfoExpress (client or server) to continue.

Action: If the associated error type is 15 (RM/InfoExpress Server Error), bring down all the connected clients, bring the server down, and make more memory available before starting the server again. If the associated error type is 16 (RM/InfoExpress Client Error), terminate the client application and restart it after making more memory available on the client system.

Error code 24 RMIX_ERR_SESSION_REJECTED

Failure Definition: This error is reported by either the Windows client or the server. When returned by the server, it indicates a problem with the network interface. When returned by the Windows client, it indicates that the RM/COBOL runtime does not match the client.

Action: If returned by the server, contact Liant technical support for assistance. If returned by the client, use the version of the runtime that matches the Windows client.

Error code 26 RMIX_ERR_SIGNAL_CAUGHT

Failure Definition: Indicates an RM/InfoExpress system error.

Action: Contact Liant technical support for assistance.

Error code 27 RMIX_ERR_FAP_MANIPULATION

Failure Definition: Indicates an RM/InfoExpress system error.

Action: Contact Liant technical support for assistance.

Error code 28 RMIX_ERR_IPC_OBJECTS_REMOVED

Failure Definition: Indicates that the server or the server display discovered Inter Process Communications (IPC) objects missing in the system. This error is specific to the server and the server display for UNIX.

Action: It may be that the IPC objects have been removed accidentally. Remove the other IPC objects and start the server and/or the server display again.

Error code 30 RMIX_ERR_INVALID_COMMAND

Failure Definition: Indicates an RM/InfoExpress system error.

Action: Contact Liant technical support for assistance.

Error code 32 RMIX_ERR_TOO_MANY_CLIENTS

Failure Definition: The server reports this error when the number of clients exceeds the value specified on the -k option (or the UseCount configuration file option) or the number of licensed use counts, whichever is less.

Action: Restart the server with a larger value on the UseCount configuration file option, as described in [Common Server-Specific Configuration Options](#) (on page 94), or use a server licensed for more users.

Error code 33 RMIX_ERR_DEF_USER_NAME_NOT_FOUND

Failure Definition: The server, running at a security level of 0 to 2, reports this error when it detects that the name specified on the DefaultServerUser configuration file option or the user name **rmserver** is not a valid user on the server machine. This error may also occur if root is specified as the default user name.

Action: Using system administration tools, add a new user with the name specified. If that user already exists, check the **etc/passwd** file.

Error code 34 RMIX_ERR_SECURITY_INFO_NOT_FOUND

Failure Definition: The RM/InfoExpress server reports this error when it cannot find a match for the *server-user-name*, *client-machine-name*, and *server-machine-name* triple passed by the client in the server's security parameter file, **ixpwwfile**.

Action: Update **ixpwwfile** by using the utility program **ixsecure.cob** on both the client and the server machines to add an entry for the *client-machine-name* and the *server-user-name* pair. For more information, see [Chapter 6: File Security on the RM/InfoExpress UNIX Server](#) (on page 53) and [Appendix E: RM/InfoExpress Security Parameter File Update Utility](#) (on page 101). For a Windows client, the client name is the Windows computer name. For a UNIX client, this is the node name and is given by the **uname** command.

Error code 35 RMIX_ERR_USER_PASSWORD_PARAM_ NOT_FOUND

Failure Definition: This error is normally reported by the RM/InfoExpress server running at a security level of 3 or higher.

Action: Contact Liant technical support for assistance.

Error code 36 RMIX_ERR_SYSTEM_PASSWORD_ MISMATCH

Failure Definition: The server, running at a security level of 3 or higher, reports this error when it detects that the *password* string stored in the **ixpwfile** security parameter file on the client machine and on the server machine, and the password stored in the UNIX system, do not match.

Action: See that the *password* string entered interactively at the client terminal or stored in **ixpwfile** on the client machine matches the *password* string stored in **ixpwfile** on the server machine and the one stored in the UNIX system. To update the password entry in **ixpwfile**, use the utility program **ixsecure.cob**. See [Appendix E: RM/InfoExpress Security Parameter File Update Utility](#) (on page 101).

Error code 37 RMIX_ERR_SYSTEM_PASSWORD_ NOT_FOUND

Failure Definition: The server, running at a security level of 3 or higher, reports this error when it cannot locate the user password in the UNIX system security database.

Action: This error normally occurs on UNIX systems that maintain the security database in a file different from the **/etc/passwd** file. This indicates that one or both of these files have been corrupted. Contact your system administrator.

Error code 38 RMIX_ERR_RHOSTS_FILE_OPEN_ERROR

Failure Definition: The server reports this error when it cannot open the **.rhosts** file in the user's home directory.

Action: Seek your server administrator's help in creating the **.rhosts** file with appropriate entries in the user's home directory on the server machine.

Error code 39 RMIX_ERR_RHOSTS_FILE_ PERMISSIONS_INVALID

Failure Definition: The server reports this error when it finds the permissions of the **.rhosts** file in the user's home directory to be invalid.

Action: Set the permissions of the **.rhosts** file in the user's home directory on the server machine to be **"-rw-r--r--"** and make certain that the user is the owner of this file.

Error code 40 RMIX_ERR_ENTRY_NOT_FOUND_IN_RHOSTS_FILE

Failure Definition: The server reports this error when it fails to find a matching client name entry (with the *client-machine-name* parameter passed by the client machine) in the **.rhosts** file on the server machine.

Action: With the help of your server administrator, edit the **.rhosts** file in the user's home directory on the server machine and add a new entry containing the *client-machine-name* and an optional *server-user-name*.

Error code 41 RMIX_ERR_NO_SESSION

Failure Definition: Both the server and the client may report this error. Although not fatal, this error is still considered an RM/InfoExpress system error.

Action: Contact Liant technical support for assistance.

Error code 42 RMIX_ERR_SERVER_USER_NAME_PARAM_NOT_FOUND

Failure Definition: The server, running at a security level of 0 to 5, reports this error when it detects that the *server-user-name* parameter is absent in the information passed by the client when connections are established.

Action: This error may occur when an old client tries to establish a connection with the new server running at security level 2 or higher. This error may also occur when the new client cannot provide the required information to the server due to some problem in processing the security parameter file, **ixpwfile** (for example, the file is not present on the client machine). Upgrade to a new version of the RM/InfoExpress client in order to use security features on the server.

Error code 43 RMIX_ERR_CLIENT_MACH_NAME_PARAM_NOT_FOUND

Failure Definition: The server, running at a security level of 0 to 5, reports this error when it detects that the *client-machine-name* parameter is absent in the information passed by the client when connections are established.

Action: This error may occur when an old client tries to establish a connection with the new server running at security level 2 or higher. This error may also occur when the new client cannot provide the required information to the server due to some problem in processing the security parameter file, **ixpwfile** (for example, the file is not present on the client machine). Upgrade to a new version of the RM/InfoExpress client in order to use security features on the server.

Error code 44 RMX_ERR_SERVER_SECURITY_INFO_FILE_ERROR

Failure Definition: This error occurs when the server fails to open the security parameter file, **ixpwwfile**, on the server machine.

Action: Make sure that a valid security parameter file, **ixpwwfile**, is present on the server machine. If this file does not exist, create it using the **ixsecure.cob** utility program. See [Appendix E: RM/InfoExpress Security Parameter File Update Utility](#) (on page 101).

Error code 45 RMX_ERR_MALFORMED_MESSAGE

Failure Definition: Indicates an RM/InfoExpress system error. This error occurs when either the client or the server fails to decompress the message received from the session partner.

Action: Contact Liant technical support for assistance.

Error code 46 RMX_ERR_NO_MEMORY_FOR_COMPRESSION

Failure Definition: There was insufficient memory to compress or decompress the data.

Action: Set the IxCompress configuration file option to No to disable message compression, as described in [Common Configuration Options](#) (on page 89). Message compression should not be used for records of more than 64000 bytes.

Error code 47 RMX_ERR_TOO_MANY_FILES

Failure Definition: The client(s) have exceeded the total number of open files supported by the server.

Action: Increase the value of the FileCount configuration file option and restart the server, as discussed in [Common Server-Specific Configuration Options](#) (on page 94).

Error code 48 RMX_ERR_SYSTEM_PASSWORD_FILE_OPEN_ERROR

Failure Definition: This error occurs when an invalid **/etc/passwd** file (which may be missing) or the *server-user-name* with which the client is trying to run is not present on the server machine.

Action: Contact your system administrator.

Error code 49 RMX_ERR_CLIENT_SECURITY_INFO_FILE_ERROR

Failure Definition: This error occurs when the client fails to open the security parameter file, **ixpwwfile**, on the client machine.

Action: Make sure that a valid security parameter file, **ixpwwfile**, is present on the client machine. If this file does not exist, create it using the **ixsecure.cob** utility program. See [Appendix E: RM/InfoExpress Security Parameter File Update Utility](#) (on page 101).

Error codes 50 — 59

Failure Definition: Error codes 50 through 59 represent internal errors in the RM/InfoExpress server program. Error code 54 may indicate an attempt to use an old client with a new server in a mode other than compatibility mode.

Action: Contact Liant technical support for assistance.

RM/InfoExpress WinSock Error Codes

Table 5 lists the possible error codes for **permanent error type 21**, which is described on page 69. Codes in the 10000 range represent network or system errors. Codes in the 11000 range represent database errors.

Table 5: Error Codes Generated by Windows Sockets

Error Code	Description	Windows Sockets Error Equivalent	UNIX Error Equivalent
10004	Interrupted system call	WSAEINTR	EINTR
10009	Bad file number	WSAEBADF	EBADF
10013	Permission denied	WSAEACCES	EACCES
10014	Bad address	WSAEFAULT	EFAULT
10022	Invalid argument	WSAEINVAL	ENOTSOCK
10024	Too many open files	WSAEMFILE	EMFILE
10035	Operation would block	WSAEWOULDBLOCK	EWOLDBLOCK
10036	Blocking operation in progress	WSAEINPROGRESS	EINPROGRESS
10037	Operation already in progress	WSAEALREADY	EALREADY
10038	Operation on non-socket	WSAENOTSOCK	ENOTSOCK
10039	Destination address required	WSAEDESTADDRREQ	EDESTADDRREQ
10040	Message too long	WSAEMSGSIZE	EMSGSIZE
10041	Wrong protocol type	WSAEPROTOTYPE	EPROTOTYPE
10044	Socket type not supported	WSAESOCKTNOSUPPORT	ESOCKTNOSUPPORT
10045	Operation not supported	WSAEOPNOTSUPP	EOPNOTSUPP
10046	Protocol family not supported	WSAEPFNOSUPPORT	EPFNOSUPPORT
10047	Address family not supported	WSAEAFNOSUPPORT	EAFNOSUPPORT
10048	Address already in use	WSAEADDRINUSE	EADDRINUSE
10049	Cannot assign address	WSAEADDRNOTAVAIL	EADDRNOTAVAIL
10050	Network is down	WSAENETDOWN	ENETDOWN
10051	Network is unreachable	WSAENETUNREACH	ENETUNREACH
10052	Network reset connection	WSAENETRESET	ENETRESET

Table 5: Error Codes Generated by Windows Sockets (Cont.)

Error Code	Description	Windows Sockets Error Equivalent	UNIX Error Equivalent
10053	Connection was aborted	WSAECONNABORTED	ECONNABORTED
10054	Peer reset connection	WSAECONNRESET	ECONNRESET
10055	No available buffer space	WSAENOBUFS	ENOBUFS
10056	Socket already connected	WSAEISCONN	EISCONN
10057	Socket not connected	WSAENOTCONN	ENOTCONN
10058	Socket was shut down	WSAESHUTDOWN	ESHUTDOWN
10059	Too many references	WSAETOOMANYREFS	ETOOMANYREFS
10060	Connection timed out	WSAETIMEDOUT	ETIMEDOUT
10061	Connection refused	WSAECONNREFUSED	ECONNREFUSED
10062	Symbolic link loop	WSAELOOP	ELOOP
10063	Path name too long	WSAENAMETOOLONG	ENAMETOOLONG
10064	Host is down	WSAEHOSTDOWN	EHOSTDOWN
10065	Host is unreachable	WSAEHOSTUNREACH	EHOSTUNREACH
10066	Directory not empty	WSAENOTEMPTY	
10067	Process limit	WSAEPROCLIM	
10091	Network is unusable	WSASYSNOTREADY	
10092	Version not supported	WSAVERNOTSUPPORTED	
10093	Startup not done	WSANOTINITIALISED	
11001	Host not found	WSAHOST_NOT_FOUND	HOST_NOT_FOUND
11002	Try again	WSATRY_AGAIN	TRY_AGAIN
11003	No recovery	WSANO_RECOVERY	NO_RECOVERY
11004	No data	WSANO_DATA	NO_DATA

RM/InfoExpress Windows Sockets Interface Error Codes

Codes in the 12000 range, shown in Table 6, are generated by the Windows Sockets interface portion of the RM/InfoExpress Windows client program or the Windows server program and represent memory allocation failures or unexpected conditions.

These errors are considered RM/InfoExpress system errors. When these errors are detected, contact Liant technical support for assistance.

Table 6: Error Codes Generated by the RM/InfoExpress Windows Sockets Interface

Error Code	Description
12001	Insufficient memory for connect.
12002	Internal socket number already in use.
12003	Unexpected event occurred during connect.
12004	Unexpected error condition from connect.
12005	Unexpected event occurred during initial receive.
12006	Received data length error (client/server not synchronized).
12007	Received data length error (client/server not synchronized).
12008	Received data length error (client/server not synchronized).
12009	Received data length inconsistent with FAP message length.
12010	Unexpected event occurred during secondary receive.
12011	Unexpected event occurred during send.
12012	Internal buffer length too small for status.
12013	Insufficient memory for status.
12014	Unknown error during asynchronous wait.
12015	Unknown error during event wait.
12016	Received data length error.
12017	Unknown error during asynchronous-wait.
12018	Unknown error during event wait.
12019	Unknown error during event wait.

RM/InfoExpress BSD Sockets Interface Error Codes

Error codes 401 through 413 are generated by the BSD Sockets interface portion of the RM/InfoExpress client and the server. These error codes are defined in Table 7.

These errors are considered RM/InfoExpress system errors. When these errors are detected, contact Liant technical support for assistance.

Table 7: Error Codes Generated by the RM/InfoExpress BSD Sockets Interface

Error Code	Description
401	Insufficient for connect.
402	Socket already in use.
403	Out of memory.
406	Received data length error (client/server not synchronized).
407	Received data length error (client/server not synchronized).
408	Received data length error (client/server not synchronized).
409	Received data length inconsistent with FAP message length.
412	Internal buffer length too small for status.
501	BSD Sockets error HOST_NOT_FOUND.
502	BSD Sockets error TRY_AGAIN.
503	BSD Sockets error NO_RECOVERY.
504	BSD Sockets error NO_DATA.

Appendix B: Limits and Ranges

This appendix describes RM/InfoExpress limits and ranges.

Limits and Ranges

The following limitations apply to RM/InfoExpress for TCP/IP:

1. It is not possible to run more than one RM/InfoExpress server program at a time on a given machine.
2. No more than nine RM/InfoExpress UNIX and Windows server display (screen handler) programs may be run at one time on a given machine.

Appendix C: Troubleshooting RM/InfoExpress

This appendix is designed to help if you run into any problems when using RM/InfoExpress. Each section offers steps you can take to solve the problem.

Failure to Locate File or Path

Error messages that occur while accessing the file on the server machine, for example, “File not found” or “Path not found”, generally indicate one of the following conditions:

1. The RM/InfoExpress UNIX server program is not running on a UNIX server machine. In this case, load **rmservtcp**.
2. The complete filename (defined using the synonym or other means) does not correctly point to the location on the server. Check your environment variables and synonyms.
3. In the case of a Windows client, the **rmtcp32** and **winsock** DLLs are not in the execution path.
4. For a Windows client, the **runcobol** configuration file contains an incorrect DLL name or the DLL specified on the NAME option of the EXTERNAL-ACCESS-METHOD record cannot be located.
5. Invoke the RM/InfoExpress server with the **-c l** option so that path names from Windows clients will be converted to lowercase by the server.
6. While accessing files from a UNIX client, make certain that the machine name specified in the path name is the same as the one in the **/etc/hosts** file on the client machine. For example, the machine name “HAL9000” in the path name defined by **INXFL=//RS6000/rminfo/inxf** matches the name “HAL9000” in the **/etc/hosts** file entry 111.22.333.44 hal9000 HAL9000.

RM/InfoExpress Client Entries Not Terminating

Certain situations on some versions of UNIX, when running RM/InfoExpress using the TCP/IP protocol, can cause the server not to notice that a client has been terminated. This occurs only if the client is terminated in a non-standard method, such as turning off the client workstation or experiencing a system failure on the client workstation. In such instances, the RM/InfoExpress client is unable to inform the server that the client is terminating. Although the operating system eventually notifies the RM/InfoExpress server that the connection has been broken, it could take several hours on some implementations of UNIX before the notification occurs.

One version of UNIX that exhibits this behavior is AIX running on the RS/6000. To reduce the amount of time before the inactivity on a TCP/IP connection is interpreted as a lost connection under AIX, use the following **no** command:

```
no -o tcp_keepidle=200 -o tcp_keepintvl=60
```

where:

-o is a network option.

Note On AIX 5.2, there is a defect that prevents a single **no** command from having two **-o** options. In this case, you must use two **no** commands.

tcp_keepidle determines the number of half-seconds to wait after the last successful I/O operation before attempting to determine whether a connection has been lost.

tcp_keepintvl determines the number of half-seconds to wait between requests for a response from the possibly lost connection.

After ten requests with no response, the operating system reports a lost connection to the server. The settings shown in this example will report a broken connection after 400 seconds ($100+30*10$).

Note You must run the **no** commands each time the network is started since it does not permanently change the default configuration values.

Removing IPC Objects After Server Failure

The recommended way to terminate the server is by using the command sequence (Terminate, Server, Now, Yes) of the screen display (screen handler) program when no active client is connected.

Using the **kill** command causes the RM/InfoExpress UNIX server to exit without removing the IPC (Inter Process Communications) objects, such as shared memory segments and semaphores. Consequently, when the server is started next time, it fails with server error code 1 (RMIX_API_ERR_SERVER_ALREADY_EXISTS).

In this situation, remove the IPC objects using the following UNIX commands:

```
ipcrm -m <shm_id> -s <sem_id>
```

where the <shm_id> and <sem_id> objects are obtained by using the UNIX command:

```
ipcs
```

Note that the key values for RM/InfoExpress IPC objects start with the value 0x49584D for shared memory and 0x495853 for semaphores.

Appendix D: Configuring RM/InfoExpress

RM/InfoExpress can be uniformly configured across all implementations of clients and servers. To maintain compatibility with previous versions of RM/InfoExpress, environment variables supported by previous versions can be used to override the settings of the configuration file. On the server, all the command line options can be specified in the configuration file.

This appendix describes the configuration files and their options.

Configuration Files and Options

Even though the names of the configuration files used by different implementations of RM/InfoExpress are different, the format of all these files is identical. The configuration files are as follows:

<u>Use</u>	<u>To set configuration parameters for</u>
rmixclnt.ini	RM/InfoExpress Windows and UNIX client programs.
rmixsrvr.ini	Either the RM/InfoExpress UNIX or the Windows server program.

For Windows clients and Windows servers, the configuration file must be present in the Windows directory (\WINDOWS or \WINNT, respectively). For UNIX clients and UNIX servers, the configuration file must be present in the current directory or the directory pointed to by the environment variable, IXCONFIG.

In a configuration file, any line beginning with a semi-colon (;) is treated as a comment and is not processed.

The client and server configuration files are divided into sections, each of which consists of a group of related options that you can use to customize your implementation of RM/InfoExpress. Some configuration options are used only by the client, while others are used only by the server. Some options are specific to the type of server. Still others are common to both client and server. All configuration options are shown in the sample configuration file that follows. See more detailed [descriptions of the configuration options](#) beginning on page 89.

Note Option names are not case sensitive.

Sample Configuration File

```
[Debug]
;###Common###
InfoxDebug=debug filename

[Options]
;###Common###
IxCompress=Yes|No
ReconnectEnable=Yes|No

;###Client-Specific###
KeepSession=Yes|No
PathPrefixExcluded=list
PathPrefixIncluded=list
ReconnectDelay=number

;###Server-Specific, All Servers###
DotsBias=number
FileBufferPool=number
FileCount=number
FileProcessCount=number
MinimumBlockSize=number
RoundToNiceBlockSize=Yes|No
UseCount=number
ReconnectTimeout=number
LargeFileLockLimit=number
InxUseLargeLimit=Yes|No
RelUseLargeLimit=Yes|No
SeqUseLargeLimit=Yes|No

;###Server-Specific, UNIX Server Only###
ConvertFileName=NoConvert|UpperCase|LowerCase

;###Server-Specific, Window Server Only###
UseCurrentDirectory=Yes|No
UseSystemShares=Yes|No

[Security]
;###Common###
EncodeData=Yes|No
IxPwFile=pathname

;###Client-Specific###
AcceptPassword=Yes|No

;###Server-Specific, UNIX Server Only###
DefaultServerUser=server-user-name
ServerSecurityLevel=number

[Sharing]
;###Server-Specific, Windows Server Only###
share-name=share-path
```

```
[Tcp]
;###Common###
MaxSendSize=number

[Winsock]
;###Common###
IgnoreHangupError=Yes|No      (Windows only)

;###Client-Specific###
UseBlockingIO=Yes|No
```

Common Configuration Options

The following configuration options, listed alphabetically, are *common* to both the client and server components of RM/InfoExpress:

- **EncodeData.** The EncodeData option in the [Security] section is used to encode messages to provide more security to the data transmitted on the network. EncodeData=No is the default. When the value is set to Yes, the RM/InfoExpress component (either the client or the server) negotiates the encoding algorithm of the messages exchanged with its session counterpart. If both the session partners have the value set to Yes, the messages are encoded before they are sent and unencoded immediately after they are received. However, if any of the session partners have the value set to No, the message encoding does not take place. Message encoding will not take place if either of the session partners is using a release of RM/InfoExpress earlier than version 2.1.
- **IgnoreHangupError.** The IgnoreHangupError option in the [Winsock] section is used only by RM/InfoExpress on Windows. If the value is IgnoreHangupError=Yes, any error returned by Windows Sockets functions, called while the Windows client is trying to disconnect the session with the server, are ignored. Do not specify this option unless instructed to do so by Liant technical support services.

IgnoreHangupError=No is the default value. If the value is set to No, a possibly serious error, should one occur while disconnecting the session with the server, is returned to the Close operation. This is normal behavior for any I/O operation.
- **InfoxDebug.** The InfoxDebug option in the [Debug] section causes the file whose path name is given by *debug filename* to be created and trace information written into it. After the client RM/COBOL application is terminated, send this file to Liant technical support services for further investigation. Use this option only when you are investigating a problem with the assistance of Liant technical support services. Using this option under normal conditions affects client operations negatively.

On the server, the InfoxDebug configuration option is equivalent to the -d command line option, as described in the appropriate sections of [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26) and [Starting and Stopping the RM/InfoExpress Windows Server Program](#) (on page 28). Note that the command line option overrides the configuration option.

- **IxCompress.** The IxCompress option in the [Options] section is used to compress messages transmitted on the network. Depending on the compressibility of the messages, which may contain COBOL data records, this option may improve the performance on the network. IxCompress=Yes is the default. When the value is set to Yes, the RM/InfoExpress component (either the client or the server) negotiates the compressibility of the messages exchanged with its session counterpart. If both the session partners have the value set to Yes, the messages are compressed before they are sent and decompressed immediately after they are received. However, if any of the session partners have the value set to No, the message compression does not take place. Message compression will not take place if either of the session partners is using a release of RM/InfoExpress earlier than version 2.1.
- **IxPwFile.** The value of *pathname* specified on the IxPwFile option in the [Security] section is used to locate the file containing the security parameters. If this option is absent, RM/InfoExpress looks for the security parameter file, **ixpwfile**, in the current directory. See [Chapter 6: File Security on the RM/InfoExpress UNIX Server](#) (on page 53).
- **MaxSendSize.** The MaxSendSize option in the [Tcp] section may be specified for those TCP/IP implementations that have a limitation. We recommend that you leave this value unspecified unless you know that the TCP/IP in use has a limitation. Some UNIX systems have a limit of 4096 bytes. Note that this value is *not* the same value as the size of the maximum packet allowed on the network.

The value specified by the MaxSendSize option is used to determine whether the RM/InfoExpress client or server code must perform multiple send operations on a given message. The underlying TCP stack implementation determines the maximum allowable value for a single send operation. Multiple send operations may be required for some large messages. The TCP stack will transmit the data in as many network packets as required by the underlying network. Again, for large messages, multiple network packets may be required.

If I/O errors occur on a file with a record size larger than about 4000 bytes while files with smaller record sizes perform normally, try specifying MaxSendSize=4096. The default value is system-dependent, but is currently 4096 or larger. The value cannot be less than 512.

On the server, the MaxSendSize configuration option is equivalent to the -z command line option, as described in the appropriate sections of [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26) and [Starting and Stopping the RM/InfoExpress Windows Server Program](#) (on page 28). Note that the command line option overrides the configuration option.

- **ReconnectEnable.** The ReconnectEnable option in the [Options] section determines whether reconnection logic in the client or server is enabled or disabled. For the client, the option determines whether the client will attempt to reconnect the session with the server if the connection is broken. For the server, this option determines whether the server will keep the file manager process and the current state of its open files intact waiting for the client to reconnect and continue from where it left off when the connection was broken.

Both the client and server sides of a connection must have reconnection enabled for the attempt to succeed. If the value is set to No for the client and the server, then they both behave identically to previous RM/InfoExpress releases; that is, the client reports an error to the COBOL program and the server closes files and terminates the file manager process running on behalf of the client. The default value is Yes for the client and No for the server. These defaults allow

reconnection to any given server to be enabled simply by changing the **rmixsrvr.ini** file for that server and starting the server again.

Beginning with version 8, a limited reconnection capability, which allows a connection that becomes broken to be reconnected automatically, has been added to the RM/InfoExpress client and server logic. The client and server continue normal operation without the client run unit (COBOL program) ever being aware of the disconnection. The server writes a log file, named **RMRECONN.LOG**, which is created in the directory specified in the environment variable **RM_RECONN_LOG_PATH**, if defined. If this environment variable is not defined, the log file is created in the **TEMP** directory on Windows or in the current directory on UNIX. Although it is not recommended, you can disable the log file by setting the **RM_RECONN_LOG_PATH** environment variable to a non-existent directory name.

TCP/IP provides a capability, known as “keepalive” support, to determine automatically whether an idle connection is still intact. When a connection has been idle for a certain period of time, TCP/IP transmits keepalive packets to see whether they are acknowledged, thus indicating an intact connection. After several retries—with each attempt receiving no acknowledgement—TCP/IP informs RM/InfoExpress that the connection is broken.

Having keepalive support enabled and keepalive packets being sent every short interval helps the reconnection logic work in a reasonable manner. Unfortunately, systems typically have keepalive support disabled or set to occur only after two hours of inactivity. Liant recommends enabling keepalive support, if necessary, and setting the keepalive delay time to a cycle of two minutes or less. Since the method of setting these system TCP/IP variables varies from system to system, consult your system administration documentation. On UNIX, these TCP/IP parameters are normally part of the kernel parameters that UNIX system administrators can set. On all versions of Windows, these TCP/IP parameters are set in the Windows registry under the following key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameter
```

In particular, it is the value name **KeepAliveTime**, the **REG_DWORD** value that defaults to 7,200,000 milliseconds (two hours), which is the value that Liant recommends changing to 120,000 milliseconds (two minutes) or less. More information is available by searching the Microsoft Support Knowledge Base for “keepalive configuration.” RM/InfoExpress calls the **setsockopt** function to enable the **SO_KEEPALIVE** socket option.

Client-Specific Configuration Options

The following configuration options, listed alphabetically, are *specific* to RM/InfoExpress clients:

- **AcceptPassword.** The AcceptPassword option in the [Security] section specifies whether the client should always accept passwords interactively. The default value is No. The server requires a password from the client when the server is running at security level 3, 4, or 5. At level 5, the server forces the client to always accept the password interactively, ignoring any password stored in the **ixpwwfile** file on the client machine.

When AcceptPassword=No is set and the server is running at level 3 or 4, the client obtains the password from the **ixpwwfile** on the client machine and sends it to the server.

When AcceptPassword=Yes is set and the server is running at level 3 or 4, the client accepts the password interactively (as it does for level 5).

The server administrator may wish to set AcceptPassword=Yes on unsecured client machines where it is undesirable to store any passwords (even though they are encoded) in the **ixpwwfile** on that client machine.

- **KeepSession.** Located in the [Options] section. KeepSession=Yes is the default. If the value is set to Yes, the client keeps the session with the server until the run unit terminates, even if all files on that server are closed before that time. This option is sometimes necessary when the client application opens and closes files rapidly, causing sessions to be established and released in rapid succession. Some network implementations cannot handle such frequent session creation, which can lead to errors and program hangs. This option may also improve performance slightly by eliminating the overhead of releasing and re-establishing a session between the Close of one remote file and the Open of another remote file on the same server. The drawback of specifying this option is that sessions may be kept with several servers for long periods of time when they will never be used again, thereby consuming network resources. Errors may occur if some network resources are exhausted.

If the value is KeepSession=No, the client releases the session with the server when the last open file is closed. In addition, the UNIX client supports this option as an environment variable (also called KEEPSSESSION), which when set, overrides the current setting.

- **PathPrefixExcluded and PathPrefixIncluded.** These two configuration options are both used to allow an RM/InfoExpress client to exclude selected UNC-style path names (beginning with \\ or //) from access via RM/InfoExpress. (Prior to version 8, RM/InfoExpress always attempted access to all UNC-style path names.) The PathPrefixExcluded option in the [Options] section determines which path name prefixes are not to be accessed via RM/InfoExpress. The PathPrefixIncluded option in the [Options] section determines which path name prefixes can be accessed via RM/InfoExpress.

In each option, the *list* is a comma-separated list of path name prefix strings. Embedded spaces within each string are kept while leading and trailing spaces are ignored. Matching is case-insensitive and slash (/) matches backslash (\). Thus, \\SRV1\TMP is equivalent to //srv1/tmp. Only whole edgenames are matched, where edgename means the text between two slashes or backslashes or end of string. Consequently, //srv matches //srv/tmp/file.ext but does not match //srv1/tmp/file.ext. No wildcard characters are allowed.

Consider the following to determine when and how to use these closely related options:

- If only PathPrefixExcluded is specified, matching path names are excluded and all other path names are included.
- If only PathPrefixIncluded is specified, matching path names are included and all other path names are excluded.
- If both PathPrefixExcluded and PathPrefixIncluded are specified, the longest matching prefix string determines exclusion or inclusion, and path names matching none of the prefix strings are included by default.
- If neither PathPrefixExcluded nor PathPrefixIncluded is specified, all path names are included (which is the same behavior as prior versions of RM/InfoExpress).

Typically, you would specify either PathPrefixExcluded or PathPrefixIncluded based upon which path name prefix list is the shortest or most well defined to enumerate. However, both options can be specified for more complicated exclusion and inclusion schemes.

For example, specifying:

```
PathPrefixExcluded=//srv1, //srv2  
PathPrefixIncluded=//srv2/data, //srv2/tmp
```

means that an RM/InfoExpress client will not attempt to access any files on server **srv1** and will attempt to access only files whose path names begin with `//srv2/data` or `//srv2/tmp` on server **srv2**. You might want this in a situation in which **srv2** is a Windows server where all RM/InfoExpress data files reside in directories **data** and **tmp**, but there are also Windows printers that you want to access via path names `//srv2/printer1`, `//srv2/printer2`, and so forth. Note, however, that if `printer1` and `printer2` are the only two path names that you do not want to access via RM/InfoExpress on **srv2**, then specifying only the following would achieve the same result:

```
PathPrefixExcluded=//srv1, //srv2/printer1, //srv2/printer2
```

Any other path name on **srv2**, such as `//srv2/data/file`, would be included by default since that path name does not match any excluded path prefix.

- **ReconnectDelay.** The ReconnectDelay option in the [Options] section determines the number of milliseconds the client will delay before attempting to reconnect to the server after the client becomes aware that the connection has been broken. The default value is 100 (one tenth of a second).
- **UseBlockingIO.** The UseBlockingIO option in the [Winsock] section is provided to improve the performance of the RM/InfoExpress Windows client. If the value is UseBlockingIO=Yes, Windows Sockets functions are called in blocking mode; that is, every function call will block until the request is complete. Using this value also ensures that Windows Sockets Asynchronous functions and the **PeekMessage** function are never called. Substantial performance improvements may occur, depending upon the type of Windows Sockets implementation used. However, the operator will not be able to cancel a Read operation waiting on a locked record. We suggest users experiment using their own benchmark programs to determine whether specifying the value Yes results in better performance for the specific TCP/IP implementation in use.

If the value is UseBlockingIO=No (the default value), Windows Sockets Asynchronous functions and the **PeekMessage** function are used; that is, functions are called in non-blocking mode. If any COBOL program using the Windows client executes a Read operation that waits on a locked record and the operator requires the ability to cancel that operation, the UseBlockingIO option must be set to No.

Sample RM/InfoExpress Windows Client Configuration File

The following is a sample Windows client configuration file (**rmixclnt.ini**).

```
[Debug]
;;;InfoxDebug=DBGFILE

[Security]
IxPwFile=d:\tmp\IXPWFILe

[Winsock]
UseBlockingIO=Yes
```

Common Server-Specific Configuration Options

CAUTION It is imperative that on every RM/InfoExpress server and RM/COBOL runtime system accessing any particular file from any machine, the values specified for the FileProcessCount, LargeFileLockLimit, RelUseLargeLimit, and SeqUseLargeLimit keywords in the RM/InfoExpress server configuration file must match the values specified in the corresponding configuration option in the RM/COBOL runtime system.

The following configuration options, listed alphabetically, are *common* to both the RM/InfoExpress UNIX server and the Windows server programs:

- **DotsBias.** The DotsBias option in the [Options] section is used to specify where an ellipsis (...) appears in filenames that are too long to fit in the display field of the server display program. The leftmost part of the filename appears to the left of the dots and the rightmost part of the filename appears to the right of the dots (the middle of the filename is replaced by the ellipsis.) The default value is zero, which causes the ellipsis to appear in the middle of the field. Negative values move the ellipsis to the left and positive values move the ellipsis to the right. Special value +9999 moves the ellipsis completely out of the right side of the field, thus displaying the leftmost part of the filename (truncated). This is equivalent to RM/InfoExpress version 2.0 behavior. Special value -9999 moves the ellipsis completely out of the left side so that the rightmost part of the filename is displayed (with no ellipsis). This option is cosmetic and has no effect on server operation other than the display.
- **FileBufferPool.** The FileBufferPool option in the [Options] section is used to specify the common buffer pool size on the server machine. The default value is zero, which causes the default size for the common buffer pool. Normally, you should not need to specify a value. This option corresponds to the BUFFER-POOL-SIZE keyword in the RUN-FILES-ATTR configuration record specified

for **runcobol**, as described in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*.

The FileBufferPool configuration option is equivalent to the -p command line option, as described in the appropriate sections of [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26) and [Starting and Stopping the RM/InfoExpress Windows Server Program](#) (on page 28). Note that the command line option overrides the configuration option.

- **FileCount.** The FileCount option in the [Options] section may be used to specify the number of files the server can have open simultaneously. The default value is ten times the UseCount. FileCount may need to be increased when every client application has more than ten files on the server open simultaneously. Reducing FileCount will reduce the server's shared and local memory requirements.
- **FileProcessCount.** The FileProcessCount option in the [Options] section determines the maximum number of run units that can have a file open at the same time. It applies to all file organizations. For record and file locks to perform correctly, all RM/InfoExpress servers and RM/COBOL runtime systems opening a file must use the same file process count. The maximum value for this keyword is 16384; the minimum value is 8. The default value is 1024. This option corresponds to the FILE-PROCESS-COUNT keyword in the RUN-FILES-ATTR configuration record specified for **runcobol**, as described in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*.
- **InxUseLargeLimit.** The InxUseLargeLimit option in the [Options] section determines which value to use for the lock limit when creating a version 4 indexed file. If the value is set to No (the default), the lock limit placed into the KIB is 2 GB for indexed files created by the RM/InfoExpress server. If the value is set to Yes, the lock limit placed into the KIB is the value of the LargeFileLockLimit option for indexed files created by the RM/InfoExpress server. Note that existing version 4 indexed files always use the lock limit stored in their KIB. This option corresponds to the USE-LARGE-FILE-LOCK-LIMIT keyword in the RUN-INDEX-FILES configuration record specified for **runcobol**, as described in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*.
- **LargeFileLockLimit.** The LargeFileLockLimit option in the [Options] section determines the limit for the location to apply locks to a file that will be accessed as a large file. For record and file locks to perform correctly, all RM/InfoExpress servers and RM/COBOL runtime systems opening a particular file must use the same lock limit for that file. The lock limit also limits the actual amount of data that can be stored in a file. This limit will be used when a new indexed file is created provided the file version of the file is 3 or greater. Otherwise, this limit has no effect on indexed files. The value assigned to this keyword is specified in gigabytes (GB). The maximum value is 1048576, which equates to 1 petabyte (2^{50}). The minimum value is 1. The default value is 64. The lock limit for a normal file is 2 GB. This option corresponds to the LARGE-FILE-LOCK-LIMIT keyword in the RUN-FILES-ATTR configuration record specified for **runcobol**, as described in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*.

- **MinimumBlockSize.** The MinimumBlockSize option in the [Options] section determines the minimum disk block size for the indexed files created by the RM/InfoExpress server, represented as a decimal number. The maximum value for this keyword is 4096; the minimum value is 256. The default value is 1024. This option corresponds to the MINIMUM-BLOCK-SIZE keyword in the RUN-INDEX-FILES configuration record specified for **runcobol**, as described in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*.
- **ReconnectTimeout.** The ReconnectTimeout option in the [Options] section determines the number of minutes the server will keep the file manager process serving the client intact waiting for the client to reconnect to it. In particular, all file and record locks remain in place while the client is disconnected and will prevent access by other run units. The default value is 180 (three hours).
- **RelUseLargeLimit.** The RelUseLargeLimit option in the [Options] section determines which value to use for the limit when applying locks to a relative file. If the value is set to No (the default), the lock limit for relative files is 2 GB. If the value is set to Yes, the value of the LargeFileLockLimit option is used. For record and file locks to perform correctly, all run units RM/InfoExpress servers and RM/COBOL runtime systems opening a file must use the same lock limit for that file. This option corresponds to the USE-LARGE-FILE-LOCK-LIMIT keyword in the RUN-REL-FILES configuration record specified for **runcobol**, as described in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*.
- **RoundToNiceBlockSize.** The RoundToNiceBlockSize option in the [Options] section determines whether the block size computed for the indexed files created by the RM/InfoExpress server is forced to be a multiple of 512 (under Windows) or the value of BUFSIZ, taken from the C include file `<stdio.h>` (under UNIX). The default value for this keyword is Yes. This option corresponds to the ROUND-TO-NICE-BLOCK-SIZE keyword in the RUN-INDEX-FILES configuration record specified for **runcobol**, as described in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*.
- **SeqUseLargeLimit.** The SeqUseLargeLimit option in the [Options] section determines which value to use for the limit when applying locks to a sequential file. If the value is set to No (the default), the lock limit for sequential files is 2 GB. If the value is set to Yes, the value of the LargeFileLockLimit option is used. For record and file locks to perform correctly, all RM/InfoExpress servers and RM/COBOL runtime systems opening a file must use the same lock limit for that file. This option corresponds to the USE-LARGE-FILE-LOCK-LIMIT keyword in the RUN-SEQ-FILES configuration record specified for **runcobol**, as described in Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*.
- **UseCount.** The UseCount option in the [Options] section may be used to specify the number of clients that the server can serve simultaneously. This number must not be greater than the server's licensed client count. A reduced value on the UseCount option will reduce the server's shared and local memory requirements. The number of clients will default to the server's licensed client count unless the client count is "unlimited." In that case, it will default to 50.

The UseCount configuration option is equivalent to the -k command line option, as described in the appropriate sections of [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26) and [Starting and Stopping the RM/InfoExpress Windows Server Program](#) (on page 28). Note that the command line option overrides the configuration option.

UNIX Server-Specific Configuration Options

The following configuration options, listed alphabetically, are *specific* to the RM/InfoExpress UNIX server:

- **ConvertFileName.** The ConvertFileName option, which is located in the [Options] section and can have three values, is used to process the filename before the file is opened on the server's native operating system. When ConvertFileName=NoConvert (the default value), no filename mapping is performed. ConvertFileName=UpperCase indicates that the entire filename is mapped to uppercase before the Open request is attempted. ConvertFileName=LowerCase indicates that the entire filename is mapped to lowercase before the Open request is attempted.

The ConvertFileName configuration option is equivalent to the -c command line option, as described in the appropriate sections of [Starting the RM/InfoExpress UNIX Server Program](#) (on page 26) and [Starting and Stopping the RM/InfoExpress Windows Server Program](#) (on page 28). Note that the command line option overrides the configuration option.

- **DefaultServerUser.** The DefaultServerUser option in the [Security] section specifies the user name (at security levels 0 or 1) to run on the server when the security validation fails. Normally, the default server user will be allowed to access files that do not require high levels of security. The default server user must be a valid user on the server. The default is DefaultServerUser=rmsrver.
- **ServerSecurityLevel.** The ServerSecurityLevel option in the [Security] section specifies the security level number at which the UNIX server is to run (for more information, see [Chapter 6: File Security on the RM/InfoExpress UNIX Server](#) on page 53). Valid values range from 0 through 5. If this option is not specified, the server runs in compatibility mode, that is, the behavior is equivalent to an RM/InfoExpress version 2.0 server.

Sample RM/InfoExpress UNIX Server Configuration File

The following is a sample UNIX server configuration file (**rmixsrvr.ini**).

```
[Debug]
;;;InfoxDebug=DBGFILE

[Security]
IxPwFile=/usr/foo/ixpwfile
ServerSecurityLevel=5
DefaultServerUser=foo
```

Windows Server-Specific Configuration Options

The following configuration options are specific to the RM/InfoExpress Windows server:

- **share-name.** The *share-name* option in the [Sharing] section defines a share name and equates it with a path name (*share-path*). On Windows, the edgename following the server machine name is a share name; for example, `\\server-name\share-name\rest-of-path-to-file`. All share names and paths are case insensitive.

The server generates path names as follows:

1. Searches for the specified share name.
2. If found, substitutes the *share-path* for the name; if not found, searches for a null share name.
3. If found, prepends the *share-path* to the filename; if not found, checks the UseCurrentDirectory configuration flag.
4. If “Yes”, prepends the current working directory path to the filename; if “No”, returns a “35” error;

The generated path name is then given to the RM/COBOL File Manager.

For example, if the [Sharing] section on host *serverW* contains

```
[Sharing]
cdrive=c:\tmp
AcctPayable=d:\acctpayable\data
=e:\guest\data
```

then the client path `\\serverW\cdrive\file.dat` causes the server to access

```
c:\tmp\file.dat
```

Similarly,

<code>\\serverW\cdrive\red\white\blue</code>	<code>c:\tmp\red\white\blue</code>
<code>\\serverW\acctpayable\master.inx</code>	<code>d:\acctpayable\data\master.inx</code>
<code>\\serverW\file1</code>	<code>e:\guest\data\file1</code>
<code>\\serverW\xyzy\tmp\junk.x</code>	<code>e:\guest\data\xyzy\tmp\junk.x</code>
<code>\\serverW\cdrive</code>	<code>e:\guest\data\cdrive</code>

If the null share name line (`=e:\guest\data`) did not exist and the server was started in `c:\bin`, then:

<code>\\serverW\file1</code>	<code>c:\bin\file1</code>
<code>\\serverW\xyzy\tmp\junk.x</code>	<code>c:\bin\xyzy\tmp\junk.x</code>
<code>\\serverW\cdrive</code>	<code>c:\bin\cdrive</code>

The server's current working directory is the default path for the null share name provided the UseCurrentDirectory option is set to Yes.

If there is no [Sharing] section and if UseCurrentDirectory=No and UseSystemShares=No are both set, then every open returns a 35 error.

The path associated with a share name is intended to start with a drive letter and to specify a valid directory so that the resulting final path name is an absolute path name on the server machine.

- **UseCurrentDirectory.** The UseCurrentDirectory option in the [Options] section determines whether or not the server's current directory path name is prepended to the filename when the edgename following the server name does not match any valid share name. UseCurrentDirectory=Yes is the default.
- **UseSystemShares.** The UseSystemShares option in the [Options] section determines whether or not the Windows server system share names are used. UseSystemShares=Yes is the default. A Windows server system share name is defined in the Shared As portion of the Sharing tab of the disk or directory folder Properties. Note that RM/InfoExpress server ignores the Access Type and Passwords portions of the Sharing tab. If UseSystemShares=No is specified, only the share names defined in the **rmixsrvr.ini** file [Sharing] section are used.

Sample RM/InfoExpress Windows Server Configuration File

The following is a sample Windows server configuration file (**rmixsrvr.ini**).

```
[Debug]
;;;InfoxDebug=DBGFILE

[Sharing]
cdrive=c:\
ShareTemp=d:\tmp\shared\files

[Options]
UseCurrentDirectory=Yes
UseSystemShares=Yes
```


Appendix E: RM/InfoExpress Security Parameter File Update Utility

This appendix describes how to use the **ixsecure.cob** program to update the **ixpwwfile** parameter file with security-related information that is used by the server to authenticate the clients. Note that **ixpwwfile** must exist when the RM/InfoExpress server is run at security levels greater than level 2. The implementation of file security in RM/InfoExpress is detailed in [Chapter 6: File Security on the RM/InfoExpress UNIX Server](#) (on page 53).

The RM/COBOL object program, **ixsecure.cob**, is included with the RM/InfoExpress media to enable users to build the security parameter file, **ixpwwfile**. The RM/COBOL runtime system (**runcobol**) is needed to run this object program.

A separate parameter file (**ixpwwfile**) is required for each of the client machines and one for the server machine. The parameter file for the client machine may have several entries, each giving information about this client and one of the servers with which this client communicates. Similarly, the parameter file for the server machine may have several entries, each giving information about this server and one of the clients that may connect to the server.

Using the Utility

To run the security parameter file update utility, use the following command:

```
runcobol ixsecure
```

If the security parameter file, **ixpwfile**, is not in the current directory or has a different name, set the IXPWFILE environment variable to the current path name of the file.

The RM/InfoExpress Security Parameter File Update utility Main screen, illustrated in Figure 15, is displayed.

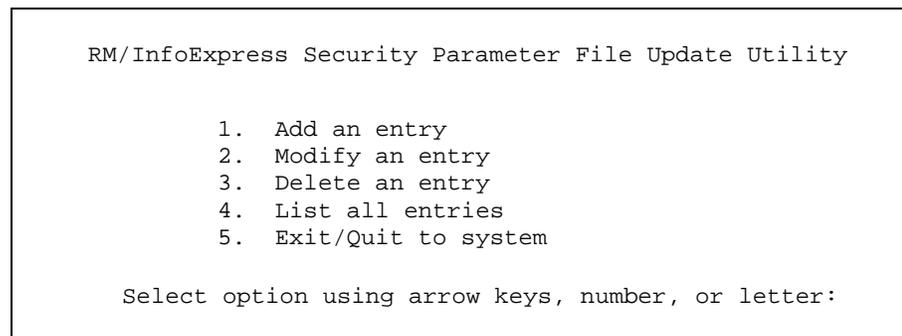


Figure 15: Security Parameter File Update Utility Main Screen

To choose an option on this screen, move the cursor with the arrow keys to a particular option and press Enter. Alternatively, you can type the option number or the first letter of the option description (it is not necessary to press Enter afterwards). To exit the utility program, choose option 5.

Note If RM/COBOL finds an error while performing the requested operation, a message with the appropriate RM/COBOL runtime error is displayed on the last line of the screen, and the utility waits for acknowledgment.

When the **ixpwfile** is empty (such as the first time this utility is run on a machine), a warning message is displayed and the file is created.

Adding a New Entry

To add a new entry, choose option 1 on the Main screen. The RM/InfoExpress Security Parameter File Update utility Add Entry screen, illustrated in Figure 16, is displayed.

```
RM/InfoExpress Security Parameter File Update Utility
                        ADD ENTRY

SERVER MACHINE NAME:.....
CLIENT MACHINE NAME:
SERVER USER NAME:
PASSWORD:
```

Figure 16: Add Entry Screen

Type the requested information and press Enter on the last line to complete the entry. If you want to cancel the input at any time, press Esc. The utility displays the RM/InfoExpress Security Parameter File Update utility Main screen, illustrated in [Figure 15](#) on page 102. Otherwise, the entry will be added to the file.

The SERVER USER NAME is case-sensitive.

The SERVER USER NAME and CLIENT MACHINE NAME are not case-sensitive; that is, they will be displayed as entered but will be mapped to uppercase for use by RM/InfoExpress.

Note If you are creating a security parameter file for an RM/InfoExpress server, the password field on the Add Entry screen should be left blank (simply press Enter in this field). The password in an entry for the server security parameter file is always ignored.

Modifying an Existing Entry

To modify an existing entry, choose option 2 on the Main screen. The RM/InfoExpress Security Parameter File Update utility Modify Entry screen, illustrated in Figure 17, is displayed.

```
RM/InfoExpress Security Parameter File Update Utility
                          MODIFY ENTRY

SERVER MACHINE NAME:  unixserver.....
CLIENT MACHINE NAME:  mypc
SERVER USER NAME:    user1
PASSWORD:

Select using DOWN-ARROW/UP-ARROW/ENTER/ESC:
```

Figure 17: Modify Entry Screen

Using the arrow keys, choose the entry you wish to modify. Update the information on the screen and press Enter on the last line to complete the entry. If you want to cancel the input at any time, press Esc. The utility displays the RM/InfoExpress Security Parameter File Update utility Main screen, illustrated in [Figure 15](#) on page 102. Otherwise, the current entry in the file will be replaced by this information.

Deleting an Existing Entry

To delete an existing entry, choose option 3 on the Main screen. The RM/InfoExpress Security Parameter File Update utility Delete Entry screen, illustrated in Figure 18, is displayed.

```
RM/InfoExpress Security Parameter File Update Utility
      DELETE ENTRY

SERVER MACHINE NAME:  unixserver.....
CLIENT MACHINE NAME:  mypc
SERVER USER NAME:    user1
PASSWORD:

Select using DOWN-ARROW/UP-ARROW/ENTER/ESC:
```

Figure 18: Delete Entry Screen

Using the arrow keys, choose the entry you wish to delete and press Enter. If you want to cancel the input at any time, press Esc. The utility displays the RM/InfoExpress Security Parameter File Update utility Main screen, illustrated in [Figure 15](#) on page 102. Otherwise, the current entry in the file will be deleted.

After successful deletion, the following message is displayed for confirmation:

```
Confirm deletion (Y/N)
```

Type Y to confirm deletion. (To abandon the deletion, type N.) The following message is displayed to confirm the successful deletion of the entry from the file:

```
Record deleted successfully. Press any key. . .
```

Listing All Entries

To list all entries in the file, choose option 4 on the Main screen. The RM/InfoExpress Security Parameter File Update utility List Entries screen, illustrated in Figure 19, is displayed showing the following information.

```
RM/InfoExpress Security Parameter File Update Utility
LIST ENTRIES

Server Machine Name      Client Machine Name      Server User Name
unixserver1              mypc                      user1
unixserver2              mypc                      user2

Press any key. . .
```

Figure 19: List Entries Screen

Press any key to return to the RM/InfoExpress Security Parameter File Update utility Main screen, illustrated in [Figure 15](#) on page 102. If the file contains more entries than can be displayed on one screen, additional screens will be displayed when a key is pressed. When all entries have been displayed, pressing a key will return to the Main screen.

Note The password information is not displayed.

Appendix F: Using RM/InfoExpress with Relativity

RM/InfoExpress can be used with Relativity for RM/COBOL to access the catalog and/or files stored on a server running the RM/InfoExpress server program. This appendix provides instructions for 32-bit RM/InfoExpress Windows clients.

Note Some earlier versions of Relativity are called Relational DataBridge.

Changes to Relativity Configuration for 32-Bit Windows Clients

The 32-bit RM/InfoExpress Windows client software (**rmtcp32.dll**) is installed with Relativity. Note that the RM/InfoExpress Windows client software is not supplied with the RM/InfoExpress server software or versions of Relativity prior to 2.5. It is distributed with the RM/COBOL for Windows runtime or development system or, alternatively, it can be downloaded from the Liant Web site (www.liant.com). Contact Liant technical support services for more information.

The configuration procedures begin in the section [Configure Relativity to Use RM/InfoExpress](#) (on page 108). These instructions assume the following:

- You have the RM/InfoExpress server main program and server display program installed and running on your server machine. For more information, see the installation instructions in [Chapter 1: Installation and Verification](#) (on page 7).
- You have the complete Microsoft TCP/IP software package installed and configured in the Networking option on the Control Panel. (See also Chapter 1.)
- You are running Windows 9x or Windows NT class clients.

Create a Configuration File

Create a file, called **rmixclnt.ini**, in the main Windows directory to set configuration parameters for RM/InfoExpress client programs. Include the following entry:

```
[Winsock]
UseBlockingIO=Yes
```

This entry prevents a 10055 system error: “No available buffer space”. This configuration parameter is discussed in [Client-Specific Configuration Options](#) (on page 92).

Configure Relativity to Use RM/InfoExpress

There are two aspects to configuring the Relativity ODBC data source setup: configuring Relativity to use RM/InfoExpress and specifying the location of the Relativity catalog on the server.

Note All setup options can be configured from the Windows client workstation using the ODBC Data Source Administrator that is distributed with Relativity.

To configure Relativity to use RM/InfoExpress:

1. On the Windows client workstation, click the **Start** button, point to **Settings**, and then click **Control Panel**.
2. To access the ODBC Data Source Administrator from the Control Panel:
 - On Windows 98, double-click ODBC Data Sources (32bit).
 - On Windows NT, double-click ODBC.
 - On Windows 2000, XP, and Windows Server 2003, double-click Administrative Tools and then click Data Sources (ODBC).
3. In the ODBC Data Source Administrator dialog box, click **Add**.
4. In the Create Data Source dialog box, select **Relativity (*.rcg)** as the driver type.
5. In the Relativity dialog box, select the **RM/COBOL** option and then click the **RM/InfoExpress** tab to display the RM/InfoExpress page.
6. In the RM File Manager options area, select the **Enable RM/InfoExpress** check box, which enables access to RM/InfoExpress.

The option for “Allow File Creation” is selected by default.
7. Next, click the **Display Initial Message Box** option to verify correct operation.

This action is useful when first configuring Relativity to use RM/InfoExpress. A message box will be displayed when RM/InfoExpress is first called. If the message box is not displayed, it indicates that any problems are not network related, but are caused by the software installation. Similarly, if there is a problem but the message box is displayed, the problem is related to the network.

Note After installation is verified, you may return to the RM/InfoExpress tab using the 32-bit ODBC Administrator, as described in Step 2, and clear the Display Initial Message Box option.

8. In the Relativity dialog box, click the **DSN** tab.

This tab has entries for the data source name and description, as well as buttons to select or create a Relativity catalog.

Continue by specifying the location of the Relativity catalog on the server:

1. In the Data Source Name box on the DSN tab, enter the desired name for the data source (what users will see from their ODBC-enabled application, such as Microsoft Access or Excel).
2. Click the **Select Catalog** button. The Select Catalog for Data Source dialog box is displayed.
3. In the Select Catalog for Data Source dialog box, select the **Use RM/InfoExpress only** check box.
4. In the File name box, enter the complete path name.

You must specify the name in the following format:

```
\\RMInfoExpressServer\PathToFile
```

where *RMInfoExpressServer* must match the TCP/IP host name for the server machine on this client (for example, \\HOSTNAME\test.rcg). The following example specifies a Relativity catalog called **shirt3.rcg** in the directory **/usr/relsamples** on the server **unixware21**:

```
\\unixware21\usr\relsamples\shirt3.rcg
```

5. After you enter a valid RM/InfoExpress server and filename, click **Open**. The Relativity catalog name will be validated and returned to the Relativity dialog box as the name of the Relativity catalog for the data source. This information is displayed in the Catalog Name area.
6. In the Relativity dialog box, click **OK** to complete creation of the Relativity data source.

Appendix G: Summary of Enhancements

This appendix summarizes the enhancements from previous releases of RM/InfoExpress, beginning with the most recent release.

Note The RM/InfoExpress version number refers to the RM/InfoExpress server; RM/InfoExpress client(s) do not have version numbers.

Version 8 Enhancements

This section summarizes the major enhancements available in version 8 of RM/InfoExpress.

Support for Large Files

Because the RM/InfoExpress server contains the RM/COBOL file management system, the RM/InfoExpress server includes the same support for large files as that offered by the RM/COBOL runtime system (**runcobol**).

When running under operating systems that support files larger than 2 GB (gigabytes), the RM/COBOL runtime system allows RM/COBOL files to grow past limits imposed in previous versions. This support is provided by the LARGE-FILE-LOCK-LIMIT keyword of the RUN-FILES-ATTR configuration record. In order to use this new limit on relative or sequential files, you must use the USE-LARGE-FILE-LOCK-LIMIT keyword in a RUN-REL-FILES or RUN-SEQ-FILES configuration record. In RM/InfoExpress, the server configuration file (**rmixsrvr.ini**) contains keywords that correspond to those in the RM/COBOL runtime system and that provide the same support. For record and file locks to perform correctly, all RM/InfoExpress servers and RM/COBOL runtime systems opening a file must use the same lock limit for that file.

On the Windows 9x class of operating systems, files up to 4 gigabytes (GB) are supported. The Windows NT class of operating systems support multiple terabyte files on the NT file system. Only files on FAT32 (file system format supported for Windows 9x-class operating systems) or NTFS (file system format supported on Windows NT-class operating systems) may be larger than 2 GB.

For more information, see [Appendix D: Configuring RM/InfoExpress](#) (on page 87) of the *RM/InfoExpress User's Guide* and Chapter 10: *Configuration*, of the *RM/COBOL User's Guide*. In order to use this new limit on indexed files, you must use an indexed file version level of 3 (see the "Very Large File Support" topic in

Chapter 8: *RM/COBOL Features*, of the *RM/COBOL User's Guide* for more information). Additional information about UNIX and Windows systems that support large files also can be found in the “Using Large Files” topic in Chapter 2: *Installation and System Considerations for UNIX*, and in Chapter 3: *Installation and System Considerations for Microsoft Windows*, respectively, of the *RM/COBOL User's Guide*.

Atomic I/O Support for File Version Level 4

In RM/InfoExpress, as in RM/COBOL, file version level 4 indexed files optionally support the new “atomic I/O” capability, which provides a means for users to avoid almost all 98 errors caused by failures that occur while a file is open. Files created with atomic I/O will almost never need recovery. If a crash occurs during a COBOL I/O operation, the file will be automatically and quickly recovered the next time the file is opened or a write operation is performed. The ENABLE-ATOMIC-IO keyword has been added to the RUN-INDEX-FILES configuration record to determine whether indexed files created by the runtime system use atomic I/O.

The default indexed file version for new files has been changed from 2 to 4 to automatically provide the higher level of reliability to new files. The DEFAULT-FILE-VERSION-NUMBER keyword of the RUN-INDEX-FILES configuration record may be used to specify a different value.

Version 4 indexed files may, like version 3 files, grow to a larger size than version 0 or 2 files. However, unlike version 3 files, version 4 files may be either large or regular sized files, depending on the new USE-LARGE-FILE-LOCK-LIMIT keyword of the RUN-INDEX-FILE configuration record. This new keyword determines whether the LARGE-FILE-LOCK-LIMIT or the FILE-LOCK-LIMIT keyword of the RUN-FILES-ATTR configuration record is used to determine the largest address that can be locked in the file. This, in turn, determines how large the file can be.

Limited Automatic Session Reconnection

Beginning with version 8, a limited reconnection capability, which allows a connection that becomes broken to be reconnected automatically, has been added to the RM/InfoExpress client and server logic. The client and server continue normal operation without the client run unit (COBOL program) ever being aware of the disconnection. To enable this capability, you must set ReconnectEnable=Yes in the [Options] section of the **rmixsrvr.ini** server configuration file, as explained in [Appendix D: Configuring RM/InfoExpress](#) (on page 87).

Client Path Prefix Inclusion and Exclusion

A new feature has been added in version 8 to allow the RM/InfoExpress client to exclude selected UNC-style path names (beginning with \\ or //) from access via RM/InfoExpress. Prior versions of RM/InfoExpress always attempted access to all UNC-style path names. In the **rmixclnt.ini** configuration file in the [Options] section, you can specify PathPrefixIncluded=*list* and PathPrefixExcluded=*list*. For more information, see Appendix D.

Version 2.1 Enhancements

This section summarizes the major enhancements available in version 2.1 of RM/InfoExpress.

RM/InfoExpress Server Now Supported on Windows NT Version 4.0

A version of the RM/InfoExpress server software now runs on the Windows NT Server (version 4.0).

File Security on the RM/InfoExpress UNIX Server

The RM/InfoExpress UNIX server now provides enhanced file security. The level of security is specified at the time the server is invoked. The server performs various validations on the authenticity of the client(s) before granting access to a file. See [Chapter 6: File Security on the RM/InfoExpress UNIX Server](#) (on page 53), for more information.

New Utility to Update RM/InfoExpress Parameter File

To make the RM/InfoExpress server screens display similar information about all types of clients, all new clients now provide client-specific information (such as *client-machine-name* and *user-name* of the client on the server, as described in Chapter 6) to the server from a security parameter file. This parameter file, default name **ixpwfile**, is created using a utility program, **ixsecure.cob**. Refer to [Appendix E: RM/InfoExpress Security Parameter File Update Utility](#) (on page 101), for more information about how to use this utility.

Improved Server Screens

Additional information has been added to the server screens to identify the clients. For example, the Error Log screen now displays the name of the file on which the error occurred.

Optional Message Compression

This version of RM/InfoExpress optionally compresses messages before transmitting them on the network. Depending on the compressibility of the messages, which include the records from RM/COBOL data files, compression may improve the performance of RM/InfoExpress over WANs and heavily loaded LANs.

Optional Message Encoding

This version of RM/InfoExpress optionally encodes messages before transmitting them on the network to provide more security for the COBOL data.

Initialization File Support

All implementations of RM/InfoExpress now allow configuration information to be stored in a file that is in an .INI format. See [Appendix D: Configuring RM/InfoExpress](#) (on page 87), for more information.

-m Server Option Obsolete

The RM/InfoExpress server now automatically expands the message buffer size (previously set using the -m option on the server command line) as required by each session. The user should no longer receive the error RMIX_ERR_OUT_OF_MEMORY when transmitting records larger than 5000 bytes.

Use Count Check by the Server

The RM/InfoExpress server now limits the number of client connections to the value specified by the UseCount configuration option or the licensed use count, whichever is less. For more information, see the UseCount option as described in Appendix D.

New File Count Option

The RM/InfoExpress server can now be configured for any number of simultaneously open files, independent of the licensed use count. For more information, see the FileCount configuration option as described in Appendix D.

New Option to Handle the Display of Long Filenames

The RM/InfoExpress screen handler (server display) program can now be configured to display more reasonably a filename that is too long to fit in the display field of the screen handler. For more information, see the DotsBias configuration option as described in Appendix D.

Version 2.0.2 Enhancements

This section summarizes the major enhancements available in version 2.0.2 of RM/InfoExpress.

New Server Option Enables the RM/plusDB Interface

The -b option has been added in order to enable RM/InfoExpress to communicate with RM/plusDB. Use the -b option when invoking the RM/InfoExpress server with the RM/plusDB product if every filename is to be checked for an RM/plusDB table name by the server before opening the RM/COBOL data file.

Note Beginning with version 8 of RM/InfoExpress, Liant Software no longer develops or supports RM/plusDB. This option is maintained for backward compatibility only and should be ignored. Do not specify this option unless you have used RM/plusDB in your application.

Version 2.0 Enhancements

This section summarizes the major enhancements available in version 2.0 of RM/InfoExpress.

RM/InfoExpress UNIX Server Filename Case Sensitivity

For the RM/InfoExpress UNIX server, the -c option allows you to specify whether to map the filename on an Open request to uppercase, lowercase, or leave it unaltered (the default). See [Chapter 2: Configuring and Running the RM/InfoExpress Server](#) (on page 25), for more information.

RM/InfoExpress UNIX Server Configuration Option

For the RM/InfoExpress UNIX server, the -c 1 configuration option must be specified if the path names are to be converted to lowercase (as in the previous version). The default is no conversion. For more information, see Chapter 2.

RM/InfoExpress UNIX Server Runs as a Daemon

This version of the RM/InfoExpress UNIX server runs unattended in the background and no longer requires an additional terminal. The server uses data structures built in shared memory. The server modifies the data structures using a well-defined administrative API (Application Programming Interface) to preserve the integrity of the server data structures.

RM/InfoExpress Screen Handler Program

The screen handler (server display) portion of RM/InfoExpress has been removed from the server program and is now a separate application. The screen handler application shares the data structures present in shared memory along with the server daemon. The screen handler accesses the data structures using a well-defined administrative API.

The screen handler program is improved to read an entire screen of information in a single operation, thus providing more consistency to the data it displays.

Under UNIX, the screen handler can be invoked more than once on the system, making it possible for multiple users to view the server statistics simultaneously. The screen handler application can be run from any terminal on the UNIX system.

The command sequence, Terminate Display, now terminates the screen handler program without affecting the server or any clients.

The following sections describe two additional modifications to the screen handler program.

Changes in the Default Behavior

The default behavior of the screen handler (server display) program allows only the termination of the screen handler program itself. This prevents you from accidentally stopping the server or a specific client. To terminate the server or a particular client, you must specify the `-t` option (as described in [Chapter 2: Configuring and Running the RM/InfoExpress Server](#) on page 25) when you start the screen handler program.

New Screens

The Error Information screen has been replaced by two new screens.

The Open Log screen displays information about the most recent 24 open operations performed by the server. The Error Log screen displays information about the most recent 24 errors, including the complete error code and location of the error. See [Chapter 5: RM/InfoExpress Server Operations](#) (on page 41), for more information.

More COBOL Information Added to Existing Screens

More COBOL-related information has been added to existing screens. The Client Files Information screen now displays the organization, open mode, and the access mode of each file currently opened by the client. A new field, System name, has been added to the Client Information screen. This field displays the type of operating system on which the client is running. See Chapter 5 for further details.

Improved Error Handling

Error handling has been improved in this version of RM/InfoExpress. Additional information, such as the location of the occurrence, is also now maintained.

KEEPSESSION Configuration Option

The default value for the KEEPSESSION configuration option has changed from NO to YES. For more information, see [Appendix D: Configuring RM/InfoExpress](#) (on page 87).

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