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MHarness

version 3.2

Software Installation Guide

for UNIX

MHarness version 3.2 Software Installation Guide for UNIX

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MHarness Installation Documentation

A copy of this document is also on the MHarness CD, in the subfolder "unix/installdocs".

EMA and Software Information on the CD-ROM

In addition to the MHarness software, the MHarness CDROM also contains a number of documents, in several electronic formats, containing a variety of information about EMA, its various software products, software features and prices, consulting and other activities, and other information. Look in the "EMAandSoftwareInformation" folder on the CD-ROM.

Overall Procedure

The overall procedure for installing MHarness is:

- 1) install the software - see section "Installing MHarness"
- 2) install a license - see section "Setting Up Licensing"
- 3) source the setup scripts - see section "Running MHarness"
- 4) test run the program - see section "MHarness Examples"
- 5) locate the documentation - see section "MHarness Documentation"
- 5) Additional Information: - see section "gnuplot" for more information about gnuplot, a free third-party plotting program included with EMA software.
- see section "Adobe Acrobat Reader" for instructions on obtaining and installing Adobe Acrobat Reader if you do not already have Acrobat Reader on your system.

Installing MHarness

Perform the following steps to install MHarness on a UNIX system:

1) Load the MHarness CD into the CD-ROM drive

2) Navigate to the "unix" subdirectory of the CDROM, e.g.,

```
% cd /cdrom/cdrom0/unix
```

3) Run the setup script "install.sh", e.g.

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

4) The setup program will prompt you for some choices, including choice of platform (depending on what is on the CDROM), installation directory, and installation type. The installation type "MHarness License Manager Only" should be used if you have a machine on which you want to run the license manager but do not want to install MHarness. Otherwise choose the "MHarness" setup type which includes the license manager.

Running MHarness

Installing a License

Before running MHarness you must either install a standalone license, or set-up the license server with a floating network license. See the section "Setting Up Licensing" for more information.

Running MHarness

Before attempting to run MHarness, you should source the set-up script "mharness_setups_csh" (for C-shell (csh)) or "mharness_setups_sh" (for Korn or Bourne shells (ksh or sh)).

example:

```
# (sh or ksh)
```

```
% . mharness_setups_sh
```

```
# (csh)
```

```
% source mharness_setups_csh
```

These scripts add the full pathname of the MHarness "bin" subdirectory to the PATH environment variable so that Mharness may be run from the command-line.

These scripts are placed in the top-level installation directory by the installation program. The command to source the appropriate script can be placed in a system login script or in individual users' login scripts. See your system documentation or UNIX documentation for instructions on how to do this.

Once the script has been sourced to include the MHarness "bin" path in the PATH environment variable, Mharness can be executed at the command line:

```
% mharness
```

MHarness will prompt you for the name of an input file and proceed with the computation. You can also give the name of the input file as a command-line argument:

```
% mharness testmodel.inp
```

```
MHarness version
```

```
-----
```

The exact version of MHarness that is installed can be determined with the following command:

```
% mhver
```

It is a simple shell script that echoes the MHarness version and date release.

```
-----
```

```
MHarness Examples
```

```
-----
```

The subdirectory /examples of the installation contains input and output files for the examples described in the MHarness manual, as well as modifications of those examples for use in MHarness training sessions. These files can also be used to test an installation of MHarness to see if everything is working correctly. Running MHarness on any of the example input files will produce output files that will overwrite any existing output files in the same directory. So, if you wish to compare your outputs with the pre-existing output files, make a copy of the input files in a separate test directory first so as not to over-write the pre-existing output files. For example,

```
% mkdir ./test
% cp /*.inp ./test
% cd ./test
% mharness ex2.inp
% gnuplot
gnuplot> plot "./ex2voltout", "../ex2voltout"
gnuplot> exit
%
```

```
-----
```

```
MHarness Documentation
```

```
-----
```

The following user manuals and documentation are part of the MHarness software installation:

```
Installation Documentation
```

```
-----
```

```
docs/install_mharness.pdf
    - MHarness Installation Guide for UNIX (this document)
docs/install_mharness.txt
    -text file version of install_mharness.pdf
```

MHarness User Manual

docs/MHv3.2_User_Manual.pdf
- MHarness User Manual

MHarness tools/utilities documentation

docs/utilities.readme
- README file documenting the function of the MHarness utility programs

docs/writewcur_readme.pdf
- README file to accompany the tool "writewcur", one of the utility tools included with the MHarness distribution

MHarness examples problem assignments

examples/ProblemAssignments.pdf
- description of problems to be worked with the MHarness example files. Used primarily for MHarness training.

examples/ProblemAssignments.txt
- text file version of ProblemAssignments.pdf

gnuplot documentation

gnuplot4.0.0/man/man1/gnuplot.1
- man page for gnuplot
gnuplot4.0.0/docs/gnuplot.pdf
- gnuplot manual
gnuplot4.0.0/docs/gpcard.pdf
- gnuplot reference card
gnuplot4.0.0/docs/tutorial/tutorial.pdf
- gnuplot tutorial

There are other miscellaneous gnuplot documents in the "docs" directory which you may also find useful; the abovementioned ones are the primary reference manuals.

Documentation for gnuplot is also available in the form of the help system within gnuplot, after you start gnuplot.

NOTE on gnuplot documentation: With the exception of the man page, the documentation mentioned above (i.e. the PDF files and all other documents in the "docs" directory), came from the Windows distribution of gnuplot 4.0.0. However, these documents are generally applicable and deemed to be useful to users of gnuplot on any platform. But you may occasionally find reference to features that are Windows-specific.

Rainbow SLM license manager software (for system administrators)

docs/SLM71sys.pdf

- Rainbow Sentinel License Manager System Administrator's Guide
(for use by system administrators)

docs/man/man1/lsdecode.1

- man page for lsdecode, a Rainbow SLM utility
(for system administrators)

docs/man/man1/lsmon.1

- man page for lsmon, a Rainbow SLM utility
(for system administrators)

lic/README - quick-start instructions for setting-up a license server

Files with a name like "README", "*.readme", "*.README" or "*.txt" are text files that may be viewed with any text file viewer.

Files in PDF format (*.pdf) are Adobe Portable Document Format files. They require Adobe Acrobat Reader to view them. To view these files, first launch Adobe Acrobat Reader:

% acroread

Then click the "File" menu, choose "Open...", and navigate to the location of the desired document listed above. Check the installation location or consult your system administrator if you are not sure where to find the documents listed above.

If you do not have Adobe Acrobat Reader on your system, see the section "Adobe Acrobat Reader", below, or consult your system administrator.

MHarness Utilities

running utilities

A standard suite of command-line utilities useful in working with Mharness files is included. These programs are in the same folder as the other executable files: the subdirectory /bin of the installation. If the MHarness setups script has been sourced as described in "Running MHarness", you should be able to run any of the utilities at the UNIX command prompt, similar to the way you run MHarness. For example,

% tfunc

The file "utilities.readme", in the /docs subdirectory of the installation, contains a brief description of the functionality of each utility. The utilities prompt the user for inputs and are largely self-explanatory.

source code included

Source code for most of the utilities is also included; it is in the subdirectory "source/utilities" of the installation. The source code may be freely modified, re-distributed, etc.

This source code is included as a convenience for those customers who may be interested in creating their own modifications of these programs. However, it is not guaranteed to compile on any particular platform, or to produce predictable

results when it does compile. EMA, Inc. cannot officially or fully support such efforts, since they are beyond the scope of basic end-user support; however, EMA will attempt to provide what assistance it can. You are welcome to do what you want with it but you are basically on your own.

Users interested in using this source code should view it as a time-saving starting point for their own software tools, rather than as something that is guaranteed to produce a particular result. Those using the source code should study it carefully and understand it thoroughly when using it, modifying it, or incorporating it into their own software tools.

gnuplot

gnuplot installed automatically

MHarness result waveforms may be viewed with any available third-party plotting package. The freely-available "gnuplot" is fit for this purpose, and is included with the MHarness software distribution. gnuplot is installed automatically by the installation script along with the MHarness software.

The MHarness setup scripts "mharness_setups_sh" and "mharness_setups_csh" (see the section "Running MHarness") add the directory path containing the gnuplot executables to the PATH environment variable. They also add the path containing a gnuplot man page to the MANPATH environment variable. If the setup script has been sourced, you should be able to run gnuplot from the UNIX command prompt:

```
% gnuplot
```

And you should be able to read the gnuplot man page*:

```
% man gnuplot
```

*NOTE: you may need to run "windex" first; see your UNIX documentation.

source code to compile for alternate platforms or terminal types

The installation script installs a copy of gnuplot that has been pre-compiled by EMA, from the gnuplot source code distribution, for the appropriate platform and using the default set of terminal drivers. A copy of the raw gnuplot source code distribution is included on the MHarness CD but is not installed by the installation script. This may be used, if you wish, to compile a version of gnuplot for some other platform, or to add or remove terminal drivers for particular terminal types. The source code is set-up to compile more or less automatically on a variety of systems. For more information, look on the MHarness CD in the following directory:

unix/gnuplot-4.0.0

and read the file "gnuplot-4.0.0.readme".

Adobe Acrobat Reader

Most of the manuals included with the MHarness distribution are in Adobe Portable Document Format (PDF). Viewing them requires Adobe Acrobat Reader, which is available for free.

get Acrobat Reader from Adobe

Acrobat Reader can be obtained from the Adobe web site at:

<http://www.adobe.com>

get Acrobat Reader from the MHarness CD

Acrobat Reader is included on the MHarness CD for convenience. It is not installed by the installation script, but it can be installed separately if you do not have Adobe Acrobat Reader on your system. Look in the subdirectory "unix/acrobat" of the the CD-ROM. Look for a directory corresponding to your platform, for example "unix/acrobat/solaris2.8" or "unix/acrobat/irix6.5", then look for a directory called "install", then look for a file called "README" in the "install" directory for further instructions.

Setting Up Licensing

Licensing Overview

Software licensing for EMA software is managed by the Sentinel License Manager product, version 7.2, from Rainbow Technologies.

End-users of EMA software may choose between two basic types of licensing: a floating network license (also called a server license), or a standalone license. The type of licensing you wish to use will determine the type of license key you will request EMA, Inc. to issue. It also will determine whether you need to run the license server.

With a floating network license, the license server software is installed on one machine along with a floating network license key for the product(s) purchased. Users may use the EMA software product(s) on any machine on the same subnetwork as the license server machine; the application checks out a license key from the server when it is run. Several machines can share the same license(s) up to the concurrent usage limit (number of licenses purchased).

With a standalone license, the license server is not used. A license key for the software product(s) purchased is installed on each individual machine, and the software application reads the license key directly. Each machine requires its own individual license.

After you have decided which type of licensing you wish to use, follow the instructions below. If you decide to use standalone licensing, you may skip the sections "License Server Installation" and "License Server Startup".

Obtaining and Installing a License - Overall Procedure

Use the following overall procedure to obtain and install a license for MHarness.

- 1) install the license server if you are using floating network licensing
- 2) generate locking information for the license server machine (for network licensing) or for the individual machine(s) (for standalone licensing)
- 3) transmit the locking information to EMA
- 4) receive one or more license key files (usually by e-mail)
- 5) install the key file(s) in the correct location(s)

Follow the instructions below to perform each step of the procedure:

Step 1) License Server Installation and Startup (floating network license only)

License Server Installation (floating network license only)

If you wish to use a floating network type of license, you must install the license server on one machine of your choice. This is accomplished by running the MHarness setup as described in "Installing MHarness". The setup option "MHarness License Manager Only" can be used to install just the license server on a machine where you do not want to install MHarness.

The setup option "MHarness" includes all the licensing software files -- running the "License Server Only" setup is not necessary if you have already run setup and chosen the "MHarness" installation option.

License Server Startup (floating network license only)

Once the licensing software has been installed on a machine, the license server can be started by changing dir to the "lic" subdirectory of the MHarness installation and using the following command:

```
% ./lserv -s ./lservrc
```

where, `lservrc` is the license file which has been installed in the "lic" subdirectory.

A command similar to the above may be put in a system startup script to start the license server every time the machine boots. See your system documentation or UNIX documentation for instructions on how to do this. For starting the server from such a startup script, you will want to use the command in the form:

```
<license_dir_path>/lserv -s <license_dir_path>/lservrc
```

I.e., use full pathnames in a startup script.

License Server Control Script (floating network license only)

A shell script is provided which may be used to control the license server (start and stop it). This script is located at

```
<installation_dir>/mharness320/lic/slm_ema_daemon
```

This script is meant as an example or framework to be used by the system administrator as a time-saver compared to creating their own startup/control script from scratch. However, daemon startup scripts vary widely between different implementations of UNIX, and are sometimes used differently even on different instances of the same system from the same vendor. Therefore, EMA cannot guarantee that this script will work on your system, or that the script will not cause some undesirable effect on your system. The script should be studied carefully and understood before it is used, and it should be edited to customize it for your site (to set certain directory pathnames to the license server software; and to adjust the system commands or syntax to fit your system).

The script was developed on a Solaris 8 machine, so it may require significant modifications before it can be used on a system with startup semantics or startup script organization that are different from Solaris-style.

Note that the script launches the license server daemon process as user "slm". So you will either want to create such a user for running the daemon, or change the daemon startup line in the script to launch the daemon as a different user (running application daemons as user "root" is not recommended as a standard precaution).

Step 2 & 3) Obtain machine locking codes and transmit them to EMA

Machine Locking Codes

In order to obtain a license or licenses for the software you have purchased, you will need to obtain some machine locking codes for the machine on which the license server will run (in the case of network licensing), or the machine(s) on which the EMA software will run (in the case of standalone licensing). This is done with the utility "echoid", which is part of the Rainbow licensing software. To run the utility, change directory to the "lic" subdirectory and run it by name at a command prompt as in the example below. The output from "echoid" in the example below is only a sample, your lock codes depend on your machine hardware configuration and will be different from those shown in the example.

example:

```
% cd <install_dir>/mharness320/lic
% ./echoid
```

```
          SentinellM 7.2.0 Host Locking Code Information Utility
Copyright (C) 2002 Rainbow Technologies, Inc.
```

```
          Locking Code 1 :    1-2524D
          Locking Code 2 :    8-352C5
```

```
%
```

Locking codes can be generated for a machine on which MHarness or the licensing software has not been installed, by running "echoid" directly from the MHarness CD. The licensing tools are available for use directly from the CD, in the directory "<cdrom>/unix/lic/<platform>", where "<platform>" is a directory whose name indicates the platform for which the tools it contains are intended.

example:

```
% cd <cdrom>/unix/lic/solaris8
% ./echoid
%
```

NOTE1: Do not confuse "echoid" with any native UNIX command. "echoid" is a utility included with the Rainbow Technologies licensing software used by EMA.

NOTE2: When running "echoid", the file "echoid.dat" MUST be in the current working directory in order to generate the correct locking codes! Running "echoid" without first making the licensing subdirectory your current working directory will result in incorrect locking codes. Always change dir to this directory first. (As an alternative, the file "echoid.dat" can be copied to the current working directory before the command "echoid" is run.)

Return the resulting locking code(s) to EMA and EMA will generate and issue appropriate licenses based on those locking codes.

Step 4 & 5) Receive and install license key file(s)

License Key File Installation

You will be issued one or more license codes to activate the EMA software you have purchased. Each license code is an alphanumeric string, usually e-mailed as an ASCII text license key file. When you receive a license key file, save it as (or save a copy of it as) a text file named "lserverc". Where you place the key file depends on whether you are using network or standalone licensing.

For standalone licensing:

Place the key file "lserverc" in the "bin" subdirectory of the MHarness installation. This directory will be "<install_dir>/mharness320/bin", the same directory containing the mharness executable program files. Do this on each machine on which Mharness is installed and for which you have been issued a license.

License File Environment Variable "LSERVRC" (standalone key file only):

For a standalone license on a UNIX system, you should also set the environment variable "LSERVRC" to the full path name of the license key file as in the following example:

example of setting LSERVRC to the license key file path name:

(Korn or Bourne shell):

```
unix prompt% set LSERVRC=<install_dir>/mharness320/bin/lserverc
unix prompt% export LSERVRC
```

(or, more compactly):

```
unix prompt> export LSERVRC=<install_dir>/mharness320/bin/lserverc
```

(C shell)

```
unix prompt% setenv LSERVRC <install_dir>/mharness320/bin/lserverc
```

Note that LSERVRC should be set to the full path name of the file "lserverc", including the file name, not just the directory containing the file. Also note that LSERVRC should be exported (Korn or Bourne shell), or should be set as an environment variable rather than a shell variable (C shell), so that it will be visible in subshells. You might wish to put the command to set LSERVRC in users' login or shell-initialization scripts or a system login or initialization script.

For network licensing:

Place the key file "lserverc" in the "lic" subdirectory of the MHarness installation. This directory will be "<install_dir>/mharness320/lic", the same directory containing the license server executable program and other license manager files. If you are installing a new license file, you will have to stop the license server (which can be done with the tool "lsrvdown" in the "lic" directory) and re-start it to pick up the new license keys.

If you already have a network license key file named "lserverc" containing licenses for other EMA products, or for products from other vendors using the Sentinel License Manager license server, append the contents of the new key file to the existing file instead of replacing it.

It is not necessary to set the environment variable LSERVRC for a network license key if the key file is placed in the same directory as the license server or if the key file is specified in the license server command as described in "License Server Startup".

License Key File Format:

The format of the license key file is important in order for the EMA software or license server to successfully read it. License keys issued by EMA will be in the correct format when they are sent. However, if the format becomes altered or if you experience trouble, the following are the important points to observe:

- Every line in a license file consists of a license code string, optionally followed by a comment. A '#' denotes the beginning of a comment.
- There should be exactly one license code string in each line of the file.
- Every line in the file must begin with a license code string and not some other text, not even a comment.
- The permissions of the file must be set so that the users (in the case of standalone licensing) or the license server (in the case of network licensing) have permission to read it.

Documentation:

For more detailed information about the Sentinel License Manager, refer to the "Sentinel License Manager System Administrator's Guide". A copy of the guide is installed with Mharness in the following location:

<install_dir>/mharness320/docs/SLM71sys.pdf

The file is named "SLM71sys.pdf". It is in Adobe Portable Document Format.

Appendix A: Environment Variables Used by MHarness

When you source the setup script "mharness_setups_csh" or "mharness_setups_sh" (see section "Running MHarness"), some environment variables are set, that assist in running the program. Here is a list of the environment variables set by the shell setups scripts and their meaning.

Environment Variable	Usage/Meaning
----------------------	---------------

PATH	Enables the system to locate programs whose names are typed at a command prompt. The setup scripts add the path names of the MHarness "bin" directory and the gnuplot "bin" directory to this environment variable. This enables mharness, the mharness command-line utilities, and gnuplot, to be run by typing their names at a shell command prompt.
------	---

values added by setups scripts:

```
<install_dir>/mharness320/bin  
<install_dir>/mharness320/gnuplot4.0.0/bin
```

MANPATH	Specifies the location of man pages. Man pages that are located in a directory that is included in MANPATH, may be viewed by typing "man <command_name>" at a shell prompt (you may need to run "windex" first -- see your UNIX documentation). The setup scripts add to this environment variable, a directory containing man pages for gnuplot and a couple of Rainbow Sentinel License Manager license utilities.
---------	--

value added by setups scripts:

```
<install_dir>/mharness320/docs/man
```

Environment variables used by Gnuplot:

GNUHELP	Specifies the location of the gnuplot help file "gnuplot.gih", so that interactive help is available while running gnuplot.
---------	---

value set by setups scripts:

```
<install_dir>/mharness320/gnuplot4.0.0/share/gnuplot/4.0/gnuplot.gih
```


GNUPLOT_DRIVER_DIR Specifies the location of the directory containing the gnuplot X11 driver file.

value set by setups scripts:

<install_dir>/mharness320/gnuplot4.0.0/libexec/gnuplot/4.0

Environment variables used by the Sentinel License Manager licensing system:

LSERVRC Specifies the location of the license key file "lservrc". This environment variable should only be necessary for a standalone license key. For a standalone key, it may be necessary to set this variable to enable the licensing in the application to locate the key file, which is normally placed in the MHarness "bin" directory. The setup scripts contain a line to set this variable to the appropriate location for a standalone key file, but it is commented-out. It can be un-commented in the setup script if it is necessary for a standalone key file. For a floating network key file, it should remain commented-out.

value set by setups scripts:

<install_dir>/mharness320/bin/lservrc

Appendix B: Platform Compatibility & System Requirements

The following are the system requirements for MHarness version 3.2 for UNIX. Some system requirements are platform-specific, others are common to all variants of UNIX.

SUN Solaris

The SUN Solaris version of MHarness in this distribution was prepared on a SUN Ultra60 running Solaris 8. Here are the SUN Solaris-specific system requirements for MHarness version 3.2:

Hardware Platform:

processor: SPARC family processor.

Software Platform:

operating system: Solaris 8 or compatible.

SGI IRIX

The SGI IRIX version of MHarness in this distribution was prepared on an SGI Octane running IRIX 6.5.20. Here are the SGI IRIX-specific system requirements for MHarness version 3.2.

Hardware Platform:

processor: SGI MIPS processor.

Software Platform:

operating system: SGI IRIX 6.5.x.

UNIX (all)

Here are the MHarness version 3.2 system requirements common to all variants of UNIX.

Hardware Platform:

hard disk space (installation): 45 MB
hard disk space (user)*: 1 GB or more recommended
system memory**: 64MB minimum, 128MB - 256MB recommended
swap file size: appropriately proportional to system memory (for example, 100% to 150% of system memory size is one commonly used rule of thumb)
graphics card/display: no graphics card or display requirement

Software Platform:

graphics system***: no graphics requirement

*User disk space requirements vary significantly. Most MHarness problems require relatively little user disk space for the problem files. 1 GB is probably more than enough; however, this is very little disk space by today's standards and since disk space is rather cheap, a good rule of thumb is "the more, the better".

**System memory requirements vary significantly depending on the MHarness problem you are solving. Most MHarness problems will take much less space in memory than the minimum mentioned. However, you may want to have enough memory for multiple MHarness jobs, very large jobs, etc.

***There is no particular graphics requirement for running MHarness itself. MHarness results are typically viewed with any data-plotting program of the user's choice (such as the free "gnuplot" that is included). The graphics requirements for "gnuplot" are very basic. If some other third-party plotting package is being used to plot/visualize result waveforms, the graphics requirements for that package should be considered.

Appendix C: Gnuplot Copyright

Gnuplot is distributed with EMA software in accordance with the Gnuplot Copyright, quoted here:

GNU PLOT v4.0.0 COPYRIGHT

```
/*[
 * Copyright 1986 - 1993, 1998, 2004 Thomas Williams, Colin Kelley
 *
 * Permission to use, copy, and distribute this software and its
 * documentation for any purpose with or without fee is hereby granted,
 * provided that the above copyright notice appear in all copies and
 * that both that copyright notice and this permission notice appear
 * in supporting documentation.
 *
 * Permission to modify the software is granted, but not the right to
 * distribute the complete modified source code. Modifications are to
 * be distributed as patches to the released version. Permission to
 * distribute binaries produced by compiling modified sources is granted,
 * provided you
 * 1. distribute the corresponding source modifications from the
 * released version in the form of a patch file along with the binaries,
 * 2. add special version identification to distinguish your version
 * in addition to the base release version number,
 * 3. provide your name and address as the primary contact for the
 * support of your modified version, and
 * 4. retain our contact information in regard to use of the base
 * software.
 * Permission to distribute the released version of the source code along
 * with corresponding source modifications in the form of a patch file is
 * granted with same provisions 2 through 4 for binary distributions.
 *
 * This software is provided "as is" without express or implied warranty
 * to the extent permitted by applicable law.
]*/
```