MULTI: Licensing

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Preface

Contents

This preface discusses the purpose of the manual, the MULTI documentation set, and typographical conventions used.

About This Book

The *MULTI: Licensing* book contains information about installing and administering Green Hills licenses for the MULTI IDE and Green Hills Compiler. The license keys used to access INTEGRITY and velOSity are discussed in the *INTEGRITY Installation Guide*.

This book is divided into the following parts:

- *Part I: Information for End Users* provides licensing instructions for end users of MULTI. See Part I. Information for End Users on page 1.
- *Part II: Information for System Administrators* provides more extensive information for system administrators who need to set up a License Manager, administer licenses, and configure license administration settings. See Part II. Information for System Administrators on page 7.
- *Part III: Appendices* contains reference and troubleshooting material. See Part III. Appendices on page 51.

Note

New or updated information may have become available while this book was in production. For additional material that was not available at press time, or for revisions that may have become necessary since this book was printed, please check your installation directory for release notes, **README** files, and other supplementary documentation.

The MULTI 6 Document Set

The primary documentation for using MULTI is provided in the following books:

- *MULTI: Getting Started* — Provides an introduction to the MULTI Integrated Development Environment and leads you through a simple tutorial.
- *MULTI: Licensing* — Describes how to obtain, install, and administer MULTI licenses.
- *MULTI: Managing Projects and Configuring the IDE* — Describes how to create and manage projects and how to configure the MULTI IDE.
- *MULTI: Building Applications* — Describes how to use the compiler driver and the tools that compile, assemble, and link your code. Also describes the Green Hills implementation of supported high-level languages.
- *MULTI: Configuring Connections* — Describes how to configure connections to your target.
- *MULTI: Debugging* — Describes how to set up your target debugging interface for use with MULTI and how to use the MULTI Debugger and associated tools.
- *MULTI: Debugging Command Reference* — Explains how to use Debugger commands and provides a comprehensive reference of Debugger commands.
- *MULTI: Scripting* — Describes how to create MULTI scripts. Also contains information about the MULTI-Python integration.

For a comprehensive list of the books provided with your MULTI installation, see the **Help → Manuals** menu accessible from most MULTI windows.

Most books are available in the following formats:

- A printed book (select books are not available in print).
- Online help, accessible from most MULTI windows via the **Help → Manuals** menu.
- An electronic PDF, available in the **manuals** subdirectory of your IDE or Compiler installation.

Conventions Used in the MULTI Document Set

All Green Hills documentation assumes that you have a working knowledge of your host operating system and its conventions, including its command line and graphical user interface (GUI) modes.

Green Hills documentation uses a variety of notational conventions to present information and describe procedures. These conventions are described below.

Convention	Indication	Example
bold type	Filename or pathname	**C:\MyProjects**
	Command	**setup** command
	Option	**-G** option
	Window title	The **Breakpoints** window
	Menu name or menu choice	The **File** menu
	Field name	**Working Directory:**
	Button name	The **Browse** button
italic type	Replaceable text	**-o *filename***
	A new term	A task may be called a *process* or a *thread*
	A book title	*MULTI: Debugging*
`monospace` type	Text you should enter as presented	Type `help command_name`
	A word or words used in a command or example	The **wait** [-global] command blocks command processing, where `-global` blocks command processing for all MULTI processes.
	Source code	`int a = 3;`
	Input/output	`> print Test` `Test`
	A function	`GHS_System()`
ellipsis (...) (in command line instructions)	The preceding argument or option can be repeated zero or more times.	**debugbutton** [*name*]...

Convention	Indication	Example
greater than sign (>)	Represents a prompt. Your actual prompt may be a different symbol or string. The > prompt helps to distinguish input from output in examples of screen displays.	`> print Test` `Test`
pipe (|) (in command line instructions)	One (and only one) of the parameters or options separated by the pipe or pipes should be specified.	**call** *proc* | *expr*
square brackets ([ ]) (in command line instructions)	Optional argument, command, option, and so on. You can either include or omit the enclosed elements. The square brackets should not appear in your actual command.	`.macro` *`name`* `[`*`list`*`]`

The following command description demonstrates the use of some of these typographical conventions.

gxyz [-*option*]...*filename*

The formatting of this command indicates that:

- The command **gxyz** should be entered as shown.
- The option *`-option`* should either be replaced with one or more appropriate options or be omitted.
- The word *`filename`* should be replaced with the actual filename of an appropriate file.

The square brackets and the ellipsis should not appear in the actual command you enter.

Licensing Models

To maximize flexibility, the MULTI products support four different licensing models:

- *Computer- and dongle-locked licenses* — These licenses are only supported on Windows and are not available over a network. They allow an unlimited number of instances of the licensed MULTI component to run on the licensed PC. For example, a single compiler license allows you to run an unlimited number of compilers.

  You can only move a computer-locked license to a new machine after contacting Green Hills Software, but a dongle-locked license becomes available on any PC to which the dongle (a hardware security device) is attached, and on which the license is installed.

  Computer- and dongle-locked licenses are only available to one user at a time. If more than one user is connected at once, the license is only available from the console.
- *Floating and named-user licenses* — These licenses are available over a network and are managed by a License Manager.

  Floating licenses are distributed on a first-come, first-served basis. Any end user may obtain as many floating licenses as are available in the license pool. For example, if a user obtains a floating license on one machine and wants to move to another, they can leave the licensed product running on the first machine and obtain another floating license—assuming one is available—for the same product on the second machine.

  Named-user licenses are accessible only to a defined set of end users, and each user may access only one license at a time.

  The License Manager reserves floating and named-user licenses for up to five minutes in case the client that last used the license needs it again within that time frame. Consequently, if a user obtains a named-user license on one machine, but wants to move to another, they must exit the licensed product on the first machine and then wait for the license reservation to expire (up to five minutes) before they are able to obtain a named-user license for the same product on the second machine.

Regardless of whether you are using the floating or named-user license model, a single end user working at a single machine consumes only one license, even if they are running multiple instances of the licensed component. For example, a single compiler license allows the user to run an unlimited number of compilers. However, if a user is running the component on multiple displays of a single Linux/Solaris machine, a new license is required for each display.

Floating and named-user licenses are locked to a particular license host. To rehost licenses from one license host to another, you must contact Green Hills Software.

More About Named-User Licenses

The main difference between floating and named-user licenses is that a named-user license can only be used by a single, unique user, whereas a floating license can "float" among users. Traditionally, customers tend to think of MULTI products as being offered in "seats", where the number of seats for a product matches the number of end users of the product. Named-user licenses implement this concept: if a group has ten users of a product, then that group must have ten "seats," or ten named-user licenses for that product.

A named-user license provides a unique user with the right to use a product, but the choice of which user this license is assigned to is the decision of the user's organization (system administrator, manager, etc.). The list of valid users for a particular product is managed through the **lic_userlist** command line utility (see "Managing User Lists with lic_userlist" on page 14).

Part I

Information for End Users

Chapter 1

Licensing for End Users

Contents

Before you can use the MULTI IDE and Green Hills Compiler, appropriate software licenses must be installed or accessible. When you first start the IDE, it checks for a valid MULTI license. If it cannot obtain a license, the **MULTI Licensing Wizard** automatically opens. You can use this wizard to request and install computer- or dongle-locked licenses (Windows only), or to obtain floating or named-user licenses, as documented in the following sections.

Note

This chapter assumes that you have installed MULTI 6 on your machine. If you have not, see the installation document located in the root directory of the installation CD for information.

Requesting Computer- or Dongle-Locked Licenses

Computer- and dongle-locked licenses are supported on Windows machines only. To request computer- or dongle-locked licenses, follow these steps:

1. For dongle-locked licenses — Insert the dongle into a USB port on your machine.
2. If the **MULTI Licensing Wizard** is not already open, select **Utilities → License Administrator** from the MULTI Launcher.
3. In the **MULTI Licensing Wizard**, select **License my MULTI products (recommended for end users)**, and click **Next**.
4. Choose the on-screen options for requesting licenses.

Customers submitting license requests via email or fax should use the appropriate email address or fax number, as listed below.

- MULTI customers in the Americas, Australia, and New Zealand should send completed license requests to:
  - Email: *license@ghs.com*
  - Fax: (805) 965-6343 (Attn: Licensing)
- MULTI customers from other parts of the world should send the completed license request to:
  - Email: *license@ghs.nl*
  - Fax: +31 (0)33 4613640

- Ada/Safety-critical customers should send the completed license request to:
  - Email: *adalicense@ghs.com*
  - Fax: (727) 781-3915

License requests are processed as quickly as possible within business hours.

If you have questions, please call Green Hills' toll free licensing line (877-962-2950 in the U.S.), or call Green Hills Technical Support (+1 805-965-0124 worldwide).

Installing Computer- or Dongle-Locked Licenses

Computer- and dongle-locked licenses are supported on Windows machines only. To use the **MULTI Licensing Wizard** to install computer- or dongle-locked licenses, follow these steps:

1. If the **MULTI Licensing Wizard** is not already open, select **Utilities → License Administrator** from the MULTI Launcher.
2. In the **MULTI Licensing Wizard**, select **License my MULTI products (recommended for end users)**, and click **Next**.
3. Select **Install a computer- or dongle-locked license file**, and click **Next**.
4. In the file chooser that appears, select the **.ghslic** license file that you received from Green Hills Software, and click **Install**.

To manually install computer- or dongle-locked licenses, follow these steps:

1. Copy the Green-Hills-supplied **.ghslic** license file to the license file directory. The default license file directory on Windows is **C:\GHS\licenses**. To use a different directory, set the `LICENSE_FILE_DIR` configuration variable accordingly. For more information, see “Configuration Variables for Machines with Local Licenses” on page 39.
2. For dongle-locked licenses — Install the appropriate drivers for your dongle. The installers for the SafeNet Sentinel dongle driver are included in the **safenet** directory of your MULTI IDE installation.

Obtaining Floating or Named-User Licenses

To configure your machine to contact one or more License Managers from which you may obtain floating or named-user licenses, follow these steps:

1. Make sure that your system administrator has set up a License Manager on the network. For more information, see "Configuring a License Manager and Installing Licenses" on page 10.
2. If the **MULTI Licensing Wizard** is not already open, select **Utilities → License Administrator** from the MULTI Launcher.
3. In the **MULTI Licensing Wizard**, select **License my MULTI products (recommended for end users)**, and click **Next**.
4. On Windows, select **Specify the network location of License Managers**, and click **Next**.
5. Specify one or more license hosts running a License Manager on the network by doing one of the following:
   - Click **Search** to browse a list of License Managers found on the local network. Select one more more entries in the list, and click **OK**. (Note that search results depend on your network configuration. If you do not find a License Manager appropriate for your use, contact your system administrator for the name or IP address of a License Manager that you can access.)
   - Manually enter the name or IP address of one or more license hosts. If specifying multiple license hosts, separate each with a comma.

   When specifying multiple license hosts, you may choose whether the license hosts are contacted in order (precede the list with `@`) or at random (precede the list with `#`).

Note

This step sets the `GHS_LMHOST` configuration variable in your license configuration file. For more information, see "Setting Configuration Variables" on page 36.

Part II

Information for System Administrators

Chapter 2

Managing Floating and Named-User Licenses

Contents

This chapter describes the installation and administration of license management tools on the license host and of floating and named-user licenses.

Note

Elan licensing, aka legacy licensing, is no longer supported.

Configuring a License Manager and Installing Licenses

The following steps outline how to set up a License Manager on a license host and install floating or named-user licenses:

1. Install the licensing utilities on the machine that is to be used as the license host. The license host may be a Windows, Linux, or Solaris machine. See "Installing Licensing Utilities on the License Host" on page 12.
2. Request licenses via the **MULTI Licensing Wizard**. See "Requesting Floating or Named-User Licenses" on page 13.
3. Save the Green-Hills-supplied **.ghslic** license file to a local directory that the License Manager has read and write permissions to. The license file may have any name.
4. For named-user licenses — Optionally assign user lists via the **lic_userlist** utility. See "Managing User Lists with lic_userlist" on page 14.
5. Use the **MULTI Licensing Wizard** to specify the location of the license file and to configure and then start the License Manager. See "Configuring and Starting the License Manager from the GUI" on page 22.

In order for client machines to obtain floating or named-user licenses, end users must complete the steps listed in "Obtaining Floating or Named-User Licenses" on page 6.

Replacing or Adding Licenses

If you have already set up a License Manager and would like to install a new floating or named-user license file, follow these steps:

1. Stop the License Manager if it is running. See "Stopping the License Manager" on page 29.
2. Save the Green-Hills-supplied **.ghslic** license file to a local directory that the License Manager has read and write permissions to. The license file may have any name.
3. For named-user licenses — Optionally assign user lists via the **lic_userlist** utility:
   - If the new license file replaces your old license file — Use the **-f** option to replace the old user list.
   - If the new license file supplements the old license file — Create a new user list for the new license file.

   See "Managing User Lists with lic_userlist" on page 14.
4. Specify the location of the license file and restart the License Manager:
   - If the new license file replaces your old license file — Use the **MULTI Licensing Wizard** to specify the location of the new license file and to restart the License Manager. See "Configuring and Starting the License Manager from the GUI" on page 22.
   - If the new license file supplements the old license file — Run **lic_lm** with the **-license** option. See "Configuring and Starting the License Manager from the Command Line" on page 24.

Installing Licensing Utilities on the License Host

The following should be taken into consideration when selecting a machine to serve as a license host:

- The license host must be an easily accessible network machine that is up and running when users need licenses.
- Avoid using DHCP or dial-up networking on the license host. Doing so may cause the license host to change its default IP address. The License Manager will detect this address change and may stop granting license requests for security reasons.

Before installing licensing utilities on Windows, ensure that the following prerequisites have been met:

- The installing user has administrator privileges.
- The **Services** applet in the Windows **Control Panel** is not active.
- All running programs have been exited (recommended, not required).

For information about prerequisites that must be met before starting the License Manager, see “Before Starting the License Manager” on page 21.

Install the licensing utilities from a MULTI 6 installation CD. Instructions are provided in the installation document located in the root directory of the installation CD.

Note

The MULTI 6 License Manager will continue to serve licenses to MULTI 4 and MULTI 5 clients, but earlier versions of the License Manager will not serve licenses to MULTI 6 clients.

Requesting Floating or Named-User Licenses

To request floating or named-user licenses, follow these steps:

1. On the license host, run **mlmadmin.exe** (**mlmadmin** on Linux/Solaris) from the licensing utilities installation directory.
2. In the **MULTI Licensing Wizard** that appears, select **Set up a network License Manager (recommended for administrators)**, and click **Next**.
3. Choose the on-screen options for requesting licenses.

Customers submitting license requests via email or fax should use the appropriate email address or fax number, as listed below.

- MULTI customers in the Americas, Australia, and New Zealand should send completed license requests to:
  - Email: *license@ghs.com*
  - Fax: (805) 965-6343 (Attn: Licensing)
- MULTI customers from other parts of the world should send the completed license request to:
  - Email: *license@ghs.nl*
  - Fax: +31 (0)33 4613640
- Ada/Safety-critical customers should send the completed license request to:
  - Email: *adalicense@ghs.com*
  - Fax: (727) 781-3915

License requests are processed as quickly as possible within business hours.

If you have questions, please call Green Hills' toll free licensing line (877-962-2950 in the U.S.), or call Green Hills Technical Support (+1 805-965-0124 worldwide).

Managing User Lists with lic_userlist

Note

This section only applies to named-user licenses.

A user list defines a set of end users who may obtain a named-user license for a particular product. You can manage user lists by running the **lic_userlist** utility on the license host.

When named-user licenses are first installed (see step 3 in “Configuring a License Manager and Installing Licenses” on page 10), no user lists are assigned. You can assign user lists by running **lic_userlist** with arguments. See the fourth format of the **lic_userlist** command below. The resulting user lists are stored in a file named ***license_file*.gul**, which is located in the same directory as the license file.

If you do not assign a user list for a particular licensed product, or if the number of licenses available for that product exceeds the number of end users named in the product's user list, the user list auto-populates. That is, users who obtain a product license are automatically added to the user list for that product if they are not already on the list.

Once a user is added to a user list, whether by auto-population or by manual setting, the only way to remove them is to use the **lic_userlist** utility. See Example 2.1. Modifying Existing User Lists on page 16. Modifying a user list via means other than **lic_userlist** renders your licenses unusable.

Three runs of **lic_userlist** are allowed to the user lists during a 24-hour period. A maximum number of changes is imposed for security purposes. If a fourth change to the user lists is attempted, a message indicates that the maximum number of daily changes has been exceeded, and the user list changes are not saved. (If this policy hampers your development efforts, please contact Green Hills Technical Support.)

Note

If the License Manager is running, stop it before running **lic_userlist** (see “Stopping the License Manager” on page 29). Restart the License Manager to cause your user list changes to take effect (see “Restarting the License Manager” on page 30).

The **lic_userlist** executable is available from the MULTI IDE and licensing utilities installation directories. You can run it from the command line in any of the following ways:

- **lic_userlist** [-h]
- **lic_userlist** [-q] -license *license_file* -f *user_list_file*
- **lic_userlist** [-q] -license *license_file* -r *reset_code*
- **lic_userlist** [-q] -license *license_file product user_list_options*

Options are described in the following table:

-h Displays help information.
-q Enables quiet mode, in which no questions are asked.
-license *license_file* Specifies the license file (**.ghslic**) containing named-user licenses for which you want to assign user lists.
-f *user_list_file* Replaces the license file's current user list (stored in ***license_file*.gul**) with the user list from *`user_list_file`*. For more information, see Example 2.2. Replacing a User List File on page 17.
-r *reset_code* Applies *`reset_code`*, which allows you to change the license file's user lists more than 3 times in a 24-hour period. This may be useful if the user lists are damaged. If you need a reset code, contact Green Hills Technical Support.
product user_list_options Modifies the user list for the licensed product *`product`*. Licensed products are listed in the license file. Valid *`user_list_options`* are: • `-a` *`user...`* — Adds *`user`* to the list of licensed end users for *`product`*. • `-d` *`user...`* — Deletes *`user`* from the list of licensed end users for *`product`*. You may specify multiple `-a` and `-d` options to effect multiple changes at once. See the following example.

Running **lic_userlist** with no options creates an empty user list file (**.gul**).

Example 2.1. Modifying Existing User Lists

Given the following **.ghslic** file named **mylicenses.ghslic**, see the example commands below.

```
[...]

version: 20

serial: 2345
port: 2009
ethernet: 1.1.1.1

lm key: 45ac040
lm code: 10000
lm hostid: 102bce95

multi key: 46d0866b
multi code: 100
multi licenses: 5

simppc key: 350acd10
simppc code: 470
simppc licenses: 5

isimppc key: 330b0f39
isimppc code: 610
isimppc licenses: 5

ecomppc key: 58df0eba
ecomppc code: 2901
ecomppc licenses: 5

enable_MULTI_v6 key: 2533f55f
enable_MULTI_v6 code: 11101
enable_MULTI_v6 licenses: 5
```

Examples:

To remove the users “sam” and “bob” from the `ecomppc` user list and to add “jon” to the `ecomppc` and `multi` user lists:

```
lic_userlist -license mylicenses.ghslic ecomppc -d sam -d bob -a jon multi -a jon
```

To add the user “susanna” to the `ecomppc` and `multi` user lists:

```
lic_userlist -license mylicenses.ghslic ecomppc -a susanna multi -a susanna
```

Note

The above commands are only examples. Your installation may require you to specify product licenses other than the ones shown here.

Example 2.2. Replacing a User List File

The **-f** option to **lic_userlist** replaces the license file's current user list (if any) with the user list from the file you specify. This allows you to effect multiple user list changes with only one run of **lic_userlist** (three runs are permitted during a 24-hour period).

To create a new user list file:

1. Copy:
   - The MULTI 6 file ***license_file*.gul**, located in the same directory as the license file, or
   - The MULTI 5 file **userlist.txt**. By default, **userlist.txt** is located in **C:\GHS\licenses** (Windows) or in **green_hills_install_dir/licenses** (Linux/Solaris).
2. Open the copy in a text editor, and assign a user list for each product. In the following sample file, each of the first three lines specifies a user list for the product indicated. `100`, `310`, and `2901` are product codes. Available product codes are listed in your license file.

   ```
   100 seth<END>
   310 kevin,joe<END>
   2901 kevin,joe,dan<END>
   <UPDATED 1316465457 0 0>
   <DIGEST a54296e91660acd30c5ea3b395f0786c>
   WARNING: DO NOT TOUCH OR EDIT THIS FILE. It will break your licenses.
   If you want to edit the user lists, please use lic_userlist.
   ```

Controlling Access to Licenses

License access files allow you to control who can obtain floating and named-user licenses. There are two types of license access files: those containing whitelists and those containing blacklists. A whitelist specifies who may obtain licenses from a particular license file. A blacklist specifies who may *not* obtain licenses from a particular license file. For example, if you want to reserve the licenses in a license file for the exclusive use of one particular user group, you can create a whitelist containing the names of the users in that group. Only requests from the specified users will be granted. If, on the other hand, you want to allow all end users except a few to obtain licenses from a license file, you can create a blacklist containing the names of the users you want to bar from obtaining licenses. In this case, requests will only be granted if they do not come from the specified users.

In each whitelist and blacklist, you may specify user names and IP addresses. When a whitelist is used, only requests from the specified users on hosts with the specified IP addresses are granted. When a blacklist is used, any requests from the specified users or from hosts with the specified IP addresses are denied. If no user names are specified, all users are qualified to obtain licenses. If no IP addresses are specified, requests from all hosts are qualified to obtain licenses.

You may optionally define one license access file per license file. The license access file should be located in the same directory as the license file, and it should have the same base name. The extension must be **.ghslac**.

The License Manager must have read permissions to the license access file, which it checks for approximately once every 15 seconds. If a new license access file has been created or if an existing file has been changed, the License Manager loads it.

Note

If you are using named-user licenses, the user lists created via **lic_userlist** also specify who may obtain licenses. These lists are not automatically updated when you create or modify a license access file; you must update them manually by running **lic_userlist** with the appropriate options (see “Managing User Lists with lic_userlist” on page 14). If a license access file conflicts with an existing user list, you will see a warning similar to the following:

```
User "jerry" is blacklisted from accessing product "ecomppc".
Use "lic_userlist" to remove the user from the user list.
```

License Access File Format

Format your license access file as follows:

```
version = 1;

whitelist|blacklist {
    user = {"user_name", "user_name", ...}
    user += {"user_name", "user_name", ...}

    ip = {"IPv4_address", "IPv4_address", ...}
    ip += {"IPv4_address", "IPv4_address", ...}
}
```

where:

- `version` is the version number of the license access file. At present, the version is `1`.
- `whitelist` or `blacklist` may be specified, but not both.
- `user` and `ip` are lists. Note that you must enclose list values in curly braces `{}`.
- The operator = overwrites existing list values (if any) with new list values, while += appends new list values to existing list values.
- *`IPv4_address`* may indicate a range of IP addresses. For example:

  ```
  192.168.22-38.0-255
  ```

  matches all IP addresses whose first fields are `192` and `168`, whose third field is between `22` and `38` (inclusive), and whose last field is any number (`0-255` matches any value).

Example 2.3. Whitelist

```
version = 1;

whitelist {
    user = {"joe"}
    user += {"kahlil"}
    user += {"jasmine", "toby"}

    ip = {"192.168.102.195"}
```

```
    ip += {"192.168.11.195", "192.168.22-38.0-255"}
}
```

This whitelist only allows the users `joe`, `kahlil`, `jasmine`, and `toby` to obtain licenses from hosts whose IP address meets one of the following criteria:

- The IP address is `192.168.102.195`.
- The IP address is `192.168.11.195`.
- The first two fields of the IP address are `192` and `168`, the third field is between `22` and `38` (inclusive), and the fourth field is any number.

Example 2.4. Blacklist

```
version = 1;

blacklist {
    user = {"joe"}
    user += {"kahlil"}
    user += {"jasmine", "toby"}

    ip = {"192.168.102.195"}
    ip += {"192.168.11.195", "192.168.22-38.0-255"}
}
```

This blacklist blocks any license requests from the users `joe`, `kahlil`, `jasmine`, and `toby`, or from any host whose IP address meets one of the following criteria:

- The IP address is `192.168.102.195`.
- The IP address is `192.168.11.195`.
- The first two fields of the IP address are `192` and `168`, the third field is between `22` and `38` (inclusive), and the fourth field is any number.

Ignored License Access Files

A license access file will be ignored in any of the following cases:

- It contains both a whitelist and a blacklist.
- It contains a syntax error.

- You started the License Manager with the **-filter** option or the equivalent **IP Addr Filter** option.
- The corresponding license file is dedicated to serving requests from the local host.

Configuring and Starting the License Manager

Before Starting the License Manager

Before starting the License Manager, consider the following caveats:

- You must configure and start the License Manager from the license host.
- UDP port 2009—used by the **MULTI License Administrator** to locate the License Manager on the network—must not be blocked by firewall and must be otherwise available for listening.
- The TCP port(s) specified by your license file(s) must be available. TCP ports are used to accept license requests from client machines. The default TCP port is 2009.
- Windows — Users with limited permissions are not able to modify the state of Windows services. To start the License Manager, you must be logged in with administrator privileges. Additionally, if you want to start the License Manager from the command line and you are using Windows 7 or Windows Vista with User Account Control (UAC) enabled (the default), the command prompt must be started using the **Run as administrator** option:
  1. From the Start menu, select **All Programs → Accessories**.
  2. Right-click **Command Prompt** and select **Run as administrator**.
- Linux/Solaris — Many Linux/Solaris systems set a hard limit on the number of open sockets per process (1024 by default). If you expect many client applications to try to connect with the License Manager simultaneously, you may need to increase this limit before starting the License Manager. For example, on bash, the command **ulimit -n 5555** sets the limit to 5555.

Configuring and Starting the License Manager from the GUI

The **License Manager Settings** dialog box allows you to configure and start the License Manager. To open the dialog box, perform the following steps:

1. Run **mlmadmin.exe** (**mlmadmin** on Linux/Solaris) from the licensing utilities installation directory.
2. In the **MULTI Licensing Wizard** that appears, select **Set up a network License Manager (recommended for administrators)**, and click **Next**.
3. Select **Configure the License Manager on this machine**, and click **Next**.

To configure the License Manager, fill in the fields of the dialog box. The following table gives a description of each field. Command line equivalents are documented in "Configuring and Starting the License Manager from the Command Line" on page 24.

After filling in the fields of the dialog box, you can click **Start License Manager** if the License Manager is not running. On Windows, a Windows service with the display name `Green Hills License Manager` and the service name `ghs_lm` is created for the License Manager if a service does not already exist. If the License Manager is running, you must click **Restart License Manager** for your changes to take effect.

License File

Specifies the license file (**.ghslic**) containing licenses to be served by the License Manager. This field is equivalent to the **-license** command line option to the License Manager.

Note

Only one license file is supported from the GUI.

Description

Specifies a description for the License Manager. The description has no purpose other than identification. It appears in the **MULTI License Administrator**, which lists available License Managers on the network. A description may be useful when a network has multiple License Managers in use, with each one serving a particular group of end users. For example, you could set the description to `The Tools Group`, or `Firmware Development`.

This field is equivalent to the **-desc** command line option to the License Manager.

Log File

Specifies the absolute path to a file that stores logging information for every significant licensing event, such as the acquisition and release of a license. An absolute path is recommended to avoid confusion over the location of the log file when the License Manager is started in different ways (for example, automatically at boot, from a command line script, etc.). If you do not specify a log file, debugging information is sent to `stdout`, which is not displayed by Windows GUI applications.

If the first character of this field is a pipe character (`|`), the License Manager will use the rest of the field as a command line to be spawned and the log file will be sent as `stdin` to that process. This *log piping* is useful for implementing log rotation, filtering, or other custom log processing.

Note

Because log piping can be used to execute programs on the license host, take care to properly set permissions to the License Manager's configuration file. A malicious or ignorant user could configure the License Manager to run a program with undesirable side effects.

Example **Log File** entries follow:

```
/usr/green/lm.log
```

Sends log output to the file `/usr/green/lm.log` on the license host.

```
|/usr/local/bin/rotate.py /usr/green/lm.log 5m
```

Sends log output to a Python script written by the user, located at `/usr/local/bin/rotate.py`. The script takes two command line arguments: `/usr/green/lm.log` and `5m`.

This field is equivalent to the **-log** command line option to the License Manager.

User Tracking File

Specifies the absolute path to a file that stores distinct user names. This field is equivalent to the **-track_users** command line option to the License Manager.

IP Addr Filter

Specifies a dotted-decimal or 32-bit hex value IP address as a filter whose zero fields match all values and whose non-zero fields match only the non-zero value given. The License Manager uses this value to filter requests from external machines and to deny those that come from unauthorized IP addresses. For example, if the IP address filter is `192.168.100.0`, any client on the `192.168.100` subnet, such as `192.168.100.10`, can access the License Manager. Requests from other subnets, such as `192.168.101.10` will be denied.

Requests coming from the local host address `127.0.0.1` are not filtered and always reach the License Manager.

This field is equivalent to the **-filter** command line option to the License Manager.

Note

This field is deprecated in MULTI 6. Use a license access file instead (see "Controlling Access to Licenses" on page 18).

Verbose Logging

Indicates whether the License Manager logs more or fewer events. Logging additional events may be useful for visualizing the activity of the License Manager.

This field is equivalent to the **-verbose** command line option to the License Manager.

Start License Manager or **Restart License Manager**

Starts or restarts the License Manager on the license host. If the operation fails, a dialog box displaying diagnostic information appears.

On Windows, this button does not function correctly if the **Services** applet in the Windows **Control Panel** is open.

Configuring and Starting the License Manager from the Command Line

Note

Windows users running the License Manager as a Windows service should configure the License Manager via the GUI or via the **lmconfig.txt** configuration file. See "Configuring and Starting the License Manager from the GUI" on page 22 or "Configuring the License Manager via Its Configuration File" on page 27.

The License Manager executable, **lic_lm**, is available from the MULTI IDE and licensing utilities installation directories. To start the License Manager as a stand-alone program, run **lic_lm** from the command line as follows:

lic_lm [options]

The following table gives a description of each option. For options with a GUI equivalent in the **License Manager Settings** dialog box, more information is available in the description of the GUI equivalent. See "Configuring and Starting the License Manager from the GUI" on page 22.

-debug **-d** On UNIX, enables debug mode, in which the License Manager will not start up as a daemon. On Windows, causes the log file to be output to **stdout**. See also the **-log *log_file_path*** option below.
-debug_level *num* Specifies how much debugging information should be logged. Valid values for *`num`* are from `0` to `11`. See also the **-verbose** option below.
-desc *description* Specifies a description for the License Manager. If *`description`* contains a space, enclose it in quotation marks. This command line option is equivalent to the **Description** field in the **License Manager Settings** dialog box.
-filter *IP_filter* Specifies a dotted-decimal or 32-bit hex value IP address as a filter whose zero fields match all values and whose non-zero fields match only the non-zero value given. This command line option is equivalent to the **IP Addr Filter** field in the **License Manager Settings** dialog box.  **Note** This command line option is deprecated in MULTI 6. Use a license access file instead (see "Controlling Access to Licenses" on page 18).
-help **-h** Displays help information.

-license *license_filename ...*   Specifies the license file (**.ghslic**) containing licenses to be served by the License Manager. If `license_filename` contains a space, enclose it in quotation marks.   To specify multiple license files, repeat `-license` before each new filename. See Example 2.5. Specifying Multiple License Files on page 27.   When multiple license files are specified, each of them must be locked to a different TCP port. (TCP ports can only be assigned by Green Hills Software.) Duplicate license files (identified by serial number) are ignored.   This command line option is equivalent to the **License File** field in the **License Manager Settings** dialog box.
-log *log_file_path*   **-l *log_file_path***   Specifies the absolute path to a file that stores logging information for every significant licensing event, such as the acquisition and release of a license. If `log_file_path` contains a space, enclose it in quotation marks. See also the **-debug** option above.   This command line option is equivalent to the **Log File** field in the **License Manager Settings** dialog box.
-noudp   Disables the UDP broadcasting service that locates the License Manager. As a result, UDP port 2009 is not used.
-track_users *user_file_path*   Specifies the absolute path to a file that stores distinct user names. If `user_file_path` contains a space, enclose it in quotation marks.   This command line option is equivalent to the **User Tracking File** field in the **License Manager Settings** dialog box.
-verbose   **-v**   Causes the License Manager to log additional events. To set verbosity more precisely, use the **-debug_level *num*** option above.   This command line option is equivalent to the **Verbose Logging** field in the **License Manager Settings** dialog box.

An example use of the **lic_lm** command follows.

Example 2.5. Specifying Multiple License Files

```
> lic_lm -desc Development -log /tmp/lm.log -license ppclicenses.ghslic \
-license armlicenses.ghslic
```

This command specifies multiple license files for use with a single License Manager. Note that each license file must be unique. Duplicate files will be rejected by the License Manager.

Configuring the License Manager via Its Configuration File

The License Manager's configuration is normally managed via the **License Manager Settings** dialog box. (For more information, see "Configuring and Starting the License Manager from the GUI" on page 22.) The configuration is stored in a file called **lmconfig.txt**, which is located in the MULTI IDE or licensing utilities installation directory. You may configure the License Manager by modifying this file directly or by creating it, if it does not exist.

lmconfig.txt should be in ASCII format, with one option per line. The same syntax is used for options specified in **lmconfig.txt** and for command line options to the License Manager. Options specified on the command line override those specified in **lmconfig.txt** even if multiple occurrences of an option (such as **-license**) are permitted. For options, see "Configuring and Starting the License Manager from the Command Line" on page 24. Lines beginning with `#` are treated as comments, and blank lines are ignored.

You must restart the License Manager before changes to **lmconfig.txt** take effect. See "Restarting the License Manager" on page 30.

Other Ways to Start the License Manager

- Windows — To register the License Manager as a Windows service that runs automatically upon Windows startup, enter the following on the command line:

  ```
  > wrap_svc -m auto register
  ```

  To start the License Manager service after it has been registered, enter:

  ```
  > wrap_svc start
  ```

For more information, see “Controlling the License Manager with wrap_svc” on page 30.

- Windows — If a Windows service exists for the License Manager, ensure that the **MULTI License Administrator** is not open, and then use the **Services** applet to start the License Manager. You can access the **Services** applet from the Windows **Control Panel** or by running `services.msc`.
- Linux/Solaris — Modify the startup scripts on the license host to launch **lic_lm** at boot time. As an example, a bare-bones script for Solaris might exist in a file named **/etc/rc2.d/S99ghs_lm** with the following contents.

```
#!/bin/sh

LM_DIR="/usr/ghs/licensing"

# This file will be loaded by the host, with default
# values for log file, verbosity, etc. In MULTI 6, the
# mlmadmin utility can be used to change these settings,
# or you may modify the config file with any text editor.
# The new settings will take effect after the host is
# restarted. The location of this file is defined here
# only for the operator's reference; changing this value
# will not enable lic_lm to use a different config file.
LM_CONFIG_FILE="$LM_DIR/lmconfig.txt"

case "$1" in
'start')
        cd $LM_DIR
        ./lic_lm
        ;;

'stop')
        /usr/bin/pkill -x -u 0 lic_lm
        ;;

*)
        echo "Usage: $0 { start | stop }"
        exit 1
        ;;
esac
exit 0
```

For information about how to modify startup scripts, consult your operating system documentation. If you have any problems, please contact Green Hills Technical Support.

Stopping the License Manager

Note

Windows users with limited permissions are not able to modify the state of Windows services. To stop the License Manager, you must be logged in with administrator privileges.

To manually stop the License Manager:

- In the **MULTI License Administrator**, select **License → Stop License Manager on This Machine**. For information about how to access the **MULTI License Administrator**, see "Viewing License Information with the MULTI License Administrator" on page 44.
- Windows — If a Windows service exists for the License Manager, ensure that the **MULTI License Administrator** is not open, and then use the **Services** applet to stop the License Manager. You can access the **Services** applet from the Windows **Control Panel** or by running `services.msc`.
- Windows — If you have started the License Manager via the **wrap_svc** utility, enter the following on the command line:

  ```
  wrap_svc stop
  ```

  For more information, see "Controlling the License Manager with wrap_svc" on page 30.

Restarting the License Manager

If you make changes to the License Manager's configuration via the **License Manager Settings** dialog box or the file **lmconfig.txt**, you must restart the License Manager before your changes take effect. To restart the License Manager manually, perform one of the following operations:

- In the **License Manager Settings** dialog box, click **Restart License Manager**. For information about how to access this dialog box, see "Configuring and Starting the License Manager from the GUI" on page 22.
- Windows — If you have started the License Manager via the **wrap_svc** utility, enter the following on the command line:

  ```
  > wrap_svc restart
  ```

  For more information, see "Controlling the License Manager with wrap_svc" on page 30.
- Windows — If a Windows service exists for the License Manager, ensure that the **MULTI License Administrator** is not open, and then use the **Services** applet to restart the License Manager. You can access the **Services** applet from the Windows **Control Panel** or by running `services.msc`.

Controlling the License Manager with wrap_svc

On Windows, the **wrap_svc** utility allows you to register the License Manager as a Windows service, and control the service once it is registered.

Before running **wrap_svc** on Windows, ensure that the following prerequisites have been met:

- You are logged in with administrator privileges. Additionally, if you are using Windows 7 or Windows Vista and User Account Control (UAC) is enabled (the default), the command prompt must be started using the **Run as administrator** option:
  1. From the Start menu, select **All Programs → Accessories**.
  2. Right-click **Command Prompt** and select **Run as administrator**.
- The **Services** applet in the Windows **Control Panel** is not active.

- The **MULTI License Administrator** is not open.
- All other running programs have been exited (recommended, not required).

The **wrap_svc** executable is available from the MULTI IDE and licensing utilities installation directories. You can launch it from the command line as follows:

wrap_svc [***options***] [***action***]

The following *options* can be used with **wrap_svc**.

-b 0|1 Determines whether or not **wrap_svc** creates Windows firewall exceptions for the License Manager. Passing `0` does not create firewall exceptions; passing `1` does. The default is `1`.
-compat Causes **wrap_svc** to act on the MULTI 5 License Manager instead of the MULTI 6 License Manager. See also the **-new** option below.
-e *executable* Registers *executable* as the License Manager. The default is **lic_lm.exe**.
-m *mode* Sets the startup mode to *mode*. The default is `manual`. Supported modes are: • `auto` — The service starts automatically at boot. • `manual` — The service must be started manually. • `disabled` — The service is marked as disabled.
-n *service_name* Causes **wrap_svc** to act on the service registered with *service_name*. The default service name is `ghs_lm`.
-new Causes **wrap_svc** to act on the MULTI 6 License Manager (the default). See also the **-compat** option above.

The following *actions* can be used with **wrap_svc**.

print Print the current service registration information. This is the default *action* if none is specified.

register Register the service with the operating system.
restart Restart the service.
start Start the service.
stop Stop the service.
unregister Unregister the service. Running services are unregistered when they are stopped.

Example 2.6. Registering the License Manager for Automatic Startup

To register the License Manager as a Windows service and schedule it to start automatically when Windows starts, enter the command:

```
wrap_svc -m auto register
```

Example 2.7. Starting the License Manager

To start the License Manager after it is registered, enter the command:

```
wrap_svc start
```

Example 2.8. Stopping the License Manager

To stop the License Manager, enter the command:

```
wrap_svc stop
```

License Manager Automatic Startup and Shutdown

If you are using Windows and you start the License Manager via the **License Manager Settings** dialog box, or if you create a service via the **wrap_svc** utility that is set to start up automatically, the License Manager automatically runs when the operating system is booted and shuts down when the operating system is shut down.

Likewise, if you are using Linux/Solaris and you modified the startup scripts on the license host to launch **lic_lm** at boot time, the License Manager automatically runs when the operating system is booted and shuts down when the operating system is shut down.

Chapter 3

Configuring End User Machines

Contents

Certain license administration settings can be controlled by way of configuration variables set in the end user's installation or in the end user's environment. This chapter contains information about these variables and how to set them.

Setting Configuration Variables

Configuration variables should normally be set in the end user's license configuration file, **license.cfg**, making settings available for easy reference and allowing settings to be shared with colleagues. To maintain a single **license.cfg** file that affects the IDE and Compiler installations on the client machine, set the environment variable `GHS_LICENSE_CFG_FILE` to an absolute path. For more information about this variable, see the next section.

If you do not set `GHS_LICENSE_CFG_FILE`, MULTI searches for **license.cfg** in ***install_dir*\config**, where *`install_dir`* is the IDE installation directory if the MULTI IDE is in use, and the Compiler installation directory if the Green Hills Compiler is in use. This means that by default, **license.cfg** only affects the product in whose installation directory it is found, necessitating its maintenance in both the IDE and Compiler installation directories.

If **license.cfg** does not exist, you can create it. Each line of **license.cfg** should specify a single setting. A setting is of the form *`VARIABLE=VALUE`*. Valid variables are listed below.

While setting configuration variables in **license.cfg** is preferred, configuration variables may also be set in the user's environment. However, settings in the configuration file override environment settings. For information about setting environment variables, refer to your operating system documentation.

Configuration Variables for End User Machines

The following configuration variables are valid for use on client machines connecting to the License Manager, and on machines with computer- or dongle-locked licenses.

`GHS_LICENSE_CFG_FILE`

Specifies the location of the license configuration file. Unlike other configuration variables, which should optimally be set in the license configuration file, but which may be set in the user environment, `GHS_LICENSE_CFG_FILE` can only be set in the environment. Valid values are:

- unset — [default] Uses the default location for the license configuration file: ***install_dir*\config**, where *`install_dir`* is the IDE installation directory if the MULTI IDE is in use, and the Compiler installation directory if the Green Hills Compiler is in use. For more information, see "Setting Configuration Variables" on page 36.
- *absolute_path* — Uses a specific configuration. Do not begin the path with a tilde (~).

`GHS_LMDEBUG`

Specifies the level of debugging information to be generated. Valid values are from `0` to `11`.

By default, debugging information is sent to `stdout`. Windows GUI applications, however, do not display `stdout`. To redirect debugging output to an accessible file, use the `GHS_LMINFO_DIR` variable (see below).

`GHS_LMINFO_DIR`

Specifies an existing directory in which to create an **.lmi** file that contains debugging output. This variable implies the `GHS_LMDEBUG` variable.

Configuration Variables for Client Machines

The following configuration variables are valid for use on client machines connecting to the License Manager.

`GHS_LMDELAY`

Specifies the maximum acceptable time to elapse (in seconds) before receiving a response from a License Manager once a connection has been successfully established. This number should account for the overall transit speed of Ethernet communication on your network.

The default is `15`.

GHS_LMHOST

Specifies the name(s) or IPv4 address(es) of the license host(s) running a License Manager on the network, and, if there are multiple license hosts, the way in which MULTI products attempt to contact License Managers when trying to obtain a license. This variable can be set in one of the following ways:

- Single license host:

  license_host_name_or_ip

- Multiple license hosts, attempt contact in order:

  @*license_host_name_or_ip*,*license_host_name_or_ip*,...

  For example:

  GHS_LMHOST=@192.168.100.10,192.168.100.11,host3

- Multiple license hosts, attempt contact at random:

  #*license_host_name_or_ip*,*license_host_name_or_ip*,...

  For example:

  GHS_LMHOST=#fee,fie,192.168.100.12,fum

Note

Multiple license hosts should be specified in a comma-separated list.

For more information, see “Specifying a Floating or Named-User License Pool” on page 39.

GHS_LMNOCACHE

Suppress the default behavior of using cached licenses when available. Due to its negative impact on performance, this variable should only be set for diagnostic purposes. Valid values are:

- unset [default]
- 1

GHS_LMPORT

Specifies the Green-Hills-assigned TCP port that the License Manager(s) listen(s) on. If the default port (2009) is not the port in use, this variable must be set to the correct port to ensure that the client programs connect to it. Every License Manager running on a license host specified by GHS_LMHOST is assumed to be listening on this port.

For more information, see “Specifying a Floating or Named-User License Pool” on page 39.

Configuration Variables for Machines with Local Licenses

The following configuration variables are valid for use on machines with computer- or dongle-locked licenses.

`GHS_LM_EXPECTED_MAC`

Specifies the MAC address (for example, `B8-AC-6F-97-5A-5F` or `B8:AC:6F:97:5A:5F`) to use when validating licenses against the Ethernet hardware. This can be used to tell MULTI products not to use an Ethernet adapter that is commonly removed from the system. The specified value must match the Ethernet address of an installed adapter.

You can display MAC addresses by:

- Windows — Running **ipconfig /all** from a command prompt. MAC addresses are listed under `Physical Address`.
- Linux/Solaris — Running **ifconfig -a**.

By default, the first adapter in the system is used.

`LICENSE_FILE_DIR`

Specifies the directory where the license files reside. By default, the MULTI products look for the license files in **C:\GHS\licenses** on Windows. To instruct the products to look in a different directory for the license files, specify an absolute path.

Specifying a Floating or Named-User License Pool

When a licensed MULTI product runs on a client machine, the product attempts to obtain a floating or named-user license from a *license pool*. A license pool is a set of licenses specified in a license file (**.ghslic**). The licenses in a given license pool are served by a particular License Manager running on a license host on the network and listening on a particular TCP port. The preferred license pool can be identified by:

- the license host that the License Manager is running on
- the TCP port that the License Manager is listening on

End users are instructed to specify the license host by setting the `GHS_LMHOST` configuration variable in the GUI (see “Obtaining Floating or Named-User Licenses” on page 6), but the license host may also be specified by setting `GHS_LMHOST` in the client's license configuration file (**license.cfg**) or in the client's environment.

For more information, see “Setting Configuration Variables” on page 36. If there are multiple license hosts, see “Using Multiple License Hosts” on page 41.

The TCP port that the License Manager listens on is assigned by Green Hills Software. If a TCP port other than the default (2009) is assigned, the `GHS_LMPORT` configuration variable on the client machine should be set to the corresponding port number. Only one TCP port can be specified via `GHS_LMPORT`, and this port number is assumed to be in use by every License Manager running on a license host specified via `GHS_LMHOST`. If `GHS_LMPORT` is not set, the default port number (2009) is used.

Example 3.1. Using a Single License Host and TCP Port

Suppose there is one license host, which is named *host1* and which is running a License Manager that is listening for license requests on TCP port 2009. On client machines, `GHS_LMHOST` should be set as follows:

```
GHS_LMHOST=host1
```

Since the default TCP port is in use, `GHS_LMPORT` does not need to be set.

Example 3.2. Using a Single License Host and Multiple TCP Ports

Suppose now that there is still one license host named *host1*, but that it is running a License Manager that is listening for license requests on TCP ports 2009, 3000, and 4000. A license pool of MULTI for Power Architecture licenses is bound to port 2009, a pool of MULTI for ARM licenses is bound to port 3000, and a pool of MULTI for MIPS licenses is bound to port 4000. On client machines requiring access to Power Architecture licenses, `GHS_LMHOST` should be set as follows:

```
GHS_LMHOST=host1
```

Since the Power Architecture license pool is bound to the default TCP port, `GHS_LMPORT` can remain unset.

On clients requiring access to ARM licenses, `GHS_LMHOST` and `GHS_LMPORT` should be set as follows:

```
GHS_LMHOST=host1
GHS_LMPORT=3000
```

Finally, on clients requiring access to MIPS licenses:

```
GHS_LMHOST=host1
GHS_LMPORT=4000
```

Using Multiple License Hosts

If there are multiple license hosts, `GHS_LMHOST` should be set to a comma-separated list of license host names or IP addresses. Clients attempt contact in a designated order if the comma-separated list is prepended with an `@` character, or at random if the comma-separated list is prepended with a `#` character.

For example, suppose there are three license hosts whose IP addresses are 192.168.100.10, 192.168.100.11, and 192.168.100.12. Suppose further that you want clients to attempt to contact the License Manager running on 192.168.100.10 first, then on 192.168.100.11, and finally on 192.168.100.12. On client machines, `GHS_LMHOST` should be set as follows:

```
GHS_LMHOST=@192.168.100.10,192.168.100.11,192.168.100.12
```

Randomly selecting license hosts implements a rudimentary form of load balancing. To indicate that the License Managers should be tried at random, `GHS_LMHOST` should be:

```
GHS_LMHOST=#192.168.100.10,192.168.100.11,192.168.100.12
```

Note

The `#` character is a comment character for many shells. If set in an environment variable, it should be escaped.

Example 3.3. Using Multiple License Hosts and Multiple TCP Ports

Suppose that the following are true:

- There are two license hosts named *host1* and *host2*.
- A license pool of MULTI for Power Architecture licenses is bound to host1, port 2009. A second pool of Power Architecture licenses is bound to host2, port 2009.
- A license pool of MULTI for MIPS licenses is bound to host1, port 3000. A second pool of MIPS licenses is bound to host2, port 3000.

- A license pool of MULTI for ARM licenses is bound to host2, port 4000.
- You prefer the License Manager running on host1 to be contacted first, if applicable.

On client machines requiring access to Power Architecture licenses, `GHS_LMHOST` should be set as follows:

```
GHS_LMHOST=@host1,host2
```

`GHS_LMPORT` would remain unset.

On clients requiring access to MIPS licenses, `GHS_LMHOST` and `GHS_LMPORT` should be set as follows:

```
GHS_LMHOST=@host1,host2
GHS_LMPORT=3000
```

Finally, on clients requiring access to ARM licenses:

```
GHS_LMHOST=host2
GHS_LMPORT=4000
```

Chapter 4

Viewing License Information

Contents

Licensing information is accessible from the **MULTI License Administrator** and via certain license administration utilities. This chapter contains information about using the **MULTI License Administrator** and about running the **lic_find_licenses** and **lic_log_summary.py** utilities.

Viewing License Information with the MULTI License Administrator

The **MULTI License Administrator** is a graphical interface to the License Managers on the network and to licenses available locally (computer- and dongle-locked) or over the network (floating and named-user). To open the **MULTI License Administrator**, follow these steps:

1. Start the **MULTI Licensing Wizard** by:
   - Selecting **Utilities → License Administrator** from the MULTI Launcher, or by
   - Running **mlmadmin.exe** (**mlmadmin** on Linux/Solaris) from the MULTI IDE or licensing utilities installation directory.
2. In the **MULTI Licensing Wizard**, select **View license information**, and click **Next**.

Viewing License Managers on the Network

By default, the **MULTI License Administrator** displays License Managers on the network. Whether all License Managers are displayed depends upon your network configuration. To specify additional License Managers for display:

1. Click **Specify License Managers**.
2. Enter a comma-separated list of the license hosts on which a License Manager is running.

By default, the **MULTI License Administrator** displays only those License Managers on the network that are serving licenses to enable MULTI 6. To display License Managers that are serving licenses to enable another version of MULTI:

- Clear **Only show License Managers for MULTI v6**.

For information about the items available in the **MULTI License Administrator**, see "The MULTI License Administrator Window" on page 54.

Viewing Floating and Named-User Licenses

To view the floating or named-user licenses served by a particular License Manager:

1. Display available License Managers (the default) in the **MULTI License Administrator** by selecting **License → View Network Licenses**. (If this menu item is not available, you are already viewing available License Managers.)
2. Do one of the following:
   - Double-click an entry in the **MULTI License Administrator**.
   - Right-click an entry in the **MULTI License Administrator**, and select **View License Information**.

To view the floating or named-user licenses served by all License Managers listed in the **MULTI License Administrator**, do one of the following:

- In the **MULTI License Administrator**, click **Show License Info**.
- In the **MULTI License Administrator**, select **License → View Network License Details**.

For information about the resulting **License Information** window, see "The License Information Window" on page 58.

Viewing Computer- and Dongle-Locked Licenses

To view the computer- or dongle-locked licenses that are installed locally:

- Select **License → View Local Licenses** in the **MULTI License Administrator**. (If this menu item is not available, you are already viewing local licenses.)

For information about the items available in the **MULTI License Administrator**, see "The MULTI License Administrator Window" on page 54.

Listing Floating and Named-User Licenses with lic_find_licenses

The **lic_find_licenses** utility lists floating and named-user licenses served by License Managers on the network. The **lic_find_licenses** executable is available from the MULTI IDE and licensing utilities installation directories. You can launch it from the command line as follows:

lic_find_licenses [***options***]

By default, the utility will contact the License Managers running on license hosts specified by `GHS_LMHOST` and list information about them. See "Configuration Variables for Client Machines" on page 37.

The following options can be used with the **lic_find_licenses** command.

-a Displays an alternative format (suitable for **grep** and other line-oriented text processors).
-b Broadcasts to find license hosts running a License Manager on the network.
-l *list* (This option begins with a lowercase `L`.) Uses *`list`* as the comma-separated list of license hosts. Ports may be specified by appending `:`*`port`* to the license host name.
-o Only shows licenses currently in use. The default is to show all installed licenses.
-product *product_name* | *product_code* Specifies the product that a License Manager must serve in order to be found by a broadcast.
-s Displays license sources, but not the licenses found on those sources. A license source can be a local directory or a License Manager that is checked for licenses by the MULTI products. This option implies the **-x** option.
-w Includes information about who is using licenses. See "Output Format with -w" on page 47.
-x Does not start with the default License Managers, which are those running on license hosts specified by `GHS_LMHOST`. This option implies the **-b** option.

Example 4.1. Using lic_find_licenses

Assuming GHS_LMHOST has been set to TARPON, and you want to list information about licenses served by the License Manager running on TARPON, enter the command:

lic_find_licenses

This generates output similar to:

```
Server TARPON: 2009 (169.254.139.247):
  ecomppc (2901): 10 installed, 2 in use, 7 hwm
```

This indicates that the License Manager running on TARPON is listening on port 2009 and has 10 licenses for ecomppc (the Power Architecture C/C++ compiler). Of those 10, 2 are currently in use. Since the License Manager was started, the most licenses that have been in use at any time (hwm—the *high water mark*) is 7.

Output Format with -w

When the **-w** option is specified with **lic_find_licenses**, user information is formatted in one of two ways:

- The following format indicates that the license is not actively in use, but the License Manager is temporarily reserving the license for the specified previous user:

  ! *user@host* {*client_id*}

  where:

  - *user* is the login of the end user that requested the license.
  - *host* is the IP address of the computer from which the license was requested. @*host* may be omitted if the specified user has a named-user license reserved to their use, but has not yet requested a license.
  - *client_id* is an internal, hexadecimal number used by the License Manager to keep track of the license.
- The second format indicates that the specified user is actively using the license:

  user@host time_in_use {*client_id*}

where:

- *user*, *host*, and *client_id* are the same as above.
- *time_in_use* indicates how long the license has been checked out. For example, 35m26s indicates that the license has been checked out for 35 minutes and 26 seconds.

Summarizing License Manager Logs with lic_log_summary.py

The **lic_log_summary.py** utility is a Python script that serves as a reference implementation of a log summarizing tool. This utility processes a License Manager log file and produces a summary of the license usage by product and date. The output is in a *comma-separated values* (CSV) format, which can easily be imported into spreadsheet and database applications for advanced reporting and graphing capabilities. With this data, it should be easy to produce reports in different formats to suit your needs.

The **lic_log_summary.py** script is available from the MULTI IDE and licensing utilities installation directories. You can launch it from the command line as follows:

lic_log_summary.py [***options***] [***products***]

The following arguments can be used with **lic_log_summary.py**:

--help Print usage information.
-m Total usage by month, rather than by day
-f *file* Read the log file from *file*, rather than stdin.
products Only display information about the specified products. If no products are specified, all products will be included.

Example 4.2. Using lic_log_summary.py

The command:

```
lic_log_summary.py -m -f ghs_elmd.log
```

will display a summary of license usage from the log file named **ghs_elmd.log**, with usage totaled by month and product.

Note

The **lic_log_summary.py** utility is written in the Python language, and requires a Python v2.x interpreter to run. It is not compatible with Python v3. The MULTI IDE installation (but not the licensing utilities installation) includes a complete Python 2.3.3 installation for your platform. For more information, see "Python Installation" in Chapter 2, "Introduction to the MULTI-Python Integration" in the *MULTI: Scripting* book. The utility is provided as a script so that its source code can be examined and modified to suit the needs of the end user. It should be simple to study the script and implement the same concepts in another language if desired.

Part III

Appendices

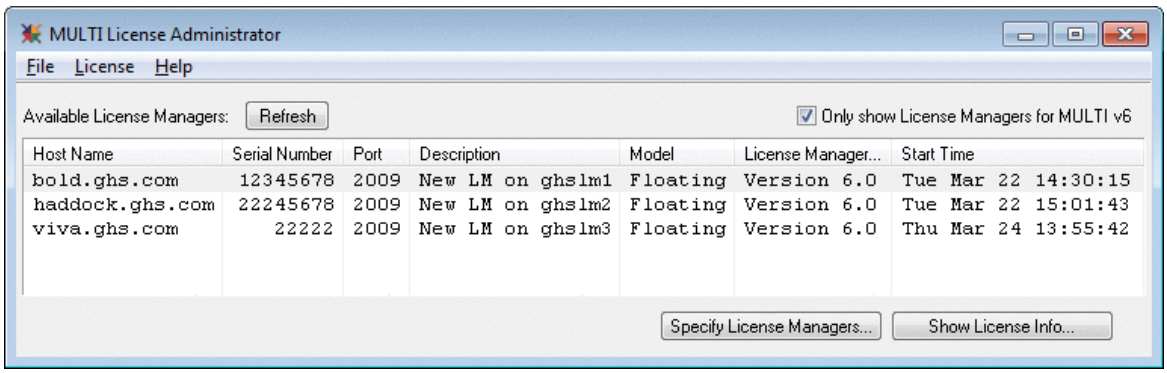
Appendix A

GUI Reference

Contents

The MULTI License Administrator Window

By default, the **MULTI License Administrator** displays available License Managers, as shown next.

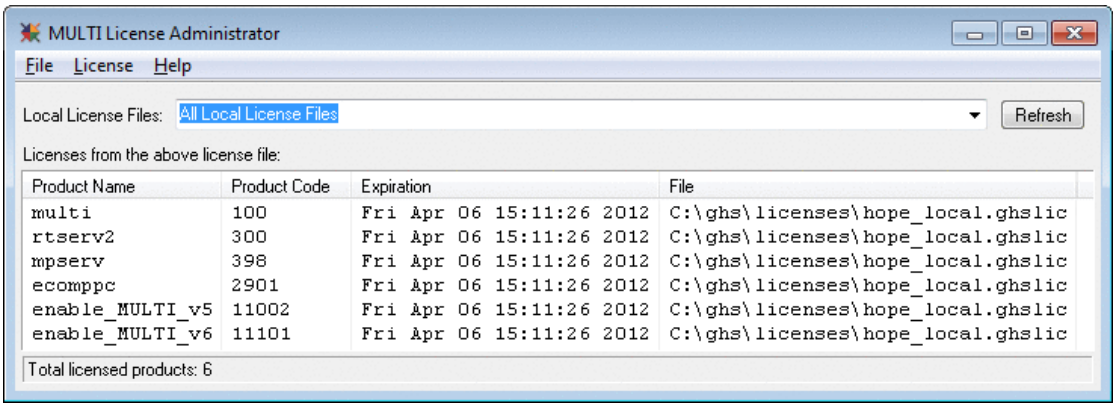


Each field in the window is described in the following table.

Available License Managers Lists information about each License Manager running on the network, where: • **Host Name** — Specifies the name of the machine on which the License Manager is running. • **Serial Number** — Uniquely identifies the license file that the License Manager is reading from. • **Port** — Specifies the TCP port that the License Manager is listening on. • **Description** — Provides a description of the License Manager. • **Model** — Specifies the type of network license—floating or named-user—that the License Manager is serving. • **License Manager Information** — Lists version information for the License Manager. • **Start Time** — Lists the date and time that the License Manager was started. **N/A** indicates that information is not available from the License Manager because it predates MULTI 6.
Refresh Populates or refreshes the list of License Managers running on the network. The **MULTI License Administrator** performs a broadcast to find available License Managers on the network.
Only show License Managers for MULTI v6 Toggles the display of all License Managers on the network or only those License Managers serving licenses to enable MULTI 6 (the default).

Specify License Managers Allows you to provide a comma-separated list of license hosts. The **MULTI License Administrator** will attempt to contact License Managers running on these license hosts. This setting is necessary if the license hosts cannot be reached by broadcast.
Show License Info Displays information about all product licenses served by License Managers shown in the **MULTI License Administrator**, and provides access to lists of license users. For more information, see "The License Information Window" on page 58.

Selecting **License → View Local Licenses** in the **MULTI License Administrator** displays locally available computer- or dongle-locked licenses. A sample window is shown next.



Each field in the window is described in the following table.

Local License Files Displays information about the computer- or dongle-locked licenses in the specified license file(s).
Refresh Refreshes local license information.

Licenses from the above license file
Lists information about the licenses, where each row specifies: • **Product Name** — The type of product license. • **Product Code** — The internal ID used by Green Hills Technical Support to identify the licensed product. • **Expiration** — The expiration date for the license. • **File** — The license file (**.ghslic**) containing the license.

MULTI License Administrator Menus

The File Menu

The **File** menu of the **MULTI License Administrator** contains the following options:

Licensing Wizard
Launches the **MULTI Licensing Wizard**.
Save Local License Information to File
Allows you to save license information displayed in the **MULTI License Administrator** to a file. This option is only available if you are viewing local licenses.
Close
Closes the **MULTI License Administrator**.

The License Menu

The **License** menu of the **MULTI License Administrator** contains the following options. The appearance of certain options is dependent upon whether you are viewing local or network licenses.

View Local Licenses
Displays information about local computer- and dongle-locked licenses.
View Network Licenses
Displays information about License Managers found on the network.

View Network License Details Displays all floating and named-user product licenses served by License Managers shown in the **MULTI License Administrator**, and provides access to lists of license users. For more information, see "The License Information Window" on page 58.
Stop License Manager on This Machine Stops the local License Manager.
Diagnose License Problems Allows you to test whether you can obtain a license for a particular MULTI product. You should only need to use this feature if prompted by Green Hills Technical Support.

The Help Menu

The **Help** menu of the **MULTI License Administrator** contains the following options:

Help Opens online help for the **MULTI License Administrator**. You may also press **F1** to access online help.
Manuals Opens the **Manuals** submenu, which displays a list of all manuals included in your MULTI installation. Choose a manual to open its online help.
About Opens a dialog box that contains basic information about the **MULTI License Administrator**, such as its version and copyright information.
Troubleshooting Info Launches the **gbugrpt** utility, which collects information about your MULTI installation and allows you to save it or email it. In the event of problems, it can be useful to email the information to Green Hills Technical Support or to your product support contact.

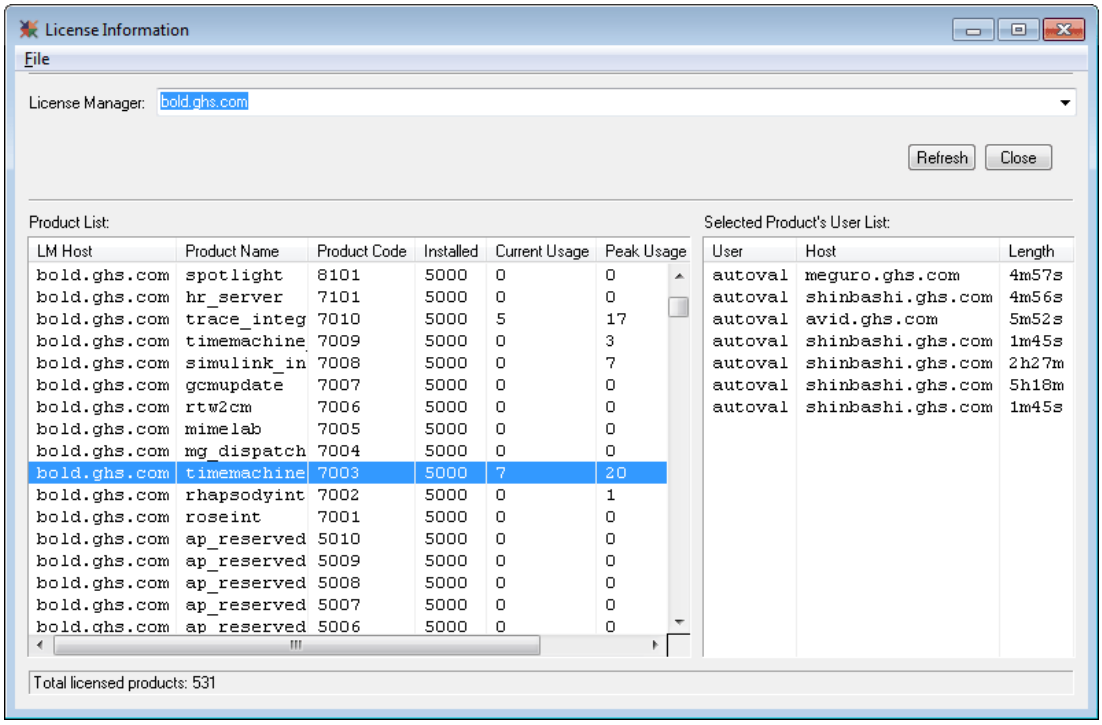
Shortcut Menu

When you are viewing network licenses, and you right-click an **Available License Manager** entry, a shortcut menu opens. The shortcut menu contains the following item:

View License Information

Displays all floating and named-user product licenses served by the License Manager, and provides access to lists of license users. For more information, see “The License Information Window” on page 58.

The License Information Window



The **License Information** window contains the following items:

License Manager

Displays information about the floating or named-user licenses served by the License Manager(s) running on the specified machine.

Refresh

Updates the license usage snapshot.

Close

Closes the window.

Product List

Lists information about product licenses, where each row identifies:

- **LM Host** — The machine from which the License Manager is running and serving licenses.
- **Product Name** — The type of product license being served.
- **Product Code** — The internal ID used by Green Hills Technical Support to identify the licensed product.
- **Installed** — How many product licenses are installed.
- **Current Usage** — How many product licenses are currently in use.*
- **Peak Usage** — The greatest number of product licenses that have been in use at any one time since the License Manager was started.*
- **Expiration** — The product licenses' expiration date. If the product licenses do not expire, nothing is displayed in this column. If the expiration is not available because the License Manager predates MULTI 6 and does not provide this information, **N/A** is displayed in this column.

*A named-user product license is not considered to be in use until it is actually granted to the named user for whom it is reserved.

Selected Product's User List

Lists information about the entry selected in the **Product List**, where each row specifies:

- **User** — An end user to whom a floating product license has actually been granted, or an end user for whom a named-user product license is reserved. Named user licensees are displayed whether or not the named-user license has been granted.
- **Host** — The end user's machine (the client machine) if the end user has been granted a license. If a license has not been granted, this column is empty.
- **Length** — The length of time that the license has been in use, if granted. If a license has not been granted, this column is empty.

The License Information Window's File Menu

The **File** menu of the **License Information** window contains the following options:

Save Viewed License Information to File Allows you to save the license usage snapshot in the **License Information** window to a file.
Close Closes the **License Information** window.

Appendix B

Administration Utilities

Contents

This appendix provides information about administration utilities. Unless otherwise noted, these utilities are supported on Windows and on Linux/Solaris.

Utilities are further documented in relevant sections of this book or, if no applicable context exists elsewhere, in this appendix.

lic_find_licenses Lists licenses served by License Managers on the network. For more information, see "Listing Floating and Named-User Licenses with lic_find_licenses" on page 46.
lic_log_summary.py A Python script that serves as a reference implementation of a log summarizing tool. This utility processes a License Manager log file and prints a comma-delimited summary of license usage by product and date, suitable for importing into a spreadsheet for graphing and further analysis. For more information, see "Summarizing License Manager Logs with lic_log_summary.py" on page 48.
lic_userlist Utility for named-user licenses, which manages user lists on the license host. For more information, see "Managing User Lists with lic_userlist" on page 14.
mlmadmin Program used for displaying license information. For more information, see "Viewing License Information with the MULTI License Administrator" on page 44.
servecode Prints valid server codes for the machine upon which it is run. For more information, see "Determining Server Codes with servecode" on page 63.
wrap_svc Windows only Wrapper executable that allows the License Manager to act as a Windows service. Windows services can be launched automatically at system startup, and can be controlled through the **Services** applet. For more information, see "Controlling the License Manager with wrap_svc" on page 30.

Determining Server Codes with servecode

Licenses are locked to a *server code*, which defines where the licenses can be installed (computer- and dongle-locked) or where the License Manager serving the licenses can run (floating and named-user). When Green Hills Software grants license requests, it is important for it to have the correct server code from the correct machine.

The **servecode** utility determines valid server codes for the machine upon which it is run. While a valid server code is automatically determined when you request licenses via the **MULTI Licensing Wizard**, there are a few cases when you may want to run **servecode** directly.

The **servecode** executable is available from the MULTI IDE, Compiler, and licensing utilities installation directories. You can launch it from the command line as follows:

servecode [*options*]

The following table provides descriptions of the **servecode** options.

--help **-h** Displays usage information.
--verbose **-v** Displays all available server codes. If this option is not specified, only the first available server code is printed.

Appendix C

Troubleshooting

Contents

Floating and Named-User Licensing Problems

- If you see a dialog box with the following message:

  ```
  No MULTI licenses available.
  [There are no local licenses and there are no License Managers to contact]
  MULTI Licensing Wizard will be launched.
  ```

  You have not specified a License Manager from which to obtain licenses, or the specified License Manager cannot be contacted. If the former, follow the instructions in "Obtaining Floating or Named-User Licenses" on page 6. If you have already specified a License Manager, ask your system administrator to investigate the problem.
- If you are unable to obtain floating or named-user licenses and you have determined that the information above is not applicable, you can set the variable `GHS_LMDEBUG` to `11`, and the variable `GHS_LMINFO_DIR` to an existing directory. This causes MULTI to output diagnostic information to **.lmi** files created in the specified directory. For more information, see "Setting Configuration Variables" on page 36.

See also "Common Problems" on page 68.

Dongle Problems

Most dongle problems are due to the following issues:

- *The installed license was not issued for use with your dongle.*

  To determine whether this is the cause of the problem, locate the `SERVER CODE` comment in your installed license file (**.ghslic**), and compare it to the output of the **servecode** utility (see "Determining Server Codes with servecode" on page 63). While **servecode**'s output begins with *num*`#0x` and the license file's code begins with *num*`/`, the codes should otherwise match. *num* at the beginning of the **servecode** output and *num* at the beginning of the license file code should also match. The most common cause of mismatch is use of the wrong license file.
- *There are incompatibilities with other devices or certain hardware.*

GHS uses the SafeNet Sentinel SuperPro as our hardware security device (dongle). Dongle drivers are installed by default if you use the **MULTI Licensing Wizard** to request or install licenses. If you experience conflicts or incompatibilities after the drivers are installed, Green Hills recommends that you:

1. Run the **SetupSysDriver.exe** utility (typically located in **C:\Program Files\Common Files\SafeNet Sentinel\Sentinel System Driver**\).
2. Configure the drivers to use only the device to which the dongle is attached.

For example, you might:

1. Run the utility.
2. Click the **Configure Driver** button to get to the configuration screen.
3. Select any lines not corresponding to the USB port where the dongle is attached.
4. Click **Edit** so that the drivers do not use the selected port(s).

SafeNet maintains a list of known incompatibilities, accessible from their main corporate Web site [http://www.safenet-inc.com].

- *Dongle drivers are outdated or are not installed correctly.*

  Insert the dongle into a USB port on your machine. If you run the **servecode** utility (see "Determining Server Codes with servecode" on page 63) and the output does *not* begin with a `2#`, dongle drivers are outdated or are not installed correctly. You can use the Sentinel Medic program from SafeNet to further diagnose the problem. SafeNet is the manufacturer of the dongles and dongle drivers used by MULTI products. We recommend downloading the latest version of the drivers and the Sentinel Medic application from the SafeNet Web site [http://www.safenet-inc.com].

- *There is more than one dongle installed.*

  MULTI products only recognize one dongle at a time. Dongles from other vendors are not visible to our products, so they should not pose a problem.

SafeNet maintains additional dongle troubleshooting information on their Web site [http://www.safenet-inc.com/]. If you have further questions, please contact Green Hills Technical Support.

See also “Common Problems” on page 68.

Common Problems

- If you fail to get a license on Security-Enhanced Linux (SELinux), and you see the following error message:

  ```
  ghs_lclient.so: cannot restore segment prot after reloc: Permission denied
  ```

  Contact your system administrator, or do one of the following (you must have “root” permission):

  - Temporarily disable security enforcing via the command **/usr/sbin/setenforce 0**, or
  - Permanently disable security enforcing:
    1. Set `SELINUX` to `disabled` in **/etc/selinux/config**.
    2. Reboot the system.

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