XRunner®

Installation Guide

for IBM RS6000 Workstations

Version 6.0

MERCURY INTERACTIVE

XRunner Installation Guide

If you have any comments or suggestions regarding this document, please send them via e-mail to documentation@mercury.co.il.

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Table of Contents

Introduction

This guide covers the installation of XRunner. The first three chapters describe the three main steps of the installation process:

➤ Downloading XRunner from the installation tape or CD-ROM

➤ Setting up the environment

➤ Invoking XRunner

At the end of each chapter you will find a troubleshooting section that provides solutions to problems you might encounter.

Depending on your application and the type of license you purchased, you might also find useful information in one of the appendixes which cover the following topics:

➤ The XRunner license manager

➤ Context Sensitive Installation

For information on configuring your keyboard, refer to the *XRunner User's Guide*.

Once you have completed installation, refer to the additional documentation for details on working with XRunner.

Upgrading from a Previous Version

The installation program automatically scans your environment to detect an existing installation of XRunner. If the environment parameter M_ROOT is defined, it is assumed to point to the root of the XRunner installation tree. Unless you specify otherwise, XRinstall will overwrite the current installation with the contents of the new release, except for the checklists and fonts and filters libraries.

After installing a new version of XRunner, be sure to kill any previously running *mc_svc* processes, to make sure the new process from the new version will now run.

Typographical Conventions

This guide uses the following typographical conventions:

Bold	**Bold** text indicates function names and the elements of the functions that are to be typed in literally.
Italics	*Italic* text indicates variable names.
Helvetica	The Helvetica font is used for examples and statements that are to be typed in literally.
[ ]	Square brackets enclose optional parameters.
{ }	Curly brackets indicate that one of the enclosed values must be assigned to the current parameter.
...	In a line of syntax, three dots indicate that more items of the same format may be included. In a program example, three dots are used to indicate lines of a program that have been intentionally omitted.
|	A vertical bar indicates that either of the two options separated by the bar should be selected.

System Requirements

Operating System	IBM RS/6000 workstations running AIX 4.2, AIX 4.3 or higher.
X servers	IBM X server using the XTestExtension1 extension.
Memory	16 megabytes (minimum) with 60 megabytes swap space (recommended)
Disk Requirements	145 megabytes
	Additional 5 megabytes per test (recommended)
Window Managers	mwm, olwm, olvwm, twm, vuewm or any ICCCM standard window manager.
Media	1/4” tape or 4 mm DAT tape or ISO-9660 CD-ROM.

Before You Begin...

To ensure a smooth installation, it is recommended that you perform the following before you start installing XRunner.

➤ Verify that an appropriate tape drive or CD-ROM drive is attached to your local machine or to a remote machine on your network.

➤ Find out which device driver is available for use with this drive. The device driver is usually located in the */dev* directory of the machine to which the tape or CD-ROM drive is attached. Consult your system administrator for the name of your device.

➤ Make sure that there is sufficient storage space in the disk partition where you intend to install XRunner. Refer to the System Requirements section.

➤ Determine which host machine connected to your network is to be used to install the XRunner license manager and licenses purchased for your site. Note that the license manager may not be installed on a machine which is named localhost or loghost. In addition, the internet address of the host on which the license manager is installed may not be 127.0.0.1.

➤ In order to be able to install the XRunner License Manager, you should login as root, so that you will have write permission for the system startup file or directory.

➤ Insert the Installation tape in the tape drive or the CD-ROM in the CD-ROM drive.

Installing XRunner

To install XRunner, you need to access the installation program from the tape or CD-ROM, and then run the program. This section includes a description of the xr_verify troubleshooting utility.

Accessing the Installation Program

XRunner is installed using the tape or CD-ROM provided with the XRunner distribution package.

➤ To install XRunner from a tape, you must first download the installation program (install.xr) onto disk, and then run this program.

➤ To install XRunner from the CD-ROM, run the installation program, install.xr, directly from the CD-ROM.

Downloading the Installation Program from a Tape

Below, an example is used to illustrate how to download the installation program. This example assumes that the tape drive is attached to a host named *elco*, and that the device name *rst0* is to be used. (Note that the device name will vary, depending on your platform.)

1 Login to the host.

Login to the host. (If the tape drive is located on a remote machine—not the one you are logged on to—then rlogin to the remote machine.)

2 Change directory.

Change the current working directory to the one where you want to store the install.xr program. For example, if you want to place install.xr under the */tools/QA* directory, type: cd /tools/QA.

3 Download install.xr.

Download install.xr from the distribution tape, by entering the command:

```
tar xvf tape_device
```

For example, if you are using the device *rst0*, then type:

```
tar xvf /dev/rst0
```

A file named install.xr should now exist.

If you logged in to a remote machine in step 1, enter at the system prompt the command:

```
exit
```

Running the Installation Program

The installation program is called install.xr.

Starting install.xr

➤ If you downloaded the program from a tape, start install.xr by entering the command below.

```
install.xr [-v] [-log]
```

➤ If you are running from a CD-ROM drive, type:

```
<cdrom_dir>/install.xr [-v] [-log]
```

It is recommended that you use the *-v* or *-log* option while running the installation program. The *-v* option (verbose mode) provides additional information during installation about the operations being performed. The *-log* option creates a log of the current installation session, including all install.xr screens and user responses. This information may be helpful later in identifying difficulties with installation.

If you need any additional information about the command line options available with install.xr, run one of the following help utilities:

➤ If you downloaded the program from a tape, type:

```
install.xr -help
```

➤ If you are running from the CD-ROM, type:

```
<cdrom_dir>/install.xr -help
```

Once the installation program is invoked, the main menu is displayed.

Installing XRunner

To perform a complete installation of XRunner, select Option 6 from the installation menu. Note, however, that you can also choose to run specific stages of the installation process separately. For example, you may download the XRunner files from the distribution media in one session, and then install the license manager and licenses in a later session.

1 Define the XRunner installation directory.

If you want the XRunner files to be downloaded to a directory other than the one you specified earlier (when you downloaded install.xr), enter the new directory. Otherwise, press Enter.

2 View/modify the media setting.

This is a confirmation step, to ensure that the specified directory and device name are correct, and that you have sufficient disk space.

➤ If you are downloading from a CD-ROM:

Choose yes to the question, "Are you installing from a CD-ROM?"

In order to download XRunner from the CD-ROM, you must specify the location and the device drive of your media. The current settings are those you entered earlier, when you downloaded install.xr. Note that the CD-ROM settings vary, depending on your platform.

➤ If you are downloading from a tape:

Choose no to the question, "Are you installing from a CD-ROM?"

In order to download XRunner from the tape, you must specify the location and the device drive of your media. The current settings are those you entered earlier, when you downloaded install.xr. Note that the tape settings vary, depending on your platform.

Press ENTER when the correct settings are displayed.

3 Load XRunner from the tape or CD-ROM.

Choose “yes” to the question “OK to download XRunner?” and press ENTER. The downloading of XRunner files will begin; this process will take several minutes.

Enter the serial number when prompted. This number is listed on your installation tape.

The installation program notifies you that XRunner has been successfully downloaded.

Note: If at the end of the downloading process you receive a message notifying you that “A mismatch was found between the expected directory structure and the one downloaded from tape,” do not continue the installation process. You will not be able to complete the installation properly.

In such a case, quit the installation and examine the *install.xr.diff.tmp* file (in the installation directory) that lists the differences. If you cannot detect the reason for the mismatch, see the section, “xr_verify” at the end of this chapter.

---

4 Install the XRunner license manager.

Confirm the default startup file, and the directory in which the license manager will be installed. Note that the startup file is different for each platform.

5 Install a new license

The install.xr program provides you with a server code identifying the machine that it is running on. This is also the machine on which the license manager will run. Make note of this code, as well as your XRunner serial number, and call Mercury Interactive to receive your license key.

Select the license type to be installed.

Several types of licenses are available. Each license type must be installed separately. After installing your licenses, select quit. This will return you to the main installation menu. Select quit.

6 Run a full XRunner Installation.

Choose the Full XRunner Installation option to perform the first five steps listed in the menu.

7 Obtain additional information.

Select Mercury support to display the contact details of your closest Mercury Interactive sales and support office. Select Check Support for Your Server to clarify XRunner support for your server.

Note: Before you can start working, you must configure the XRunner environment. This is described in detail in the next chapter, “Setting Up the Environment.” It is also recommended that you consult the Product Release Notes.

Checking Your XRunner Installation

The XRunner installation program includes xr_verify, a self-help installation utility, located in the /bin subdirectory of your installation directory. If you experience difficulties with the XRunner installation, you may access xr_verify by entering the following command at the prompt:

```
xr_verify -h
```

Troubleshooting

The following paragraphs describe some common problems that may arise during installation:

Various problems occur when downloading XRunner from a tape located on a remote machine.

Such problems are almost always related to UNIX permissions. Note carefully the error message printed by install.xr. Make sure that you are a “trusted user” on the remote machine, and that the machine you are running on is a “trusted host.” If you are working as a superuser, verify that you can execute a remote command as root.

In addition, make sure that your shell startup files do not cause anything to be printed when you open a new shell. Otherwise, you will encounter problems during installation, if the output from the new shell gets mixed in with the output of the dd command applied remotely by XRunner. (The result will be probably be a “directory checksum” error.)

A mismatch is found between the expected XRunner directory structure and the actual files downloaded from tape.

Check that you have enough disk space.

When you try to check whether your X Server is supported (option 8 in the installation menu), the program does not detect the X Server.

The DISPLAY environment variable is probably undefined. You may safely ignore the message and continue with the installation. This may also happen if the xdpyinfo program cannot be found in your path.

The process of downloading the files from the installation tape fails.

First check that your device driver is compatible with the installation tape. See your system administrator for assistance.

If the device driver is appropriate, the block factor of your device may be different from the one on which the tape was created. For further assistance, see the section, “Checking Your XRunner Installation.”

Setting Up the Environment

This chapter describes the environment configuration you must complete before you can invoke XRunner.

Note: If your XRunner package includes a Context Sensitive license, you must perform additional steps to prepare your application for Context Sensitive Testing. Once you complete the steps described in this chapter, refer to the appendix "Context Sensitive Installation" at the end of this installation guide.

Setting Environment Variables

Open the window shell from which you intend to invoke XRunner. Define the environment variables for this shell as described below. You can also define the variables in a global location such as .cshrc.

➤ The environment variable M_ROOT points to the XRunner installation directory. For example, if XRunner is installed in the directory */tools/QA*, then you should enter the following at the command line:

```
setenv M_ROOT /tools/QA
```

➤ The XRunner binaries directory is specified by your path. This is the bin directory under M_ROOT. You should add $M_ROOT/bin to your path by entering:

```
set path = ($M_ROOT/bin $path)
```

➤ The environment variable MERCURY_ELMHOST is set to the name of the machine on which the XRunner license manager is installed. For example, if the license manager was installed on the machine named venus, set MERCURY_ELMHOST to venus. Note that the

MERCURY_ELMHOST environment variable is only required for large networks. In most cases, XRunner will be able to automatically locate its license manager using network broadcasts.

Checking .Xdefaults File Settings

Check the *.Xdefaults* file for the following recommended settings. If they do not exist, add them to the file. These settings should be entered in the *.Xdefaults* file in the home directory of each XRunner user, or in the system-wide *app-defaults* or *.Xdefaults* file.

```
Mwm*doubleClickTime: 800
```

It is recommended that multiple click timeout (used for double-clicks) be set to no less than 0.8 seconds, to ensure reliable replay under different workloads.

```
Mwm*interactivePlacement: False
```

Setting interactive placement to *False* reduces the number of TSL statements generated when opening new windows.

```
Mwm*clientAutoPlace: False
```

Setting auto-place to *False* causes pop-up windows to come up in the same location each time. If this parameter is set to *True*, pop-up windows will appear in different locations, and XRunner will have to move these windows to their correct location. As a result, test execution time will be somewhat longer.

In addition, for monochrome X displays, add the following setting:

```
xrunner*topShadowColor:black
```

After performing the necessary changes, enter the command:

```
xrdb ~/.Xdefaults
```

Defining Softkeys

XRunner uses softkeys to invoke different commands. These command softkey assignments are configurable. You can find a table of the default bindings below. Using this table, check whether any of XRunner's default softkey bindings interfere with a softkey your application uses. If so, reconfigure the command to another softkey, using the system parameters listed in the table.

For example, assume the CHECK WINDOW function is bound to the F2 key on your keyboard and that this interferes with a function used already by your application.

To change the default binding of the check window function, edit the *xrunner.cfg* file and locate the following line:

```
XR_SOFT_CHECK_WINDOW = F2
```

Change F2 to the name of another key which is unlikely to interfere with other applications. For example:

```
XR_SOFT_CHECK_WINDOW = F12
```

Once you have XRunner up and running, you can modify softkey bindings from the Configuration form. For more details, Chapter 33, "Changing System Defaults" in the *XRunner User's Guide*.

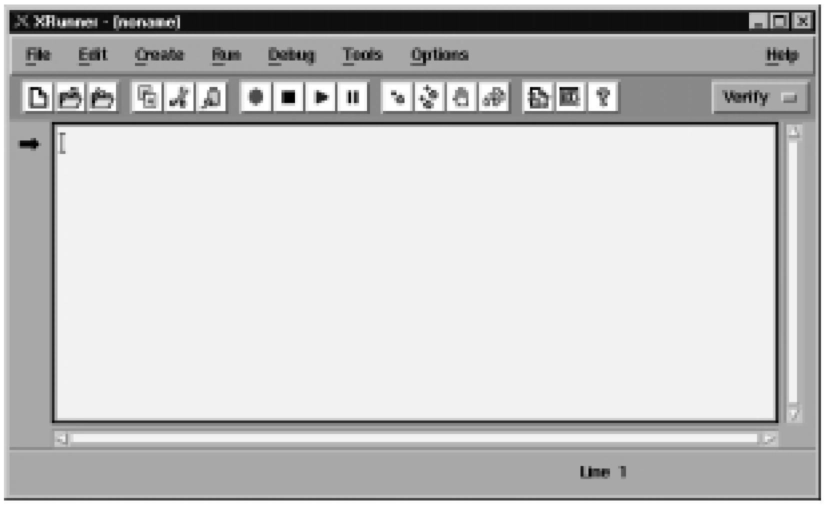
Command	**Softkey**	**Configuration Parameter**
RECORD	F5	XR_SOFT_RECORD
RUN FROM ARROW	F8	XR_SOFT_ANIMATE
STEP	F7	XR_SOFT_STEP
STEP INTO	Ctrl_L F7	XR_SOFT_STEP_INTO
STOP	F6	XR_SOFT_STOP
PAUSE	F8	XR_SOFT_PAUSE
MARK LOCATOR	Ctrl_L F5	XR_SOFT_MARKLOCATOR
GET TEXT	Ctrl_L F1	XR_SOFT_GET_TEXT
CHECK WINDOW	F2	XR_SOFT_CHECK_WINDOW
CHECK WINDOW (AREA)	Ctrl_L F2	XR_SOFT_CHECK_PARTIAL_WINDOW
WAIT WINDOW	F4	XR_SOFT_WAIT_WINDOW
WAIT WINDOW (AREA)	Ctrl_L F4	XR_SOFT_WAIT_PARTIAL_WINDOW
WAIT REDRAW	F3	XR_SOFT_WAIT_REDRAW
WAIT REDRAW PARTIAL WINDOW	Ctrl_L F3	XR_SOFT_WAIT_REDRAW_PARTIAL_ WINDOW
CHECK GUI (CHECKLIST)	Alt_L F2	XR_SOFT_CHECK_GUI
INSERT FUNCTION (FROM LIST)	F9	XR_SOFT_GEN_FUNC_CALL
INSERT FUNCTION (OBJECT/WINDOW)	Ctrl_L F9	XR_SOFT_OBJ_FUNC_CALL

Starting XRunner

Start XRunner from your working directory by entering the command:

```
xrun &
```

The XRunner window is displayed.



Troubleshooting

The following paragraphs present explanations and solutions to problems that may arise when starting XRunner:

XRunner refuses to come up and the message "system error" is displayed.

XRunner could not connect to its License Manager. Check that the MERCURY_ELMHOST environment variable points to the name of your License Manager machine and that the License Manager is running.

Using XRunner's softkeys has an adverse effect on xterm.

Try assigning XRunner commands to different softkeys.

The XRunner License Manager

The XRunner license manager supervises the allocation and use of XRunner licenses available to your staff. Five types of licenses are offered:

➤ *Development* provides full test creation and replay capabilities

➤ *Execution* supports test replay only

➤ *Text Recognition* allows you to use features that locate and read text on the screen.

➤ *Context Sensitive* allows you to record high-level test scripts.

➤ *Background Testing* allows you to run test in background mode.

The XRunner license manager uses a floating license scheme: licensing is handled according to the number of users on the network, and is not linked to one or more specific machines. XRunner also supports the allocation of reserved licenses for specific users, user groups, and machines.

You may install the license manager on multiple servers, using the redundant license key. This will allow you to maintain one or more backup file servers with XRunner license control. For details, see "xrelmd—License Manager Daemon."

The XRunner license manager incorporates four programs:

➤ *xr_elmadmin*, the license installation and general administration program

➤ *xrelmd*, the license manager daemon

➤ *xr_elmreport*, the license manager report generator

➤ *xr_elmdecode*, the license manager code and key decoder

These four programs are installed on your system by the XRunner installation program, and are stored in the $M_ROOT/elm directory that it generates. The XRunner installation program also automatically invokes the license manager administration program. Before doing so, it updates the

/etc/rc file (the default—during installation, you can specify an alternate file name), inserting a line which causes the license manager program to be invoked with the appropriate options the next time the machine is booted.

The following paragraphs describe these programs in greater detail.

xr_elmadmin—License Manager Administration Program

The *xr_elmadmin* license administration program is used by the XRunner installation program (install.xr) to install newly purchased license keys. If you are an experienced XRunner user, and you would like to store the keys to a new license in an alternative location, you can run the *xr_elmadmin* program manually. This program also performs a number of additional administrative functions. The command and option syntax for this program is:

xr_elmadmin [-b *cid* **-c -d -e** *keydir* **-h -i -k -l -q -r # -s -v # -V [A|B] -x -z]**
[*features* **|** *alias* **|** *feature* **=***alias***,...]**

Note that those options marked with an asterisk may only be invoked by the owner of the current license server process, the super-user, or any member of the specified group.

-b *cid* * Buries client. Returns all licenses used by XRunner whose client ID is cid, and marks this XRunner as dead. The client ID (CID) may be determined with "xr_elmadmin -l".

A buried XRunner will continue to run, but without licenses. All subsequent functions from XRunner that communicate with the license server will return an error.

-c Creates a license key file. Xr_elmadmin will print a server code which you give to Mercury Interactive which, in turn, will supply a key. Note that a single application may have one or more keys, one for each feature. In the case of XRunner, Text Recognition and Context Sensitive features require additional licenses.

If *feature=alias* appears as the final argument (in the program command line), then this name will be installed as an alias for this feature. One typically creates an alias for numeric features. Subsequent commands such as "xr_elmadmin -l" will print the alias instead of the feature name. A list of definitions may also appear on the command line. Upon decoding the key input, the feature name gleaned from the key will be matched against the list of definitions. If a match is found, the name following the sign is taken as the feature alias. This provides a convenient way of specifying feature aliases within shell scripts. For example,

xr_elmadmin -c -n 01=execution,02=text-recognition,03=context-sensitive

will cause the alias execution to be selected, if the key decodes with the feature 01.

The key file is placed in the key directory /usr/lib/xrlm on UNIX systems, unless the -e option described below is used. In either case, the key directory is not created, but should already exist. Here are some examples:

1. Create a standard (alphanumeric) key:
```
xr_elmadmin -c -e /usr/lib/xrlm
```

2. Create a numeric-only key, with alias development:
```
xr_elmadmin -c -n -e /usr/lib/xrlm development
```

-d Sends an ELMC_DUMP command to the daemon xrelmd. This command causes xrelmd to print the contents of the xrelmd database to the log file. It is used mostly for testing and debugging.

-e This option is meaningful only when the option -c, described above, is used. By default, license keys are placed in the directory /usr/lib/xrlm on UNIX systems. The -e option specifies a different key directory. Thus,

```
xr_elmadmin -e /local/mercury -c
```

will cause the license key to be created in the directory /local/mercury on a UNIX system. Please note that this directory must already exist—xr_elmadmin does not create it.

-h Expanded version of the -l listing, including the hold time of each XRunner and the shared license count. The hold time is the period that the licenses will be held (reserved) for the user after XRunner exits. If the user starts the application again before the hold period ends, the held licenses will be assigned to him. The hold time is specified in the resource file. If XRunner is held, column number one of the listing will be flagged with an "H". The shared license count is the number of XRunners that are currently sharing the license for the indicated feature. If XRunner has one or more shared licenses, column one of the listing will be flagged with an "S".

-i	Prints the release number of xr_elmadmin and the release of the library with which it was compiled.
-k *	Kills the current run of the license manager daemon (*xrelmd*) program. Note that this option may be issued only by the super-user.
-l	Lists the current users and outstanding licenses available for all features known to all license managers on the network. Known features are those features used since the daemon was started (usually the last time the system was rebooted). If features are given on the command line, the listing is restricted to the features named. The following is a sample listing:

	CID	LID	User	Feature	Group	Started
	1	1	charlie@venus,gold:0	XRunner-D	-	Dec 12 16:05
H	4	2	jennifer@elan,mel:0	XRunner-E	-	Dec 12 14:24
	2	3	charlie@venus,gold:0	XRunner-C	-	Dec 12 16:05
	3	4	charlie@venus,gold:0	XRunner-T	-	Dec 12 16:05
			XRunner-D [00]: 4 licenses, 0 reserved, 1 in use			
			XRunner-E [01]: 5 licenses, 0 reserved, 1 in use			
			XRunner-C [02]: 4 licenses, 0 reserved, 1 in use			
			XRunner-T [03]: 4 licenses, 0 reserved, 1 in use			

An "H" in column one indicates that this client is a held client. Such a client is one that has exited, but whose licenses are held for a certain period. The hold period may also be listed with the -h option below.

A "D" in column one indicates that this client is connected but disabled (redundant servers mode but there are too few servers running currently.)

An "S" in column one indicates that this client has a shared license for the indicated feature. Shared license groups share the same LID.

The next field, CID, is the client ID. Each client application will be assigned a unique ID. The CID may be used with the -b option described above.

	The LID is the license ID. These are unique license numbers. Each client will normally have a unique LID for each licensed feature, except when the license is shared. If clients share a license, they share the LID.
	The user is displayed as *user@host,display* where *display* is the value of the X-11 DISPLAY when the application was invoked. The *display* may be missing for non X-11 applications.
	The -l option scans all servers on the network, as well any others defined by the MERCURY_ELMHOST environment variable.
-q	Query. Prints various environment information for debugging. Output includes the current host name, its IP address, the name of the MERCURY_ELMHOST environment variable and its current setting, the current port, the license service name, the Vendor ID, and the hostcode value.
-r #	Ready-key mode, for use with the -c option. Depending on the parameter #, does not print the code(s) or prompt for the key: If the number # is positive, then does not print the server code(s); only prompts for the server key. The # in this case is the number of servers that will be running, usually 1. (It will be greater than 1 only when backup servers are used.) Thus, "-r 1" prompts for a key for a single server configuration.
	If the number # is negative, then no key prompt will be issued and only the number of codes indicated will be printed. Thus, "-r -1" prints the current server code but does not prompt for a key.
-s	Finds all license servers using server address resolution and prints their names. If a feature appears on the command line, the hosts responding with this feature available are printed.
-V *version*	Sets encryption version to the argument, a single character A though E.
-v # *	Changes the license manager log file verbose level to #. This may be used to change the level after the daemon has started. See the xrelmd documentation for the list of levels and more details.
-x	Inhibits copyright notice.
-z *	Zeroes the log file. One method to clean up the log file every evening on a UNIX system is:
	cp elm.log elm.log.old

```
MERCURY_ELMHOST=somehost
xr_elmadmin -z
```

where somehost is the host name where the xrelmd is running. Alternately, the -m option of xrelmd may be used to automatically keep the log file under control.

Note that truncating the log file by other means would be ineffectual since xrelmd keeps the log file open at all times. The next xrelmd log file write would simply use the old file pointer, filling the file to the original length. Therefore the -z option of xr_elmadmin or the -m option of xrelmd must be used to truncate the file.

xrelmd—License Manager Daemon

When you install XRunner, you must designate the machine on which the license manager will be installed. This machine will run the license manager daemon. In order to be able to invoke XRunner on any other station, the daemon must first be active. If you want to maintain a backup system with XRunner license control, you may run the daemon on multiple servers by using a redundant license key (as discussed below).

The daemon handles requests from network users to invoke XRunner by issuing and returning licenses. It also supplies the data required by the *xr_elmadmin* program to display the XRunner licenses currently in use.

The daemon continually updates a log file (stored by default under the name /usr/adm/xr_elm.log) that documents actual use of XRunner licenses, as well as all denied access. This log file also serves as the basis of a load analysis that is performed when you generate a license manager report.

The daemon is activated by running the xrelmd program. During installation, a line is written into the system startup script which automatically invokes the daemon. If you would like to change the default invocation line, you can edit the startup file.

The command and option syntax for the daemon program is:

xrelmd [**-D -e** *path* **-f -i -l** *file* **-m** *size* **-n -p** # **-r** *file* **-s** # **-v** # **-z** #]

-D	Debug mode: 1) Causes the log file to be flushed after each message. Normally it is flushed after each packet is processed. There can be several messages per packet, depending on the verbosity (-v) level. 2) Allows SIGQUIT to take the default action of creating a core file and exiting. 3) In background mode, does not perform chdir. Normally, xrelmd runs with the current working directory set to /. The message "DEBUG mode is on" will be printed to the log file if -D is used. Please also see the -v flag below for details on changing the verbosity level of xrelmd.
-e *path*	Specify the key directory, or set of directories, and load all keys found in the directories (optional). On UNIX systems, directories are specified as a list of directory names separated by a colon (:). For example: `xrelmd -e /local/elan:/local/express:/usr/lib/xrlm` Note that there is no default key path. Therefore, the -e option must be specified.
-f	Normally on UNIX, xrelmd will run in the background (it forks a child process, detaches from the terminal, and the parent exits). The -f option inhibits this, and causes xrelmd to run in the foreground. You may, for example, wish to run xrelmd from inittab, instead of /etc/rc.local, with the -f option.
-i	Prints the release number, the vendor ID, and exits. The vendor ID provides a way to verify that the same vendor salt is being used among all the commands. The vendor ID should be the same for xrelmd, xr_elmadmin, elmkey, etc.
-l *file*	Creates a log file named *file* and writes all relevant information to that file. If the file already exists, xrelmd will append to the end of the file. Note that *file* must be a complete path name. Use of a log file is highly recommended as it provides a way of tracking problems if they occur. A log file must be enabled for xr_elmreport to provide reporting information. Please see also the -m option, below.
-m *size*	Limit the log file to the size specified. With this option, the log file is “self maintained” by xrelmd such that xrelmd limits the size that the log file may

reach. When this size is reached, the log file named file is moved to *file.old* on UNIX systems and the current log file is truncated.

The *size* is an integer or floating point number. The default units are bytes. It may also be specified in kilobytes by suffixing a "k" or megabytes by suffixing an "m" to the size. For efficiency, the log file size is actually checked only every 100 lines, so it might exceed the limit slightly before it is backed up and truncated.

-n

Non-networked (stand-alone) operation. (Not applicable for Windows). This tells xrelmd that there is no network and to use local communication only. (This will force xrelmd to use System V native interprocess communication on UNIX.) This option is applicable to small systems such as SCO and Interactive UNIX without TCP/IP installed. When -n is used, you must set MERCURY_ELMHOST to “local”.

Note that on System V, the default interprocess communication queue is quite small; adequate for about two client processes talking to xrelmd concurrently. xrelmd will attempt to increase the queue size, but since only root can raise the IPC queue size, it must be run as super-user to be effective.

-p #

Cause xrelmd to use the port address # instead of the default or one specified by the system service. One might use this option if there were a port address conflict and the user did not have permission to alter the system port services file.

-r *file*

Designates the License Manager resource file to be used when issuing licenses to users or client machines. Each line of this file has the following syntax:

```
license_type:group:client1,...,clientn:k:m
```

This translates to: k licenses of the specified license_type are to be reserved for the named group composed of the enumerated clients. The licenses will be reserved for m seconds after XRunner has been exited. Note the following points:

- ➤ The license_type specified by each line will be either 00 (XRunner-D), 01 (XRunner-E), 02 (XRunner-T), 03 (XRunner-C) or 07 (Background testing).
- ➤ The named group is an arbitrary name (up to 20 characters long) assigned to a group of clients; it bears no connection to the UNIX system group names stored in /etc/group.

- ➤ The clients comprising these groups are enumerated by their login names or, in the case of hosts, by their host name. Host names should by preceded by the @ character.
- ➤ The number of licenses (k) reserved for the group concludes the line entry.
- ➤ A line beginning with the # character is recognized as a comment and is ignored.

-s #	Sets the startup time to # in seconds. This is the period that xrelmd waits and listens for XRunner to reconnect after a possible crash. The default is 180 seconds (3 minutes) If you are not on a network, this may be set to zero.
-v #	Selects the verbosity of the messages printed to the log file. When a level is selected, all levels less than or equal to the level are printed. Levels 5 and above are considered debugging levels. xrelmd starts at level 3. The levels are:

Level	Messages written to log file
1	Only error messages
2	License failures
3	License activity
4	Client connects and disconnects
5	Message for each packet received
6	Message for each packet sent
7	Additional client information
8	Data about key and resource files
9	Other details

-z #	Set the zombie to # seconds. If XRunner is not heard from within this time period, it is declared dead and its licenses are returned. The default zombie interval is 3 minutes. Note that xrelmd cleans up zombies only every 60 seconds, so it may take up to 1 minute more for the licenses to be returned.

Creating Backup License Managers

You may run the license server *xrelmd* on multiple servers by using a redundant license key. To create a redundant license key:

1 Install the license manager.

Using install.xr, individually install the License Manager on each of the redundant servers. During the installation on each machine, you will be prompted for the name of the key license directory. The key must be readable by all redundant license servers. This can be ensured by:

➤ placing the key in a file system shared by all machines, or

➤ locally copying the key to a location on each server.

For the sake of convenience, it is preferable to place the key in the same directory path on each system. If this is not practical, use the **-e** option of *xrelmd* on each server to specify the key location.

2 Name redundant servers.

Verify that all redundant servers are named in the resource file. Note that this step is not performed automatically by the installation program. You must edit the resource file manually by placing lines of the form *%SERVER hostname* in the resource file, where hostname is the name of one of the hosts. There should be one line for each redundant server.

3 Start the license manager with the -r option.

Verify that, in the startup file for each server, the License Manager is activated using the **-r** option while designating the appropriate resource file.

xr_elmreport—Report Generator

The xr_elmreport program generates a report of XRunner license activity based on the log file. To run this program, enter the following command at the system prompt:

xr_elmreport [-d *daterange* **-f** *feature* **-h -i -l -t -u** category **-w** # **]**
[*logfiles* **|** *logfiledirs* **]...**

For some examples of reports, see below.

-d *daterange*	The *daterange* is in the format [*from* - *to* | *from*]. Limit reporting for dates between *from* and *to* inclusive. The *from* and *to* dates may be specified in one of two formats: Feb 3 12:30:00 or 2/3 12:30:00. In the first format you specify the first three letters of the month. In the second format, the month number, followed by a slash is used. For example: xr_elmreport -d "Mar 15 - Apr 15 5:30" or xr_elmreport -d "3/15 - 4/15 5:30" Note that in either format, only the month is required. The day, hour, minutes, and seconds will default to zero if missing. If the hyphen and to date are missing, the report will run to the last date.
-f *feature*	Lists only activity for the feature named. Multiple -f options may be used to limit display to several features.
-h	Print a usage histogram instead of numeric data (see also -w option below).
-i	Prints the release number of xr_elmreport and the release of the library with which it was compiled, then exits.
-l	License listing. Displays a summary of licenses available along with the number of tokens of expiration dates, if any. No other options are meaningful with -l.
-t *timeunit*	Displays total license activity for each *timeunit*, where *timeunit* may be month, day, hour, minute, second. (A unique abbreviation, such as "min", is ok.) For example: xr_elmreport -d "3/15 - 4/15 5:30" -t hour If the -t option is not specified, a sun total only is printed.
-u *category*	Details report by each user, specified by category. The category may contain one or more key letters "u", "h", and "d" for user name, host, and display, respectively. Key letters may be combined in any combination of one to three letters. For example, -uu details per user name only; -uh details per host name only; and -uuh provides the most detail, with results displayed for each distinct user@host.
-w #	Specifies a display width of # character units. The default is 78. This option is currently only effective with the -h (histogram) option.
logfiles	The remaining arguments are zero or more license server log file names or directories. If any argument is a directory, then all log files in that directory are digested. xr_elmreport will silently skip files that are not license manager

log files. If no files are specified on the command line, then the default /usr/adm/elm.log will be used.

Examples

xr_elmreport produces a report of licenses available or license activity from one or more license server log files. The default log file is /usr/adm/elm.log on UNIX systems. It is compatible with all older versions as well as with Flexlm. See xr_elmadmin (-l option) for a snapshot of current license activity. xr_elmreport can display its information in two formats: numerically and as a histogram. Here is sample of numeric output from `xr_elmreport -t day:`

Feature	Requests	Issued	Denied	%Denied	Total Time Used
Apr 14 XRunner-D	20	20	0	0	0d 05h 02m 27s
Apr 14 XRunner-E	50	45	5	10%	0d 08h 09m 55s
Apr 16 XRunner-E	35	35	0	0	0d 04h 23m 03s

The Requests column shows the total number of license requests for the feature. The Issued column shows the number of licenses successfully issued. The Denied column shows the number denied, probably because the maximum number of licenses were already in use. The %-Denied column indicates the frequency of denied licenses out of the total number of requests. The final column shows the total time that the feature was checked-out by application(s).

The default report is detailed per feature. Reports can be further detailed by user, user@host, and/or user@host+display, if desired. Use of the -h option produces a histogram instead. Here is a sample histogram from `xr_elmreport -h -t day:`

```
Feature               * = issued, 0 = denied
May 15|XRunner-E      *******************************************    46
May 15|XRunner-D      *************************ooo                   25
```

When displayed as a histogram, the number of successful requests is displayed as a series of asterisks ("*") and denied requests as a series of the letter “o”, followed by the actual number of successful requests. The graph is normalized for a screen width of 78, which may be adjusted with the -w option. A summary of licenses installed may also be obtained with the -l option.

xr_elmdecode—License Manager Code and Key Decoder

The *xr_elmdecode* program decodes license server codes and keys into readable form. For instance, xr_elmdecode can be used to determine the Host ID and/or CPU ID of a license. Note that the decoded code and host ID are printed in hexadecimal, followed by its meaning—the internet number and CPU ID PROM's low order low bytes.

xr_elmdecode is a diagnostic tool which may be used to decode license server codes and keys. This tool is frequently used by Mercury Interactive to determine the Host ID and/or CPU ID of a license. Non-numeric keys include the full host ID information. Numeric keys include a hashed version of the host ID information which we call the hostlock.

The command and option syntax for this program are:

xr_elmdecode [-i -q -c *code* **-k** *key* **]**

-i	Print the release number.
-q	Print the vendor ID and current hostcode.
-c	Decode the code that follows.
-k	Decode the key that follows.

Examples

An example of a server code decoding of a numeric code:

```
% xr_elmdecode -n -c "0074 7410 4751 1860 8" Code = 0074
7410 4751 1860 8 Decode = 3224006414163 = a5c1cf53 (hex) = (192.42.111.14
a3)
Numkey hostlock = 8079
```

The following is an example decoding of a numeric key:

```
% xr_elmdecode -n -k "4778 1085 3418 0847 80"
Key = 4778 1085 3418 0847 80
Feature = 99
Vendordata = (none)
Licenses = 5
Hostlock = 8079 (hashed)
Ndays = 1540 days past 1/1/89
```

```
Expires = Sun Apr 21 00:00:00 1999 (31.51 days from now)
```

The following is an example decoding of a non-numeric key:

```
% xr_elmdecode -k "wxabr94723abc6754"
Key = wxabr94723abc6754
Feature = avi
Vendordata = h1
Licenses = 5
Hostid = c12c6f33e5 (192.44.111.19 a5)
Expires = Fri Jul 26 01:00:00 1999 (89.37 days from now)
```

Context Sensitive Installation

This chapter provides step-by-step instructions for preparing your Motif application for Context Sensitive testing on IBM AIX.

Context Sensitive testing is enabled by a Context Sensitive library provided by Mercury Interactive. To be able to perform Context Sensitive testing, you need to slink your application with this library.

To shortcut the step-by-step guide, you can run a self-help linking utility called xr_analyze. The utility resides in the */bin* directory of your installation directory. To start xr_analyze, enter the following command at the prompt:

```
xr_analyze <Application Under Test executable>
```

Overview

To link your application to Mercury Interactive's Context Sensitive library, you have two options. The option you select depends on how your application is linked with the Xt (X Toolkit) and Xm (Motif) libraries:

Shared	Use this option if your application is linked with shared X/Motif libraries.
Static	Use this option if your application is statically linked with the X/Motif libraries.

In the sections that follow, you will first determine how your application is linked. Then, you will choose the appropriate option that will link your application to Mercury Interactive's Context Sensitive library.

Determine Which Variant You Should Use

First, note that there are three supported combinations (variants) for working with the Xt and Xm libraries:

- Xt Release 4 (X11.4) with Motif Release 1.1 (Xm1.1)
- Xt Release 5 (X11.5) with Motif Release 1.2 (Xm1.2)
- Xt Release 5 (X11.5) with Motif Release 2.0 (Xm2.0)

Mercury Interactive provides two versions of the Context Sensitive library that support these two variants. It is essential that your application is linked to the correct Mercury Interactive library. In the instructions that follow, <*variant*> refers to one of three locations in which the Mercury Interactive libraries reside:

- $M_ROOT/arch/X11.4/Xm1.1
- $M_ROOT/arch/X11.5/Xm1.2
- $M_ROOT/arch/X11.5/Xm1.2/AIX4.2 (for AIX 4.2 only)
- $M_ROOT/arch/X11.5/Xm1.2/AIX4.3 (for AIX 4.3 only)
- $M_ROOT/arch/X11.5/Xm2.0/AIX4.2 (for AIX 4.2 only)
- $M_ROOT/arch/X11.5/Xm2.0/AIX4.3 (for AIX 4.3 only)

Before you proceed, find out which versions of the Xt library (X11.4 or X11.5), and the Xm library (Xm1.1, Xm1.2 or Xm2.0) are used by your application. Determine accordingly which library path to use.

Determine How Your Application Is Linked

1 Determine whether your application is dynamically linked with the Motif, X Toolkit, and X11 Libraries by entering the following command:

dump -H <*application_executable*>

The result of this command will include something like the following:

```
motifbur:
                        ***Loader Section***
                      Loader Header Information
```

```
VERSION#       #SYMtableENT     #RELOCent       LENidSTR
0x00000001     0x0000003d       0x00000060      0x0000004f
#IMPfilID      OFFidSTR         LENstrTBL       OFFstrTBL
0x00000005     0x00000a58       0x0000043a      0x00000aa7
                      ***Import File Strings***
INDEX          PATH             BASE            MEMBER
0              /usr/lib:/lib
1                               libXt.a         shr4.o
2                               libXm.a         shr4.o
3                               libX11.a        shr4.o
4                               libc.a          shr.o
```

2 If both the libXt and libXm libraries appear (as in the example above), then your application is linked with shared X/Motif libraries. In this case, use the **Shared** option to link your application with the Context Sensitive library. Follow the instructions in the section, “Shared X/Motif Libraries.”

Note that shared linking is supported for standard AIX X/Motif shared libraries or libraries that are fully compatible with the standard. If your X/Motif libraries differ from the AIX standard, use the Static option, or contact Mercury Interactive customer support for further assistance.

If either the libXt or libXm library does not appear in the list, your application is statically linked with that library. In such a case, you should use the **Static** option in order to link your application with the Context Sensitive library. Follow the instructions in the section, “Static X/Motif Libraries.”

Static X/Motif Libraries

Depending on the Xt library used by your application (Xt Release 4 or Xt Release 5), follow the appropriate instructions.

Applications Using X11.4

1 Edit your application’s makefile to include:

```
-L$M_ROOT/arch/X11.4/Xm1.1 -lmic_xm (must appear before other libraries.)
-bnso -liconv -bI:/lib/syscalls.exp (must appear before other libraries).
```

The following example shows the relevant part of the makefile before and after the necessary modifications:

Before:

```
cc $(CFLAGS)  -o <application_name> \
    <application_source>.o \
    -lMrm -lXm -lXt -lX11
```

After:

(Bold characters indicate the addition that was made)

```
cc $(CFLAGS)  -o <application_name> \
    <application_source>.o \
    -L$M_ROOT/arch/X11.4/Xm1.1 -lmic_xm -bnso -liconv \
    -bI:/lib/syscalls.exp \
    -lMrm -lXm -lXt -lX11
```

2 Your application is now ready for Context Sensitive Testing. Before you invoke your application, make sure that M_ROOT is defined correctly.

When you start your application, you should receive the message: “Loaded Mercury’s Context Sensitive Library: <*library version*>.”

If the message does not appear, your application was not linked properly. Check your makefile and relink.

Applications Using X11.5

1 For all variants except AIX 4.1 and AIX 4.2, edit your application’s makefile to include:

```
-L$M_ROOT/arch/X11.5/Xm1.2 -lmic_xm
-bnso -liconv -bI:/lib/syscalls.exp
-bI:/usr/lpp/X11/bin/smt.exp
```

For AIX 4.1 and AIX 4.2, include:

```
-L$M_ROOT/arch/X11.5/Xm1.2 -lmic_xm
-bnso -liconv -bI:/lib/syscalls.exp -lIM -li18n
-bI:/usr/lpp/X11/bin/smt.exp
```

Make sure you insert the above before other libraries.

Note: To avoid possible confusion, note that in the line beginning with -bnso above, the last two flags read as follows: -lowercase L, uppercase I, capital M, -lowercase L, lowercase I, the number 18, lowercase n.

2 The following example shows the relevant part of the makefile before and after the necessary modifications:

Before:

```
cc $(CFLAGS)  -o <application_name> \
<application_source>.o \
    -lMrm -lXm -lXt -lX11
```

After:

(Bold characters indicate the addition that was made)

```
cc $(CFLAGS)  -o <application_name> \
    <application_source>.o \
    -L$M_ROOT/arch/X11.5/Xm1.2 -lmic_xm -bnso -liconv \
    -bI:/lib/syscalls.exp -bI:/usr/lpp/X11/bin/smt.exp \
    -lMrm -lXm -lXt -lX11
```

3 Your application is now ready for Context Sensitive Testing. Before you invoke your application, make sure that M_ROOT is defined correctly.

When you start your application, you should receive the message: "Loaded Mercury's Context Sensitive Library: <*library version*>."

If the message does not appear, your application was not linked properly. Check your makefile and relink.

Shared X/Motif Libraries

If your application uses shared X/Motif libraries, follow the steps below.

1 Type the following statement at the command line:

```
setenv LIBPATH <variant>:$LIBPATH
```

Your application is now ready for Context Sensitive Testing. Before you invoke your application, make sure that M_ROOT is defined correctly.

2 When you start your application, you should receive the message: "Loaded Mercury's Context Sensitive Library: <*library version*>."

If the message does not appear, check the values of M_ROOT and LIBPATH again.

Note: Changing the value of the LIBPATH variable may affect other application linked with shared libraries. It is therefore recommended that you only run the application under test from the shell in which you changed LIBPATH.

Enabling Java Support

When you install XRunner, Java support is automatically installed. This section provides instructions for enabling the Java support. You can then use XRunner to record and replay Context Sensitive functions on Java objects.

This section describes:

- The Java Support Environment
- Setting Up Java Support
- Troubleshooting

The Java Support Environment

XRunner provides full Context Sensitive testing of Java applets and applications using various environments, platforms, and browsers.

Supported Environments

XRunner supports the following Java development toolkits:

- Java Development Kit (JDK) version 1.1, including AWT providing the standard GUI objects for Java
- Java Foundation Class (JFC), which provides the “Swing” UI for Java
- Symantec Visual Café 2.5 and 3.0.

Supported Browsers

XRunner supports the following browsers:

- Netscape 4.08 and 4.51.

Note: Netscape browser only supports JFC version 1.02 or higher. There are no JFC limitations for LoadApp and standalone applications.

Setting Up Java Support

In order to test Java objects, you must perform the following steps:

1. Check that your version of Netscape can run JDK 1.1 applets.
2. Verify that there is a minimum of 5 MB disk space available in the browser installation directory.
3. Set the LD_LIBRARY_PATH and CLASSPATH environment variables as follows:
   - ➤ setenv LD_LIBRARY_PATH $M_ROOT/arch/:$LD_LIBRARY_PATH
   - ➤ setenv CLASSPATH $M_ROOT/classes

     or if your web server is not configured to work with Mercury Interactive support:

     setenv CLASSPATH $M_ROOT/classes:$M_ROOT/classes/srv
4. Open the file *XRunner installation folder*/classes/mercury.properties and make sure that the mic_toolkit is configured to the correct toolkit environments.
5. If you want to record a standalone Java application or Java applet, you must start it by entering one of the following strings:
   - ➤ to record a **Java applet** if you have **JDK** installed and it runs under AppletViewer:

     java LoadApp <*URL address*>
   - ➤ to record a **Java applet** if you have **JRE** installed and it runs under AppletViewer:

     jre -cp $CLASSPATH LoadApp <*URL address*>

6 Once you have started the standalone application or Java applet, verify that the following message appears:

```
init mercury support
Loading <development toolkit> support...
```

7 To install support for Netscape 4.08 or Netscape 4.51 Professional Edition , you must copy the following files:

copy *~/.netscape/java40.jar* to *~/.netscape/java40.jar.orig*

copy *$M_ROOT/Java_patches/ns4[08,51]-java40.jar* to *~/.netscape/java40.jar*

Troubleshooting

If you experience problems recording from Netscape, begin by checking that XRunner works with the LoadApp appletviewer.

➤ If you have JDK installed, enter:

```
java LoadApp <URL address>
```

➤ If you have JRE installed, enter:

```
jre -cp %classpath% LoadApp <URL address>
```

Then check the classpath and verify that it contains the *XRunner installation folder*/classes directory. Check the path and verify that it contains the *XRunner installation folder*/arch directory.

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