1. LM-X End Users Guide . . . 3
1.1 Resources . . . 4
1.2 Getting started . . . 5
1.2.1 Optional license features . . . 6
1.3 How a protected application finds its license . . . 7
1.3.1 License files . . . 8
1.3.2 Search paths . . . 10
1.3.3 Adding or removing license file paths . . . 11
1.3.3.1 Adding or removing license files from the path using the LM-X End-user Configuration tool . . . 12
1.3.3.2 Adding license files to the path manually . . . 13
1.3.3.3 Formats for specifying license files . . . 14
1.3.4 Environment variables . . . 15
1.4 End-user tools . . . 17
1.4.1 Installing end-user tools and LM-X License Server . . . 18
1.4.2 LM-X End-user utility . . . 19
1.4.3 LM-X End-user Configuration Tool . . . 21
1.4.4 LM-X License Server Client . . . 22
1.4.4.1 Accessing LM-X License Server Client . . . 23
1.4.4.2 Using LM-X License Server Client . . . 24
1.4.4.3 Viewing server information and statistics . . . 26
1.4.4.4 Restarting or shutting down the server . . . 27
1.4.4.5 Viewing HostIDs . . . 28
1.4.4.6 Viewing license usage statistics . . . 29
1.4.4.7 Viewing the log file . . . 30
1.4.5 LM-X License Server . . . 31
1.4.5.1 Protocols . . . 32
1.4.5.2 License server configuration file . . . 33
1.4.5.3 lmx_server_conf.c file . . . 40
1.4.5.4 License server log file . . . 41
1.4.5.5 Running the license server from a command line . . . 42
1.4.5.6 Unix exit signals . . . 44
1.4.5.7 Upgrading the license server . . . 45
1.5 Optional features . . . 46
1.5.1 Configuring LM-X License Manager for high network connection rates . . . 47
1.5.2 High Availability Licensing . . . 48
1.5.2.1 How to install HAL license servers . . . 49
1.5.2.2 Setting up HAL servers on AWS . . . 50
1.5.3 Pay Per Use feature . . . 51
1.5.3.1 Enabling and using usage databases . . . 52
1.5.3.2 Database structure . . . 53
1.5.3.3 Usage table example . . . 54
1.5.4 Borrowing a license . . . 55
1.5.5 Automatic server discovery . . . 56
1.5.6 Queuing licenses . . . 57
1.6 Logs . . . 58
1.7 Error messages . . . 61
1.8 End-user solutions . . . 62
1.8.1 Managing multiple applications running against multiple versions of LM-X . . . 63
1.9 LM-X End User's FAQ . . . 64
1.9.1 Usage Information . . . 65
1.10 Troubleshooting end-user problems . . . 66
1.10.1 Enabling extended logging in LM-X . . . 67
1.10.2 Communication issues . . . 68
1.10.3 Locale issues . . . 69
1.10.4 Operating system issues . . . 70
1.10.5 System clock check issues . . . 71
1.10.6 System security issues . . . 72
1.11 LM-X Reference for FlexNet Users . . . 73
1.11.1 Comparison of license files . . . 74
1.11.2 Comparison of license paths . . . 75
1.11.3 Comparison of license server setup . . . 76
1.11.4 The LM-X License Server . . . 77
1.11.5 Comparison of license server parameters . . . 78
1.11.6 Administration . . . 79
1.11.6.1 Managing licenses . . . 80
1.11.6.2 Enabling and configuring HAL . . . 81
1.11.6.3 Enabling and configuring Pay Per Use . . . 82
1.11.6.4 Enabling and configuring license server logging . . . 83
1.11.6.5 Editing the configuration file . . . 84
1.11.6.6 Miscellaneous settings . . . 85
1.12 Removed features . . . 86
1.12.1 Installing and uninstalling a license server on Windows . . . 87
1.12.2 Installing a license server on Mac OS X . . . 89
1.12.3 LMX_AtExit . . . 90
1.12.4 Web-based UI . . . 91

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LM-X End Users Guide

The *LM-X End Users Guide* is intended for corporate use by system administrators of LM-X protected applications, as well as engineers, software developers and others who are end users of LM-X-served applications.

In addition to this document, if you are planning to use a network license, you should have obtained an LM-X license server, an LM-X license file, and an LM-X license server configuration file (optional) from your application vendor.

This guide includes information to help you administrate your LM-X protected applications, including a description of LM-X license files, how to use LM-X end user tools, and how to install/uninstall an LM-X license server.

Software application vendors should refer to the *LM-X Developers Manual* for information about using LM-X to license their products.

3

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Resources

As part of the LM-X License Manager user community, you have access to our Knowledgebase at https://kb.x-formation.com to get answers to commonly asked questions about LM-X product features, installation, usage and related topics. The Knowledgebase is updated regularly with new information to help you quickly and easily find the answers you're looking for.

For those transitioning from a FlexNet/FLEXlm license management system to LM-X, this document includes a helpful reference of LM-X equivalencies for some common FlexNet/FLEXlm actions.

4

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Getting started

Getting your LM-X licensed application up and running takes little to no effort. Depending on what type of licensing you have for the application, you will need the following:

Type of License	What you need
Trial	No license or setup required.
Standalone (also referred to as node-locked)	A license file installed on, and often locked to, an individual machine.
Network (also referred to as floating or shared)	A license server deployed at your site and a license file that is installed on that license server.

The LM-X End-user Configuration Tool helps you obtain information your vendor may request from you in order to create your node-locked or floating license; for example, your application vendor may ask for your HostID.

The LM-X End-user Configuration Tool also gives you a quick and easy way to add or remove license files from your license path, install a license server, and query a license server all from one simple dialog. These same tasks can also be run from a command line on either Windows or Unix with the LM-X End-user utility.

5

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Optional license features

LM-X includes the following optional features that make your network license usage easier and more reliable. The features available to you depend on what your software vendor has provided. Contact your software vendor for more information about available features, or if you have a license server configuration file included in your software distribution, review this file to determine which features are included in your license.

Feature	Description
Automatic server discovery	Locates the LM-X License Server automatically. All you need to do is install the license server and application, and LM-X does the rest to ensure you get up and running right away.
High-availability licensing (HAL)	Lets you specify backup (redundant) license servers that will continue to enable license hosting in the event that your primary license server goes down. See How to install HAL license servers for more information on HAL.
License queuing	Issues licenses based on a list of requests that are waiting for a license. When licenses are in high demand, requests for a license can be added to a queue, and then filled in the order of the queue as licenses become available. This is particularly useful for ensuring proper scheduling for automatic jobs and implementing fair usage of shared licenses. To enable license queuing, you must set the environment variable LMX_QUEUE as described in Environment variables. Also see Queuing licenses for further information on license queuing.
License borrowing	Lets you use a license to run a network application for a limited time when you are unable to connect to the license server. For example, you can borrow a license if you are taking your machine home for the weekend or going on a business trip. Effectively, borrowing a license gives you a temporary node-locked license. To enable license borrowing, you must set the environment variable LMX_BORROW, as described in Environment variables.
Grace licenses	Lets you keep using a network license for a specified period of time when the license server is down, ensuring uninterrupted access to the application so you can complete your work.

In addition to the features listed above, optional features that system administrators can use in order to control usage of application licenses include:

- Allow/deny users/groups from using the license server (including/excluding users and computers) to prevent specified users from accessing applications. This may be used as an additional security measure.
- Limit the number of licenses that can be used by individual users or groups to implement fair/desired distribution of licenses.
- Reserve a number of licenses that can be used by individual users or groups to implement fair/desired distribution of licenses.

For information about using these options, see License server configuration file.

6

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How a protected application finds its license

This chapter describes the different license file types, where an application searches for its license, and how to add or remove license files from the license path environment variable. It also describes additional environment variables you can optionally set for your license.

7

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License files

The information on this page refers to LM-X v5.0, which added the upgrade license type. If you are using an older version of LM-X, please refer to documentation for earlier versions.

Licenses are text files that can be accessed by a licensed application in two distinct ways:

- Locally, from a local hard drive
- Remotely, from a dedicated license server across a network

If you open a license file in a text editor, you will see a definition for the license in the following format:

```
FEATURE Feature_Name
{
VENDOR = XYZ
...
COUNT = 5
...
}
```

When the COUNT keyword exists in the license file, the license is intended for use on a license server; otherwise, the license is considered to be local and can be used directly with the protected application. The example above indicates that there are 5 network licenses for the application.

The following is an example of a local license file (the actual key has been abbreviated):

```
FEATURE f1
{
VENDOR = XFORMATION
VERSION = 1.5
END = 2015-01-01
KEY = F2DNR9K...
}
```

The following is an example of a network license file (the actual key has been abbreviated):

```
FEATURE f1
{
VENDOR = XFORMATION
VERSION = 1.5
END = 2015-01-01
KEY = F2DNR9K...
COUNT = 12
}
```

The license file path may be set in the license server configuration file. See License server configuration file for more information about specifying the license sever path.

The vendor may include various optional settings in a license that supply license information or control how the license may be used. The settings that can be included in a license are shown below.

8

```
VERSION = (Version number of the feature.)
LICENSEE = (User or company to whom the license was issued.)
START = (Date on which the feature becomes valid.)
END = (Date on which the feature expires.)
MAINTENANCE_START = (Date the license maintenance plan begins.)
MAINTENANCE_END = (Date the license maintenance plan expires.)
ISSUED = (Date the license was created.)
SN = (Custom serial number for the license.)
DATA = (Additional information regarding the license.)
COMMENT = (Additional information regarding the license.)
OPTIONS = (Additional licensing options.)
PLATFORMS = (Platform(s) to which usage is restricted.)
COUNT = (Number of network licenses that can be issued simultaneously.)
TOKEN_DEPENDENCY = (Reference to a real license upon which a token license depends.)
SOFTLIMIT = (Number of "overdraft" licenses.)
HAL_SERVERS = 3 (Enables redundant servers, or High Availability Servers.)
BORROW = (Number of hours a borrowed license may be used.)
GRACE = (Number of hours a grace license may be used.)
HOLD = (Number of minutes licenses are held before being checked in.)
USERBASED = (Number of licenses reserved for named users.)
HOSTBASED = (Number of licenses reserved for named hosts.)
TIME_ZONES = -12 to 13 (Allowed time zones, relative to GTM.)
SHARE = HOST|USER|CUSTOM or TERMINALSERVER and/or VIRTUAL (Type of license sharing in use.)
SYSTEMCLOCKCHECK = TRUE|FALSE (Enables/disables the system clock check.)
HOSTID_MATCH_RATE = (Percentage of hostids that must match for successful hostid verification.)

VERSION = 0.0 to 9999.9999 (Version number of the feature.)
LICENSEE = "string" (User or company to whom the license was issued.)
START = YYYY-MM-DD (Date on which the feature becomes valid.)
END = YYYY-MM-DD (Date on which the feature expires.)
MAINTENANCE_START = YYYY-MM-DD (Date the license maintenance plan begins.)
MAINTENANCE_END = YYYY-MM-DD (Date the license maintenance plan expires.)
ISSUED = YYYY-MM-DD (Date on which the license was created.)
SN = "string" (Custom serial number for the license.)
DATA = "string" (Additional information regarding the license.)
COMMENT = "string" (Additional information regarding the license.)
OPTIONS = "string" (Additional licensing options for the license.)

COUNT = 1 to 2147483647 or UNLIMITED (Number of network licenses that can be issued simultaneously)

PLATFORMS = "platform strings" (Platform(s) to which usage is restricted.)

TOKEN_DEPENDENCY = "FEATURE=FeatureName VERSION=0.0 to 9999.9999 COUNT=1 to 2147483647"
KEYTYPE = EXCLUSIVE or ADDITIVE or UPGRADE or TOKEN (Reference to a real license upon which a token license
depends.)
SOFTLIMIT = 5 (Number of "overdraft" licenses.)
HAL_SERVERS = 3 (Enables redundant servers, or High Availability Servers.)
BORROW = 1 to 8760 (Number of hours a borrowed license may be used.)
GRACE = 1 to 168 (Number of hours a grace license may be used.)
HOLD = 1 to 1440 (Number of minutes licenses are held before being checked in.)
USERBASED = 1 to 2147483647 or ALL (Number of licenses reserved for named users.)
HOSTBASED = 1 to 2147483647 or ALL (Number of licenses reserved for named hosts.)
TIME_ZONES = -12 to 13 (Allowed time zones, relative to GTM.)

SHARE = HOST|USER|CUSTOM or TERMINALSERVER and/or VIRTUAL (Type of license sharing in use.)

SYSTEMCLOCKCHECK = TRUE|FALSE (Enables/disables the system clock check.)
HOSTID_MATCH_RATE = 0 to 100 (Percentage of hostids that must match for successful hostid verification.)
```

Note: If there are multiple license files that contain the same feature (for example, a license file that contains "feature f1 version 1.0" and another license file that contains "feature f1 version 1.5"), LM-X will only use the first license file that is read. Any other license files that contain the same feature will be ignored. If this occurs, you will see a warning message in the license server log that informs you which license files contain the same feature.

In such cases, you should delete the license files that are not needed or remove the license file from the search path so the unneeded license files are not read.

9

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Search paths

The information on this page refers to LM-X v5.4.1, which added search path caching for network licenses. If you are using an older version of LM-X, please refer to documentation for earlier versions.

Every LM-X protected application has a search path for licenses. The application will search for licenses in the following order.

Order	Search Path
1	Preset path and/or automatic server discovery (this information is provided by your application vendor).
2	The environment variable *VENDOR*_LICENSE_PATH. The *VENDOR* name is the same as that specified in the license file.
3	The generic environment variable LMX_LICENSE_PATH, which is used by all applications protected by LM-X.

Note: Paths are separated with a semicolon (;) and backslashes (\ ) on Windows systems and a colon (:) and forward slashes (/) on Unix systems.

Using the above search paths, the application will try to find a license in the following order:

1. Borrowed license.
2. License embedded as a string in the software.
3. Node-locked (local) license.
4. Network (floating) license (this includes automatic server discovery).
5. Grace license.
6. Trial license.

Note: LM-X attempts to use local licenses before it tries to use counted network licenses to optimize license utilization.

At each step, if no license is found in the specified source, the application will continue to the next source in the path. You may specify unlimited multiple paths if desired; for example under Windows, LMX_LICENSE_PATH=6200@server1;6200@server2;6200@server3. The protected application stops searching as soon as it finds a valid license.

Network path caching for HAL servers

For HAL servers, LM-X uses a cache to check for server connection failures. If one of the HAL server connections fail, LM-X will move the failed server to the end of the search path list, and if the server comes back online, it will be checked for connection again.

If another of the HAL servers does not respond during the connection step, LM-X replaces the information in the cache. Information about the most recent server connection failure is cached for 10 minutes, thereby decreasing the average connectivity time in cases of restarting or simultaneously starting the LMX client.

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Adding or removing license file paths

The following sections describe how to add or remove license files from the path for Windows and Unix systems and gives formats for specifying license files.

11

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Adding or removing license files from the path using the LM-X End-user Configuration tool

Under Windows, you can use the LM-X End-user Configuration Tool, lmxconfigtool.exe, to add or remove license files from the LMX_LICENSE_PATH environment variable. The syntax of these paths is:

Platform	Syntax
Windows	LMX_LICENSE_PATH = file1;file2;host%port;@host2;directory;...
Unix	LMX_LICENSE_PATH = file1:file2:host%port:@host2:directory:...

Note that multiple paths are separated with a semicolon (;) on Windows systems and a colon (:) on Unix systems.

12

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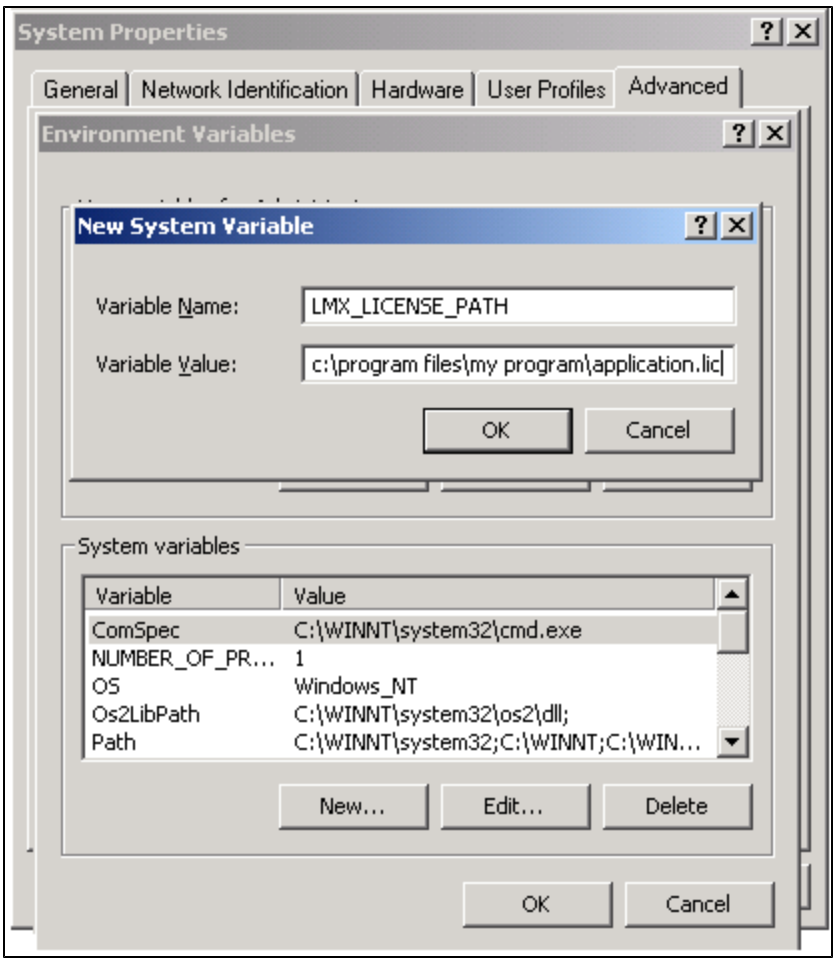
Adding license files to the path manually

If needed, you can add license files to the path manually, as described below. This method can also be used to specify other environment variables, described in Environment variables.

- On Windows, you can use the system control panel.



- On Unix systems, you can add the following in /etc/profile (or see your system documentation):
  export LMX_LICENSE_PATH=*/path/to/license.lic*

13

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Formats for specifying license files

Possible formats for specifying license files are detailed in the following table.

Type	Description	Syntax	Example
Local license	Full path to license file	Windows: C:\path\to\license.lic Unix: /path/to/license.lic	Windows: C:\application\licenses\mylicense.lic Unix: /home/henrik/application/nl.lic
Local license	Full path to license directory – all licenses (*.lic) in specified directory will be read	Windows: C:\application\licenses{color} Unix: /application/licenses/	Windows: C:\application\licenses{color} Unix: /application/licenses/
Network license on license server	Network license stored on a specified license server (default port is 6200)	hostname%tcpport	intranet.foobar.com%5678
Network license on license server	Network license stored on a specified license server with an optional specified port (defaults to port 6200)	[tcpport]@hostname	@intranet.foobar.com
Network HAL license	Network license installed on 3 redundant servers	Windows: @hostname1;@hostname2; @hostname3 Unix: @hostname1:@hostname2: @hostname3	Windows: @primary_server; @secondary_server;@third_server Unix: @primary_server: @secondary_server:@third_server

Note: You should always consult with your application vendor on how to set up their application.

14

Environment variables

You can set the environment variables listed in the table below as needed. Note that the environment variables available to you may be limited depending on whether your vendor has allowed their use as part of your software license.

All environment variables are undefined by default, and can be defined by setting the value to a number greater than 0, for example, 1. Any additional details on variable values are given in the Value column below.

Important: You must restart the client for changes to environment variables to take effect.

Variable name	Value	Description
*VENDOR*_LICENSE_PATH or LMX_LICENSE_PATH	The path to one or more LM-X managed licenses. For example: LMX_LICENSE_PATH=6200@server1	This environment variable lets you set the path to the license file. You may specify a particular vendor using *VENDOR*_LICENSE_PATH, where *VENDOR* is the name of the application vendor, as specified in the license file. LMX_LICENSE_PATH is a generic environment variable used by all applications protected by LM-X. See Search paths for information on how an LM-X application searches for licenses. You can set the license path using the LM-X End-user Configuration tool. Adding or removing license files from the path using the LM-X End-user Configuration tool, or manually.
*VENDOR*_AUTOMATIC_SERVER_DISCOVERY or LMX_AUTOMATIC_SERVER_DISCOVERY	A string that can be set to 1 (or any other integer) to enable running an automatic server discovery. For example: LMX_AUTOMATIC_SERVER_DISCOVERY=1	When this environment variable is set, automatic server discovery is enabled. You may specify a particular vendor using *VENDOR*_AUTOMATIC_SERVER_DISCOVERY, where *VENDOR* is the name of the application vendor, as specified in the license file. LMX_AUTOMATIC_SERVER_DISCOVERY is a generic environment variable used by all applications protected by LM-X. You can set this environment variable in the same manner as described in Adding license files to the path manually.
*VENDOR*_AUTOMATIC_SERVER_DISCOVERY_SERVER or LMX_AUTOMATIC_SERVER_DISCOVERY_SERVER	A string that can be set to 1 (or any other integer) to enable running an automatic server discovery within a client. For example: LMX_AUTOMATIC_SERVER_DISCOVERY_SERVER=1 To disable automatic server discovery, unset the environment variable. For example: LMX_AUTOMATIC_SERVER_DISCOVERY_SERVER=	When this environment variable is set in combination with LMX_AUTOMATIC_SERVER_DISCOVERY (described above), the client will start responding to automatic server discovery requests issued by other clients. This enables the client to relay information about another server, thereby acting as a proxy. Only one Automatic Server Discovery server (either a license server or one client acting as a server) can be active at one time on one machine. This is handled automatically. Example: You may have a license server over the Internet and several clients on a local network. In this situation, the first client can enable the broadcast server and the other clients on the same local network will get the server address from the client machine instead of manually setting the server address. For example: 1. Client A has enabled the LMX_AUTOMATIC_SERVER_DISCOVERY and LMX_AUTOMATIC_SERVER_DISCOVERY_SERVER flags. 2. Client A checks out a license for Vendor A from Server A. Server A is located on a remote network, where automatic server discovery is not working due to firewall restrictions. 3. Client B requests automatic server discovery to check out the Vendor A software. 4. Client A gets the automatic server discovery request from Client B, and manually sets the address of the server, and then Client B gets the server information from Client A. You may specify a particular vendor using *VENDOR*___AUTOMATIC_SERVER_DISCOVERY_SERVER, where *VENDOR* is the name of the application vendor, as specified in the license file. LMX_AUTOMATIC_SERVER_DISCOVERY_SERVER is a generic environment variable used by all applications protected by LM-X. You can set this environment variable in the same manner as described in Adding license files to the path manually.
*VENDOR*_BORROW or LMX_BORROW	The desired number of hours to allow license borrowing, from 1 - 8760. *or* <0 (e.g., -1) to allow early checkin of borrowed licenses. Examples: To set the borrow limit to 2 days: LMX_BORROW=48 To allow early checkin: LMX_BORROW=-1	Setting this environment variable to a number greater than 0 sets the number of hours for license borrowing. Setting this environment variable to a number less than 0 enables early return of borrowed licenses. You may specify a particular vendor using *VENDOR*_BORROW, where *VENDOR* is the name of the application vendor, as specified in the license file. LMX_BORROW is a generic environment variable used by all applications protected by LM-X. You can set this environment variable in the same manner as described in Adding license files to the path manually.

15

*VENDOR*_BORROW_FORCE_RETURN or LMX_BORROW_FORCE_RETURN	A string that can be set to enable forcing a borrow return. Valid values are 0 or 1. For example: LMX_BORROW_FORCE_RETURN = 1	When this environment variable is set to 1 and LMX_BORROW=-1 (see above), the borrowed feature will be returned on the client side, even if there is no connection with the license server. You may specify a particular vendor using *VENDOR*_BORROW_FORCE_RETURN, where *VENDOR* is the name of the application vendor, as specified in the license file.LMX_BORROW_FORCE_RETURN is a generic environment variable used by all applications protected by LM-X. Caution: Use this variable carefully, because it can create an inconsistency between the client and the license server.
LMX_RANDOMIZE_PATH	A string that can be set to enable using a random path. For example: LMX_RANDOMIZE_PATH=1	When this environment variable is set, LM-X chooses a random path from a list for each server request. If you have multiple license servers, you can set this variable to balance the load amongst the servers. You can set this environment variable in the same manner as described in Adding license files to the path manually.
*VENDOR*_EXTENDEDLOG or LMX_EXTENDEDLOG	The path to the extended client-side log. For example: LMX_EXTENDEDLOG=C:\LM-X\My_LM-X_Log_Directory\client.log	This environment variable lets you set the path and filename for the extended client-side log, which contains information about all client activity. You may specify a particular vendor using *VENDOR*_EXTENDEDLOG, where *VENDOR* is the name of the application vendor, as specified in the license file. LMX_EXTENDEDLOG is a generic environment variable used by all applications protected by LM-X. **Important: Using extended logging delays checkouts up to 15 seconds, because it gathers more information about environment than when using normal logging.** You can set this environment variable in the same manner as described in Adding license files to the path manually.
*VENDOR*_CONNECTION_TIMEOUT or LMX_CONNECTION_TIMEOUT	The desired number of seconds, from 1 - unlimited. The default value is 30. For example: LMX_CONNECTION_TIMEOUT=10	This environment variable lets you adjust the connection timeout setting. The connection timeout is set to 30 seconds by default unless you set it to a different value using this environment variable. Increasing the timeout value can be useful for highly loaded networks. For example, if you set LMX_CONNECTION_TIMEOUT = 60, the client can wait up to 60 seconds before timeout. You may specify a particular vendor using *VENDOR*_CONNECTION_TIMEOUT, where *VENDOR* is the name of the application vendor, as specified in the license file. LMX_CONNECTION_TIMEOUT is a generic environment variable used by all applications protected by LM-X. You can set this environment variable in the same manner as described in Adding license files to the path manually.
*VENDOR*_PROJECT or LMX_PROJECT	A string specifying a project name. For example: LMX_PROJECT=Doorlatch_Design	This environment variable lets you set a project name for which all or vendor-specific LM-X licensed applications are being used. The project name is reported in lmxendutil -licstat. (See LM-X End-user utility.) This lets you track for what purpose the application was used. For example, an application may be used for three different projects being run under different departments. Tracking which of the three projects the application was used for can help with accurate cost splitting amongst the projects.
*VENDOR*_QUEUE or LMX_QUEUE	A string that can be set to enable license queuing. For example: LMX_QUEUE=1	This environment variable enables license queuing for all checkout requests. You may specify a particular vendor using *VENDOR*_QUEUE, where *VENDOR* is the name of the application vendor, as specified in the license file. LMX_QUEUE is a generic environment variable used by all applications protected by LM-X. You can set this environment variable in the same manner as described in Adding license files to the path manually.
TMPDIR	A string specifying a path. For example: TMPDIR=/var/tmp	This system environment variable lets you specify the directory to be used for temporary files. You can set TMPDIR before running your LM-X licensed application if you know in advance that you will not have access to /tmp directory. TMPDIR affects UNIX platforms only.

16

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End-user tools

Some information on this page refers to LM-X v4.8 and newer, which replaced the LM-X web-based UI with LM-X License Server Client, an independent window application. If you are using an older version of LM-X, refer to documentation for earlier versions.

This chapter describes installing and using LM-X end-user tools, which include the following.

Tool	Windows File Name	Unix File Name
LM-X License Server	lmx-serv.exe	lmx-serv
LM-X end-user utility	lmxendutil.exe	lmxendutil
LM-X End-user Configuration Tool	lmxconfigtool.exe	N/A (Windows only)
LM-X License Server Client	LicserverClient.jar	LicserverClient.jar

17

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Installing end-user tools and LM-X License Server

The information on this page refers to v4.4.3 and later, which introduced an installation program that installs both LM-X License Server and the end-user tools. For installation instructions applicable to earlier versions, see Removed Features.

Installing end-user tools and LM-X License Server

An installation program lets you quickly and easily install end-user tools, as well as the LM-X License Server. The installer will allow you to install the license server as a service for Windows, Linux and Mac. (For other platforms, you will need to start the license server as a daemon manually.)

Note: You can also perform a silent installaion.

To download the latest installation program, go to http://www.x-formation.com/lm-x_license_manager/enduser_downloads.html. For previous versions, contact your application vendor.

When you run the installation program, a wizard guides you through each installation step. The installation program optionally lets you install LM-X License Server as a service and helps you locate and copy the liblmxvendor library, which is required for starting the LM-X License Server. This library and any updates to it are supplied by your application vendor.

Uninstalling LM-X License Server on Linux

To uninstall LM-X License Server on Linux:

1. Remove the directory where your SDK is installed (for example, /home/john/lmx-sdk-4.8.1).
2. If you installed the end-user tools, remove the directory where your end-user tools are located.
3. Remove init script from /etc/init.d/lmxserv{*version}* (for example, lmxserv481 for LM-X version 4.8.1).
   Please note that you need to switch to root privilege or use sudo to be able to remove init script.

Also see Installing and uninstalling a license server on Windows for detailed steps on how to install a license server as a service on Windows.

18

LM-X End-user utility

The information on this page refers to LM-X v5.4.1 or newer, which added the "-verifyauth" command and introduced brute-force password protection. If you are using a previous version of LM-X, please see the documentation for previous versions.

The LM-X End-user utility lets you get the HostID values for the computer system. For machine-locked licenses, application vendors will use HostID values to create licenses specifically for your system. The LM-X End-user utility also lets you:

- See who is currently using specific licenses on the license server, and see the borrow, grace and trial licenses currently checked out
- Remotely access the license server
- Remove users from the license server
- Read and verify a usage database and print the usage information to the screen

The LM-X End-user utility may be run by any user; you do not need administrator privileges to run the utility. The lmxendutil command usage is as follows. Optional parameters are enclosed in square brackets ([ ]). Variables are shown in italic text.

Command	Syntax	Description
-hostid	lmxendutil -hostid	Displays HostID values of your computer system.
-licstat	lmxendutil -licstat [-vendor <vendor_name> (-host <host> -port <port> | -hal <servers>) -network -borrow -grace -trial -denials]	Displays statistics and lists which users are currently using which licenses on a specific license server **Note**: The lmxendutil -licstat command does not use the environment variable LMX_LICENSE_PATH when querying the license server. A client application can find license servers on the network automatically, using automatic server discovery or the -host option. When -vendor is used, the statistics will be limited to the specified vendor. If -vendor is not used, information such as grace, borrow and trial checkouts may not be returned, because the vendor is unknown. Information for the borrow, grace and trial licenses currently checked out is also returned unless one or more options are specified; for example, specifying -borrow will result in only borrow information being returned. If the -denials option is specified, this command additionally prints detailed information about denials for current and disconnected users for the past 24 hours, including username, hostname, IP address, login times, and denial times. See below for descriptions of optional parameters - hal, -host, and -port.
-licstatxml	lmxendutil -licstatxml [-vendor <vendor_name> (-host <host> -port <port> | -hal <servers>) -network -borrow -grace -trial -denials]	Displays the same information as for -licstat, but in XML format.
-restartserver	lmxendutil -restartserver [-host *host* -port *port* -password *password*]	Remotely restarts the license server. See below for descriptions of optional parameters -host, -port and -password.
-shutdownserver	lmxendutil -shutdownserver [-host *host* -port *port* -password *password*]	Remotely shuts down the license server. See below for descriptions of optional parameters -host, -port and -password.
-readusagedb	lmxendutil -readusagedb *usage*.db	Reads the specified usage database and performs a verification, then prints the usage information to the screen. (See Pay Per Use feature.)
-removeuser	lmxendutil -removeuser -clientusername *username* -clienthostname *hostname* [-feature *feature* [-version *version*] -host *host* -port *port* -password *password*]	Removes a user from the license server. Parameter descriptions are as follows: -clientusername *username* Removes a user with the specified username. -clienthostname *hostname* Removes a user at the specified hostname. See below for descriptions of optional parameters -host, -port, -password and -feature [-version].
-verifyauth	lmxendutil -verifyauth -host *host* -port *port* -password *password*	Verify the license server's credentials on the current or a foreign host.
Optional parameters		
Command	**Syntax**	**Description**

19

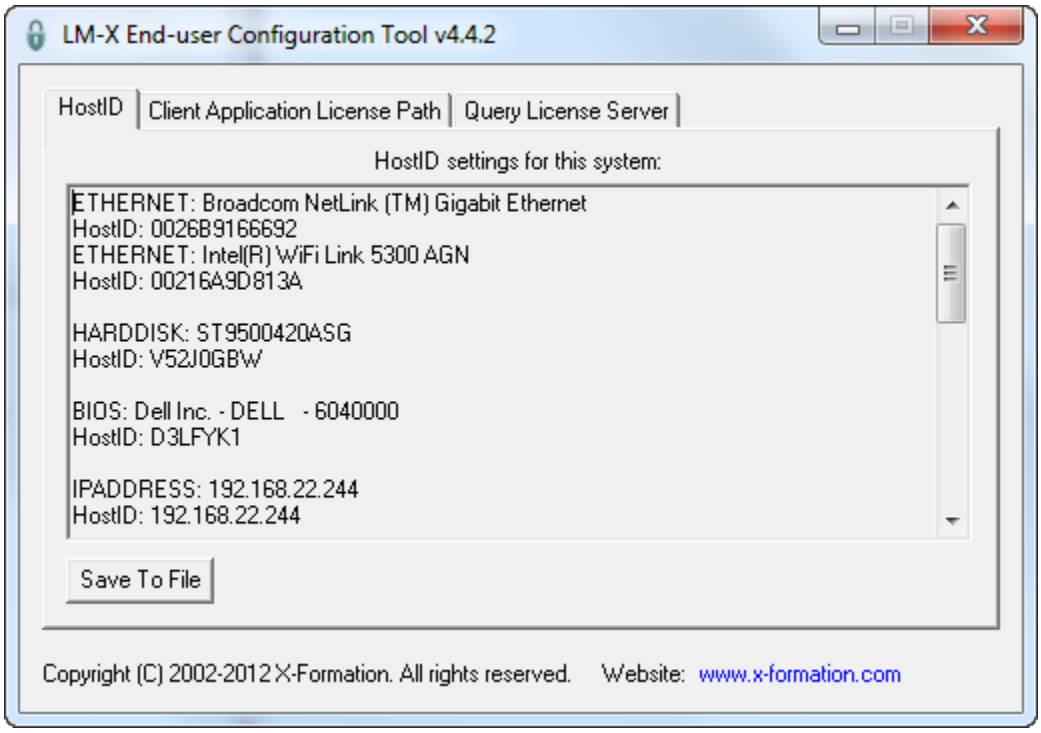
-hal	-hal *server1 server2 server3*	Optional parameter for specifying HAL servers, used only when HAL is enabled. You must specify three servers in *port@host* format; for example: lmxendutil -licstat -vendor VENDORNAME -hal 6200@localhost 6300@localhost 6400@localhost lmxendutil -licstatxml -vendor VENDORNAME -hal 6200@localhost 6300@localhost 6400@localhost
-host	-host *host*	Optional parameter that connects to the specified license server host. If you don't specify the -host option, lmxendutil command will perform autodiscovery.
-port	-port *port*	Optional parameter that connects to license server on port 'myport'. If you do not enter this optional parameter, the default port is used.
-password	-password *password*	Optional parameter that uses the specified password. If you do not use this optional parameter explicitly, you will be prompted for the password (in this case, the password you enter is not displayed on the screen as you type). Note that LM-X uses brute force password protection to prevent brute-force attacks.
-feature [-version]	-feature *feature* [-version *version*]	Optional parameter for use with -removeuser command that limits user removal to a specified user/host who has checked out a specified feature. For example: lmxendutil -removeuser -clientusername *username* -clienthostname *hostname* -feature *feature* [-version *version*]

20

LM-X End-user Configuration Tool

The End-user Configuration Tool is a Windows-only tool that lets you:

- See the HostID values of your computer system (in the HostID tab as shown in the example below)
- Edit the license path environment variable (see Adding or removing license files from the path using the LM-X End-user Configuration tool for more information)
- Query a license server



Note: After making changes to the license path, reboot to ensure that the changes take effect.

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LM-X License Server Client

LM-X License Manager uses LM-X License Server Client, an independent window application that helps you to monitor and manage your LM-X License Server.

Using LM-X License Server Client, you can:

- View information and statistics about the LM-X License Server.
- Restart or shut down the license server.
- View the LM-X server's HostIDs (unique machine values that can be used to lock a license file to a host), such as Ethernet, Hostname, IP Address, etc.
- View license usage statistics for the current license server, as well as for borrow, grace and trial licenses.
- View and edit the configuration file. (A password is required to access the configuration file.)
- View and search for entries in the log file.
- Select the license server for which you wish to manage statistics by entering the license server URL. (For more information, see Using LM-X License Server Client.)

22

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Accessing LM-X License Server Client

If you are using Windows, we recommend using a shortcut in the Windows Start menu to access LM-X License Server Client. Otherwise, go to your end-user tools directory and directly run a LicserverClient.jar file.

You can access the host of the LM-X license server on the same port as the license server, which defaults to 6200 (for example, http://www.lmx-server-host.com:6200).

To access LM-X License Server Client, you must have JRE installed on your machine.

Once you have accessed the application, you can start using LM-X License Server Client.

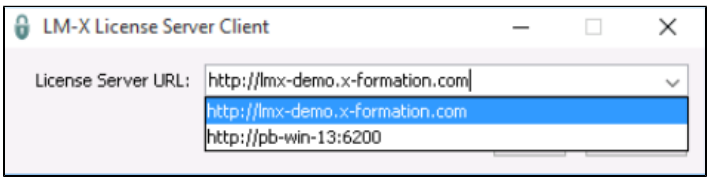
23

Using LM-X License Server Client

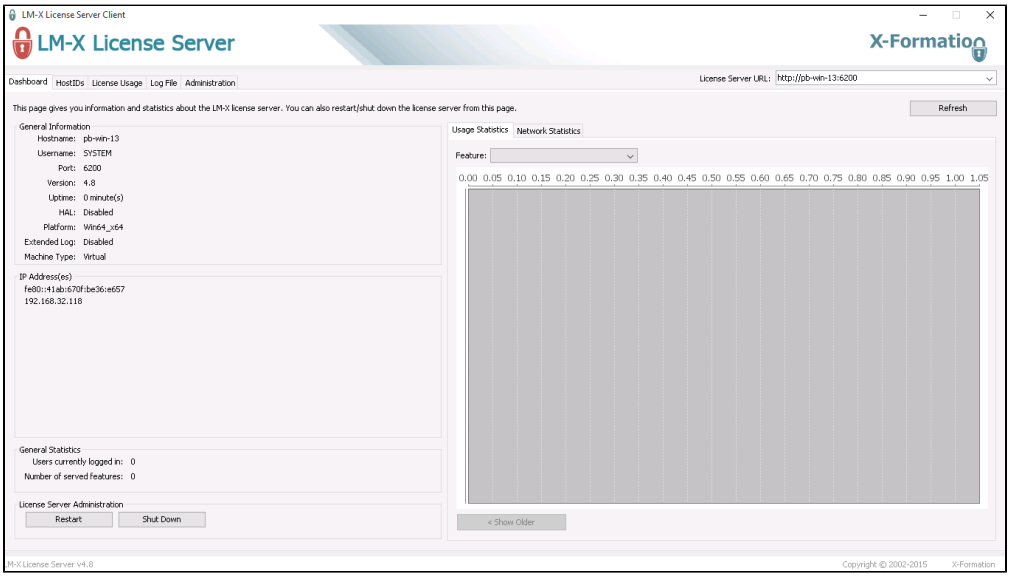
Selecting a license server

The first time you access LM-X License Server Client, a small dialog with a combo box pops up that lets you either select a LM-X license server's IP address as the URL from the list or type it directly. You can choose from the following URLs:

- http://lmx-demo.x-formation.com (the demo server which you can use to test the application)
  and
- your local host of the LM-X license server, which defaults to 6200 (for example http://lmx-server-host:6200).

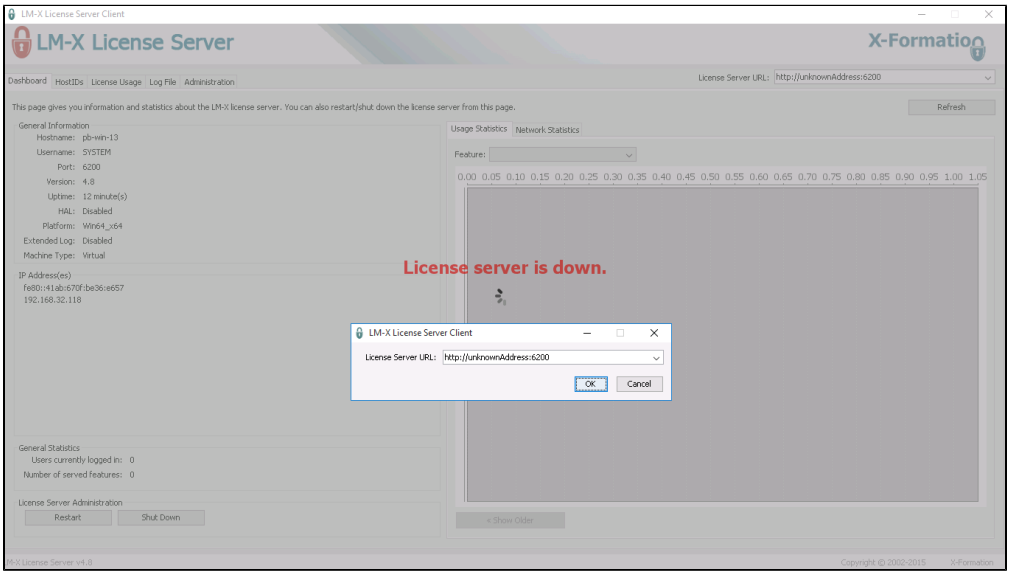


After you make your selection, you can easily view and manage the license server of your choosing, as shown below.



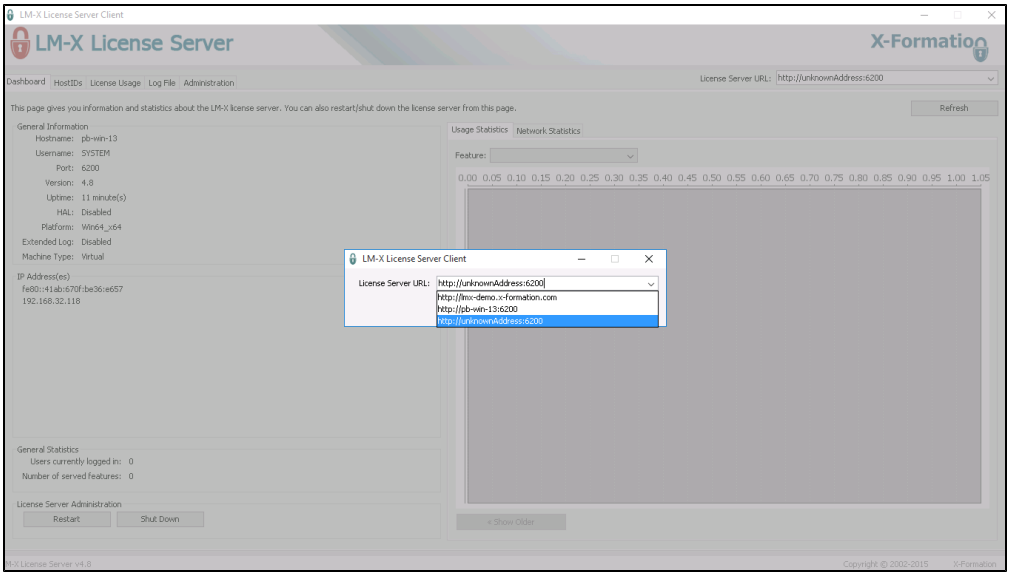
Selecting a license server that is down

When you select a server which is down, then the main window turns grey and the message "License server is down." is displayed, as shown below.



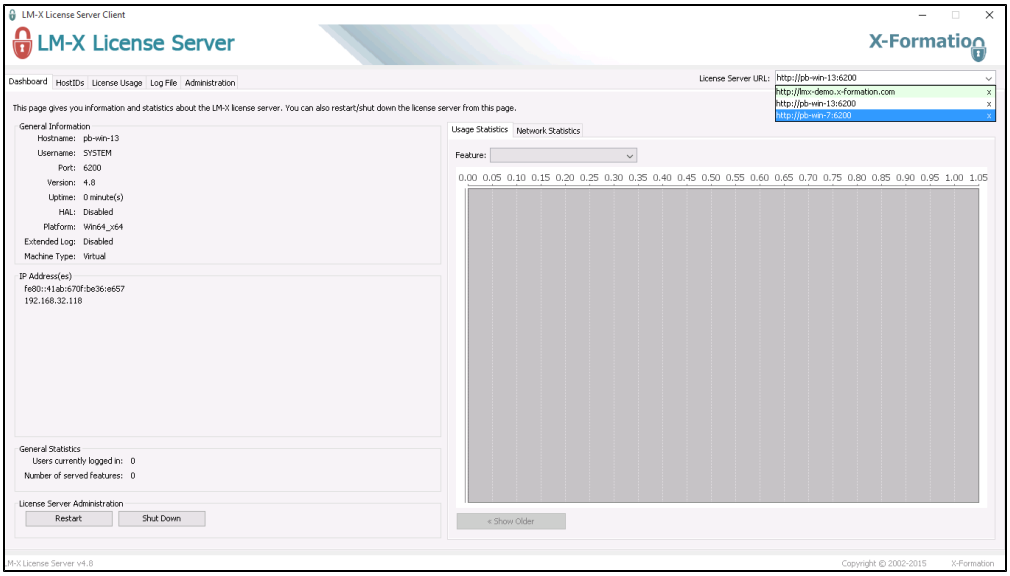
24

You are then prompted to choose from other servers you added earlier or add a new server by typing its URL in the dialog that appears, as shown below.



Removing a license server

To remove a license server's IP address from the License Server URL combo box, click "X" to the right of the URL you wish to remove, as shown below.



After removing the URL, you will be automatically switched to the server above the one you have removed.

Note: You cannot delete all servers – when only one server is left, "X" disappears.

25

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Viewing server information and statistics

The information on this page refers to LM-X version 4.1, which added new graphs to the Dashboard. If you are running LM-X version 4.0, please refer to version 4.0 documentation for information relevant to that version.

The LM-X License Server Client Dashboard shows information about your LM-X license server, including:

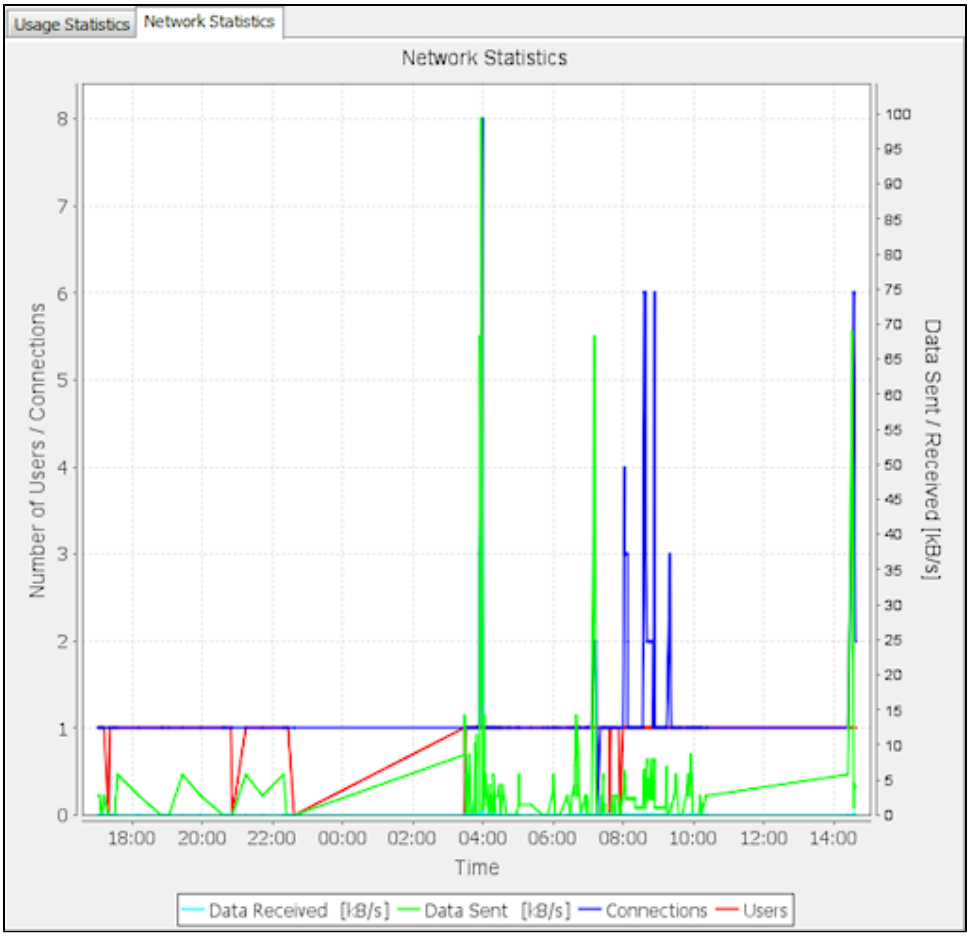
- General information, such as the hostname and port for the server, the LM-X version it is running, whether HAL and extended logging are enabled, etc.
- The IP addresses for the server.
- General statistics, including the number of users currently logged into the server and the number of features that are on the server.

In addition, the following graphs illustrate the license server data:

- The Usage Statistics graph shows usage and denials history for the past month for a selected feature on the server.
- The Network Statistics graph shows general statistics such as the server's number of users, connections, and data received/sent.

Using the right click menu in the graphs, you can:

- Modify chart properties, including settings for Title (renaming the chart and changing the appearance of the title text); Plot (renaming and changing the appearance of the axes and the lines in the plot, and setting the orientation of the plot); and Other (rendering options).
- Save the graph (currently limited to .PNG format).
- Print the graph.
- Zoom in/out on both axes or one axis (Domain, the horizontal line; or Range, the vertical line). For example, if you select Zoom Out > Domain Axis, the timeline on the graph will be less detailed and show a greater length of time. Zooming in shows greater detail over a shorter period of time.
- Zoom automatically to the extent of one or both axes of the graph. For example, the Network Statistics graph shown below has been zoomed automatically to both axes, so it shows all existing data (the data has been gathered for 20 hours and the upper limit of data sent/received is 100 kilobytes per second).



In addition to these shortcut menu zoom options, you can also click and drag to zoom to particular details in the graph.

26

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Restarting or shutting down the server

The LM-X License Server Client's Dashboard's License Server Administration area, located at the bottom of the Dashboard page, includes the ability to restart or shut down the license server. Restarting the license server normally takes a few seconds, but may take longer depending on the speed of the license server machine, number of licenses, and other factors.

27

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Viewing HostIDs

The information on this page refers to LM-X version 4.1, which now allows saving HostID information to a text file. If you are running LM-X version 4.0, please refer to version 4.0 documentation for information relevant to that version.

The HostIDs tab in the LM-X License Server Client lists all the HostIDs for the license server. The information for each HostID includes the Type (for example, ETHERNET, HOSTNAME, IPADDRESS, etc.), Description, and Value. The Description and Value are often identical, but some HostID types will have different entries. For example, an Ethernet HostID will have the Ethernet manufacturer under Description, and the actual Ethernet ID under Value.

You can use the Save button to save HostID information about the current machine the license server is running on to a text file. Saving this information to file gives you an easy way to supply your HostID information to your software vendor when requested.

28

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Viewing license usage statistics

The information on this page refers to LM-X v5.0, which added the upgrade license type. If you are using an older version of LM-X, please refer to version 4.1 documentation for information relevant to that version.

The License Usage tab in the LM-X License Server Client includes license usage statistics for features and users on the license server. Select **Users** or **Features** from the View options at the top right of the License Usage page to choose which statistics to see.

When you select **Feature** from the View options, the License Usage page includes the following information for each feature being served by the LM-X License Server:

- Feature name
- Software version number
- Software vendor name
- Key type (e.g., Exclusive, Additive, Upgrade, Token, etc.)
- Share code (e.g., Host, User, Virtual, etc.)
- License start and expire dates
- License type (e.g., Network)
- Total number of licenses for that feature on the license server
- Number of licenses in use
- Number of borrowed licenses

When you select **User** from the View options, the License Usage page lists the following statistics for each user on the LM-X License Server:

- User name
- User's machine hostname
- The IP address for the user's machine
- The features the user checked out
- The number of licenses the user has used
- The user's login and checkout time
- The state of the license (Borrowed, Checked Out, etc.)
- Borrow expiration

In addition to showing statistics for each user, you can use the Action column options to release all the licenses that are currently in use by a particular user.

The user statistics report may contain identical usernames and hosts under the following circumstances:

- If the user checked out multiple different features, each feature is displayed in a separate row.
- If multiple clients are started (for example, multiple instances of one application), you will see each client separately. (If you remove one client, the remaining clients will still remain valid.)

29

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Viewing the log file

The Log File tab in the LM-X License Server Client lets you see the LM-X License Server log file. You can filter results to show all entries, or limit the log to warnings or errors. You can search for specific entries in the log file using the "Search" box and the **Next** and **Previous** buttons. You can also use the **Download** button to download the log file.

30

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LM-X License Server

The LM-X License Server is a machine used to host network (floating, or shared) software licenses. Unlike node-locked licenses that are installed locally on individual users' machines, network licenses are able to be shared among many users. The LM-X License Server fulfills requests to run the network application if the requested license(s) are available. When the network license is released (for example, a user closes the application), the license is reclaimed by the license server and made available for other checkout requests.

When you start the LM-X License Server, it reads the associated configuration file (if one exists) to determine user settings such as the log file output path, whether certain users should be denied checkout of licenses, etc. (See License server configuration file.) The following sections describe how to manage the LM-X License Server.

31

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Protocols

The license server runs over TCP protocol. LM-X supports IPv4/6 dual stack, which means that it is able to communicate in both IPv4 and IPv6 without having separate versions of the applications.

The license server also uses UDP protocol to allow applications to perform automatic server discovery on the network. Note: Automatic server discovery works only on local networks and will not work on WAN or VPN connections. Automatic server discovery is not guaranteed to work on all networks, particularly enterprise networks on which local firewalls or routers cut off UDP broadcast traffic.

When connecting client applications to IPv6 enabled servers, you must enclose the IP addresses in brackets [ ].

For example, to set environment variables for an IPv6 license server, you would enter:

LMX_LICENSE_PATH = @[1:2:3:4:5:6:7:8] or LMX_LICENSE_PATH = @[::1]

(For information about license file paths, see Adding or removing license file paths.)

32

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License server configuration file

The information on this page refers to LM-X v5.5 or newer, which extended the LICENSE_FILE setting to support specifying a file path in addition to specifying a file name, and changed the LICENSE_FILE setting name to LICENSE_PATH. If you are using a previous version of LM-X, please see the documentation for the previous version.

The vendor may supply a license server configuration file, named lmx-serv.cfg by default. This configuration file is an ASCII text file, which can be opened and modified using any text editor. You may replace the existing information in the configuration file as needed.

For example, assume we are using a floating license. This type of license allows any number of users to have the software installed, but only a certain number of users to use the software simultaneously. When all allotted licenses are in use, other users must wait until a license becomes available to use the software. If you want to use software licenses most efficiently and implement fair/desired distribution of licenses, then as an administrator of the LM-X server, you may set the following options in the LM-X License Server configuration file:

- Permissions. Setting permissions lets you allow or deny individual users/groups use of the license server according to your organization's specific needs. Permissions can be based on a set of rules that include permissions for normal checkouts as well as license borrowing.
- Reservations. You can reserve a specified number of licenses that can be used by individual users or groups. Reservations can also be done using a set of rules, allowing you to specify the reservation order. Some users or groups can be given higher priority than others.
- Limitations. You can limit the number of licenses that can be used by individual users or groups. Limitations can be done by a set of rules. In particular, limiting of users is done by a first match rule, so if a user belongs to more than one group specified in restrictions, the first restriction will apply to that user.

The configuration file includes instructions for using each setting in the file, which may include the following, depending on the options provided by your vendor. Some of the configuration settings can also be specified using the web-based UI, as described in Administration.

Syntax	Description	Examples
TCP_LISTEN_PORT = *port number*	The TCP port number the license server will listen on. • TCP port is used for data traffic protocol. The default TCP port is 6200. • UDP port is used for automatic server discovery protocol. The UDP port is fixed to 6200 and cannot be changed. See http://www.iana.org/assignments/port-numbers for more information.	TCP_LISTEN_PORT = 6200
TCP_BIND_ADDRESS = *IP_address_1 IP_address_2*	Limit which networks the license server allows for client connections. When this setting is specified, the license server will only accept clients that connect from a network that uses the specified IP addresses. You can specify only one address for each IP version (one for IPV4 and one for IPV6). This setting is useful when the license server is connected to more than one network (has more than one IP address) and you want to limit allowed connections based on which network the client is on. When this setting is unspecified, the license server accepts clients from all available networks.	TCP_BIND_ADDRESS = 192.168.21.321 8000:8000:8000:8000:abcd:1234:12df:fd54

33

HAL_SERVER*server_number* = [*port*]@*hostname* or HAL_SERVER*server_number* = [*port*]@*IP_address* **Note**: Port is optional.	High Availability Licensing (HAL) servers, which enable redundant servers, so if one server goes down, two others will still work. HAL consists of 3 specified servers, at least 2 of which must be up and running at all times. Each HAL_SERVER line indicates a license server that has HAL enabled by its license(s). Each HAL server has a specific role, and should be specified in terms of how many resources each server has: • HAL_SERVER1 is your master server, which allows both CHECKOUT and BORROW. HAL_SERVER1 should be your most powerful server. • HAL_SERVER2 is your first slave server, which allows CHECKOUT but denies BORROW in the event that your master server goes down. HAL_SERVER2 should be your second most powerful server. • HAL_SERVER3 is part of your configuration to ensure that everything works as expected, and does not allow any CHECKOUT or BORROW requests. HAL_SERVER3 should be your least powerful server. **Important**: The HAL_SERVER list must be identical on all your servers for HAL to function properly	HAL_SERVER1 = 6200@server1 HAL_SERVER2 = 6200@server2 HAL_SERVER3 = 6200@server3
LOG_FILE = *path*	The log file path. Specifying the full path is preferred. If you do not specify this setting, the default is used: On Windows the default is lmx-serv .log, under the license server directory. On Unix, the default location for the log file is in the directory from which the license server was started	LOG_FILE = c:\program files\lmx-server.log LOG_FILE = /home/user1/lmx-serv.log
LOG_FORMAT = NORMAL or EXTENDED	The format for the log file. The default setting for the log file format is NORMAL. Specifying EXTENDED causes additional information to be included in the log file, such as license server HostIDs, whether the license server is a virtual machine, etc. Setting the log file format to EXTENDED is particularly useful for debugging purposes.	LOG_FORMAT= NORMAL LOG_FORMAT=EXTENDED
LOG_EXCLUDE = *message1*, *message2*, etc.	Exclude messages from the log. The following messages can be excluded: CHECKOUT, CHECKIN, STATUS, BORROW, BORROW_RETURN, REMOVE_USER, REMOTE_RESTART or REMOTE_SHUTDOWN.	LOG_EXCLUDE = CHECKOUT, CHECKIN, STATUS
LOGFILE_ROTATE_INTERVAL = *rotation_interval*	The interval for log file rotation. The value may be set to "day" (every day at midnight), "week" (every Monday at midnight), or "month" (the first day of every month at midnight). After rotation, the old log file will be named *filename*.log.*rotation_date* in the format yyyy-mm-dd. A message indicating the location of the rotated log file is added to the end of the old log file and the beginning of the new log file, as follows: "Log file was rotated and saved to *filename*."	LOGFILE_ROTATE_INTERVAL = day
MIN_USER_REMOVE_TIME = *time in seconds*	Minimum time, in seconds, that must elapse from the connection before a user can be removed using lmxendutil. The specified time must be equal to or greater than the number of seconds specified by your application vendor. Default minimum time is 120 seconds. If the time is set to -1, user removals will not be allowed.	MIN_USER_REMOVE_TIME = 120

LICENSE_PATH = *path*	The full or partial path under which to search for license file(s). Specifying the license file name is optional, and you can specify one or multiple paths as needed. The path must be lowercase. On Windows: If no path is set, the license server will look for *vendor*.lic in the same directory as the license server. On Unix: If no path is set, the license server will look for /usr/x-formation/*vendor*.lic.	LICENSE_PATH = c:\ LICENSE_PATH = d:\server LICENSE_PATH = d:\server\network.lic LICENSE_PATH = c:\extra_file.lic LICENSE_PATH = /home/user1 /floating_license.lic LICENSE_PATH = /home/user1 /floating_license2.lic
USAGE_DATABASE = *database path*	Pay-per-use usage database (used for billing purposes). See Pay Per Use feature for EXTENDED information, including database format and an example of data printout.	USAGE_DATABASE = d:\server\usage.db USAGE_DATABASE = /home/user1/usage.db
USAGE_LEVEL= *detail level*	Specify pay-per-use detail level. • STANDARD includes basic usage information. • EXTENDED includes user information in addition to the basic usage information.	USAGE_LEVEL = STANDARD
USAGE_WRITE_INTERVAL= *number of actions*	Specify the number of pay-per-use actions (checkouts, checkins, etc.) after which pay-per-use records will be written to the pay-per-use database file. The default setting is 1000.	USAGE_WRITE_INTERVAL = 1000
REMOTE_ACCESS_PASSWORD = *password*	Remote administration password (used when remotely stopping and restarting the license server and removing users from it). The password is case-sensitive.	REMOTE_ACCESS_PASSWORD = MyPassword123
FAST_QUEUE = *feature1, feature2*, etc. or FAST_QUEUE = ALL	Fast queuing allows requests that can be fulfilled immediately to be fulfilled. For example, if a client is waiting for two licenses, and only one license is immediately available, another client that needs only one license can bypass the queue and take the single license without waiting. Default behavior of license queuing is to put the client at the end of the queue regardless whether the license request could be satisfied.	FAST_QUEUE = f2, d5, app2

35

ALLOW_IPADDR_ALL = *one or more IP addresses* ALLOW_IPADDR_*feature name* = *one or more IP addresses* (must be either specific A.B.C.D or with wildcards; e.g., A.B.*) DENY_IPADDR_ALL = *one or more IP addresses* DENY_IPADDR_*feature name* = *one or more IP addresses* (must be either specific A.B.C.D or with wildcards; e.g., A.B.*) ALLOW_HOST_ALL = *one or more hosts* ALLOW_HOST_*feature name* = *one or more hosts* DENY_HOST_ALL = *one or more hosts* DENY_HOST_*feature name* = *one or more hosts* ALLOW_USER_ALL = *one or more users* ALLOW_USER_*feature name* = *one or more users* DENY_USER_ALL = *one or more users* DENY_USER_*feature name* = *one or more users* **Note**: For host, you can use a hostname or use "localhost" to specify the current machine. For IP address, you can specify a complete address (A.B.C.D) or use wildcards; e.g., A.B.*).	Allow/deny specific clients from using the license server. The allow/deny rules work as follows: • Rules are attempted to be matched in the order they are written. • If no rule matches the specific client, then that client is allowed.	The following example will deny all clients except that with hostname 'trusted'. This applies to all features. ALLOW_HOST_ALL = trusted DENY_IPADDR_ALL = *.*.*.* The following example will allow clients on only 2 subnets, user Administrator and root from any host and deny everyone else. This applies to all features. ALLOW_IPADDR_ALL = 192.168.1.* 192.168.2.* ALLOW_USER_ALL = Administrator root DENY_IPADDR_ALL = *.*.*.* The following example will deny clients on localhost, deny the machines with hostname 'untrusted' and 'crackerjack', allow clients on the internal network, and deny everyone else. This applies to the feature f2. DENY_HOST_f2 = localhost untrusted crackerjack ALLOW_IPADDR_f2 = 192.168.*.* DENY_IPADDR_f2 = *.*.*.*

36

ALLOW_BORROW_IPADDR_ALL = *one or more hosts* ALLOW_BORROW_IPADDR_*feature name = one or more hosts* DENY_BORROW_IPADDR_ALL = *one or more hosts* DENY_BORROW_IPADDR_*feature name = one or more hosts* ALLOW_BORROW_HOST_ALL = *one or more hosts* ALLOW_BORROW_HOST_*feature name = one or more hosts* DENY_BORROW_HOST_ALL = *one or more hosts* DENY_BORROW_HOST_*feature name = one or more hosts* ALLOW_BORROW_USER_ALL = *one or more users* ALLOW_BORROW_USER_*feature name = one or more users* DENY_BORROW_USER_ALL = *one or more users* DENY_BORROW_USER_*feature name = one or more users* **Note**: For host, you can use a hostname or use "localhost" to specify the current machine. For IP address, you can specify a complete address (A.B.C.D) or use wildcards; e.g., A.B.C.*).	Allow/deny specific clients from borrowing licenses.	The following example will allow the specific users, and deny host and IP addresses on the list from borrowing any feature. Everyone else will be allowed. ALLOW_BORROW_USER_ALL = daisy harry tom DENY_BORROW_HOST_ALL = server1 machine5 DENY_BORROW_IPADDR_ALL = 192.168.3.* 192.168.4.* The following example will allow the specific users and deny everyone else from borrowing f2. ALLOW_BORROW_USER_f2 = lazyjack rabbit joeuser DENY_BORROW_IPADDR_f2 = *.*.*.*
LIMIT_USER_*feature name___limit count = one or more users* LIMIT_HOST_*feature name___limit count = one or more hosts* LIMIT_IPADDR_*feature name_limit count = one or more hosts* **Note**: For host, you can use a hostname or use "localhost" to specify the current machine. For IP address, you can specify a complete address (A.B.C.D) or use wildcards; e.g., A.B.C.*).	Limit the number of licenses that can be used by individual users or groups to implement fair/desired distribution of licenses. Limiting of users is done by a first match rule, so if a user belongs to more than one group specified in restrictions, the first restriction will apply to that user.	LIMIT_USER_f2_5 = harry joe sam LIMIT_IPADDR_f3_3 = 192.168.2.* 192.168.4.*
RESERVE_USER_*feature name___reserve count = one or more users* RESERVE_HOST_*feature name___reserve count = one or more hosts* RESERVE_IPADDR_*feature name_reserve count = one or more hosts* **Note**: For host, you can use a hostname or use "localhost" to specify the current machine. For IP address, you can specify a complete address (A.B.C.D) or use wildcards; e.g., A.B.C.*).	Reserve a number of licenses that can be used by individual users or groups to implement fair/desired distribution of licenses. Reservation of users is done by a first match rule, so if a user belongs to more than one group specified in the rules, the first rule will apply to that user.	RESERVE_USER_f2_5 = harry joe sam RESERVE_IPADDR_f3_3 = 192.168.2.* 192.168.4.*

37

BORROW_LIMIT_COUNT_ALL = *limit count* BORROW_LIMIT_COUNT_*feature name = limit count* IGNORE_BORROW_LIMIT_COUNT_USER_*feature name = one or more users* IGNORE_BORROW_LIMIT_COUNT_HOST_*feature name = one or more hosts* IGNORE_BORROW_LIMIT_COUNT_IPADDR_*feature name = one or more IP addresses* **Note***:* You can use IGNORE_BORROW_LIMIT_* flag to whitelist small and specific predicates blacklisted by broader BORROW_LIMIT_* predicate.	Limit/Do not limit the number of licenses that can be borrowed to prevent all licenses from being borrowed at the same time.	BORROW_LIMIT_COUNT_f2 = 1 BORROW_LIMIT_COUNT_ABCDEF = 5 The following example will allow the user ADMIN, and deny host and IP addresses on the list from borrowing more than 100 features. BORROW_LIMIT_COUNT_F1 = 100 IGNORE_BORROW_LIMIT_COUNT_USER_F1 = admin IGNORE_BORROW_LIMIT_COUNT_HOST_F1 = server IGNORE_BORROW_LIMIT_COUNT_IPADDR_F1 = 192.168.1.*
BORROW_LIMIT_HOURS_ALL = *limit hours* BORROW_LIMIT_HOURS_*feature name = limit hours* IGNORE_BORROW_LIMIT_HOURS_USER_*feature name = one or more users* IGNORE_BORROW_LIMIT_HOURS_HOST_*feature name = one or more hosts* IGNORE_BORROW_LIMIT_HOURS_IPADDR_*feature name = one or more IP addresses* **Note**: You can use IGNORE_BORROW_LIMIT_* flag to whitelist small and specific predicates blacklisted by broader BORROW_LIMIT_* predicate.	Limit/Do not limit the number of hours licenses can be borrowed to prevent licenses from being borrowed for too long.	The following example will allow the specific users, and deny host and IP addresses on the list from borrowing any feature. Everyone else will be allowed. BORROW_LIMIT_HOURS_f2 = 1 BORROW_LIMIT_HOURS_ABCDEF = 5 The following example will allow the user admin, and deny host and IP addresses on the list from borrowing more than 100 features. BORROW_LIMIT_HOURS_F1 = 10 IGNORE_BORROW_LIMIT_HOURS_USER_F1 = admin IGNORE_BORROW_LIMIT_HOURS_HOST_F1 = server IGNORE_BORROW_LIMIT_HOURS_IPADDR_F1 = 192.168.1.*

FEATURE *featurename*
{
feature settings
}
	Specify licenses directly within the configuration file to eliminate the need to have both a license file and configuration file for the license server. You can specify any features from one or more license files.
	
	The content must be specified within the *_START_LICENSE_* and *_END_LICENSE_* clauses.
		*_START_LICENSE_*
		FEATURE F1
		{
		VENDOR = XYZ
		}
		*_END_LICENSE_*

GROUP_*name = member1 member2*	Specify a group name and the group members to which you want to apply restrictions, limitations and reservations. Creating groups can make these features easier to use and help you to avoid/remove redundancies from the configuration file. You can create groups that contain users, host names and IP addresses. Groups can contain any other group, and there is no limit on the number of members that can be included in a group. The names of groups and group members are case-insensitive.	The following example creates a group named "hr" with one member, "anna," and another group, "employees," which contains three individual users (joe, mary, and sam), plus includes the group "hr" as a sub-group. GROUP_hr = anna GROUP_employees = joe mary sam hr After creating groups, you can apply permissions, reservations, and limitations described above to those groups in the same way you would individual users; for example: DENY_USER_f1 = employees RESERVE_USER_f2_2 = employees LIMIT_USER_f3_2 = hr

38

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DENIAL_STORE_PERIOD = *time_in_seconds*	Specify how long the license server will keep denial information, in seconds. • Valid values are between one minute and one year, expressed in seconds. • The value is numeric only; do not use commas or periods in the entered value. • The default duration is one day (86400 seconds).	The following example sets the denial storage period to 1 day: DENIAL_STORE_PERIOD = 86400

39

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lmx_server_conf.c file

A file named lmx_server_conf.c contains various flags and callbacks which can be used to extend or modify the behavior of the license server. For each callback you can write a function which meets the specified prototype. We recommend that you write your own enhancements in a new file and modify the makefile to include your enhancements during compilation of the license server.

Note that the settings specified using lmx_server_conf.c cannot be changed after compilation of the license server.

Some of the callback functions that can be specified using lmx_server_conf.c include the following:

Callback function	Description	Parameters
LMX_ServerShutdown	Callback for cleaning up user code when license server goes down.	SERVER_SHUTDOWN_MODE
	Callback for restarting the license server.	SERVER_RESTART_MODE

40

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License server log file

The license server can produce a log file that details activity such as client connections or disconnections, license checkout/checkin, and other server activity. For Unix operating systems, the log file may also contain exit signals.

In the configuration file, you can control the following settings for the license server log:

- Specify normal or extended logging. When using extended logging note that:
  - Extended logging results in greater detail in the log file.
  - Extended logs can be imported into License Statistics to obtain denied request statistics.
- Specify the interval for log file rotation. Generally, data written to the log file is useful only for a limited time, so log rotation is recommended for removing old log data and reducing the storage requirements of the log file.
- Specify the desired output location for the log.

See License server configuration file for more details about the above log settings. You can also control these log settings using the web-based UI, as described in Enabling and configuring license server logging.

Over time, the log file can grow to a substantial size depending on licensing activity, so it is best to write the log to a local file system rather than across a network.

If the log file is deleted, the license server will create a new log file on the next write.

41

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Running the license server from a command line

The information on this page refers to v4.4.3 and later, which introduced an installation program that installs both LM-X License Server and the end-user tools and removed some commands from lmx-serv. For applicable to earlier versions, see documentation for previous versions.

The lmx-serv command will let you run the license server as a service in Windows or as a daemon in the background on Unix. However, it is recommended that you use the provided installer to install and start the license server instead of using lmx-serv.

The lmx-serv command usage is as follows.

For Windows:

Command	Options
lmx-serv	[-config *configfile* -licpath *licensefile* -logfile *logfile* -port *portnumber*]

For Unix:

Command	Options
lmx-serv	[-background -config *configfile* -licpath *licensefile* -logfile *logfile* -port *portnumber*]

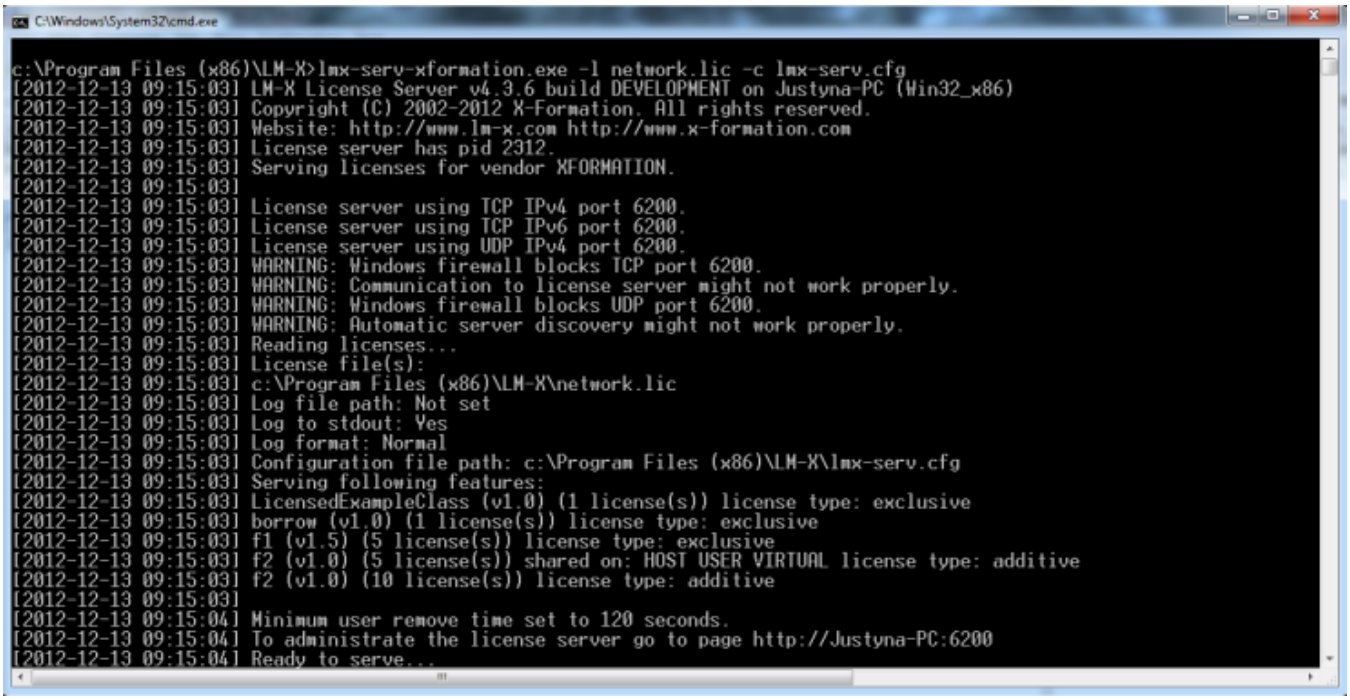
Where:

Command			Description
Long version	**Short version**	**Applies to**	
-background	-b	Unix	Run the license server as a daemon in the background.
-config	-c	All	Specify an optional path to an lmx-serv.cfg configuration file. Typing the full path is required. If the server is run without the -c parameter, it will use default settings.
-licpath	-l	All	Specify an optional license file path that will be read in addition to those specified within the lmx-serv.cfg configuration file. Alternatively, you may specify a directory in which the license server will look for all .lic files. You can specify multiple paths, separated by a semicolon (;) for Windows or a colon (:) for Unix; for example, "-l C:\dir1;c:\dir2." If no default license is defined in the configuration file and the -l parameter is not specified (or no license can be found in given location), the server will look for all .lic files in its directory.
-logfile	-lf	All	Specify an optional logfile path, which will override any logfile settings in the lmx-serv.cfg configuration file.
-port	-p	All	Specify an optional port number, which will override the port number set in the configuration file.
-help	-h	All	Print out usage information for these commands.

We recommend enclosing all switches (e.g., configuration file path) within double quotes (" ") to avoid problems with white spaces.

The following example shows running the license server on Windows from a command line.

42


C:\Windows\System32\cmd.exe
c:\Program Files (x86)\LM-X>lmx-serv-xformation.exe -l network.lic -c lmx-serv.cfg
[2012-12-13 09:15:03] LM-X License Server v4.3.6 build DEVELOPMENT on Justyna-PC (Win32_x86)
[2012-12-13 09:15:03] Copyright (C) 2002-2012 X-Formation. All rights reserved.
[2012-12-13 09:15:03] Website: http://www.lm-x.com http://www.x-formation.com
[2012-12-13 09:15:03] License server has pid 2312.
[2012-12-13 09:15:03] Serving licenses for vendor XFORMATION.
[2012-12-13 09:15:03]
[2012-12-13 09:15:03] License server using TCP IPv4 port 6200.
[2012-12-13 09:15:03] License server using TCP IPv6 port 6200.
[2012-12-13 09:15:03] License server using UDP IPv4 port 6200.
[2012-12-13 09:15:03] WARNING: Windows firewall blocks TCP port 6200.
[2012-12-13 09:15:03] WARNING: Communication to license server might not work properly.
[2012-12-13 09:15:03] WARNING: Windows firewall blocks UDP port 6200.
[2012-12-13 09:15:03] WARNING: Automatic server discovery might not work properly.
[2012-12-13 09:15:03] Reading licenses...
[2012-12-13 09:15:03] License file(s):
[2012-12-13 09:15:03] c:\Program Files (x86)\LM-X\network.lic
[2012-12-13 09:15:03] Log file path: Not set
[2012-12-13 09:15:03] Log to stdout: Yes
[2012-12-13 09:15:03] Log format: Normal
[2012-12-13 09:15:03] Configuration file path: c:\Program Files (x86)\LM-X\lmx-serv.cfg
[2012-12-13 09:15:03] Serving following features:
[2012-12-13 09:15:03] LicensedExampleClass (v1.0) (1 license(s)) license type: exclusive
[2012-12-13 09:15:03] borrow (v1.0) (1 license(s)) license type: exclusive
[2012-12-13 09:15:03] f1 (v1.5) (5 license(s)) license type: exclusive
[2012-12-13 09:15:03] f2 (v1.0) (5 license(s)) shared on: HOST USER VIRTUAL license type: additive
[2012-12-13 09:15:03] f2 (v1.0) (10 license(s)) license type: additive
[2012-12-13 09:15:03]
[2012-12-13 09:15:04] Minimum user remove time set to 120 seconds.
[2012-12-13 09:15:04] To administrate the license server go to page http://Justyna-PC:6200
[2012-12-13 09:15:04] Ready to serve...

43

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Unix exit signals

When running LM-X on a Unix operating system, you may see an "exit signal" message in the license server log file. Exit signals are not LM-X errors, but rather events sent from the operating system to instruct an application to shut down in various ways. For example, the following excerpt from a Linux license server log file contains exit signal 15, which is the signal SIGTERM (termination).

```
[2015-02-08 15:48:15] WARNING: Unable to establish connection with
HAL peer 6200@193.28.180.39. Please make sure the host is up!
[2015-02-08 15:52:35] Shutting down due to exit signal 15
```

You can find information about exit signals at http://www.comptechdoc.org/os/linux/programming/linux_pgsignals.html.

44

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Upgrading the license server

You must upgrade your LM-X License Server every time your software vendor upgrades to a new LM-X release.

To upgrade the server at your site:

1. Uninstall and remove the old LM-X License Server.
2. Install the new license server obtained from your software vendor.

After upgrading LM-X to a newer version, your existing application and existing license files should continue to work with the new version, as described in Version compatibility.

45

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Optional features

The following sections describe LM-X License Server features that you and/or your vendor may optionally enable, including High Availability Licensing, Pay Per Use feature, license borrowing, automatic server discovery, and license queuing.

46

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Configuring LM-X License Manager for high network connection rates

By default, Windows can handle a maximum of 5000 open TCP connections. If your loads are higher, you may experience problems such as failed requests for new connections and poor performance.

To improve Windows' ability to handle the connections, change the registry as described below.

(**Important**: **Changes to the registry can cause serious problems, including inability to reboot your machine**. You may want to make a backup of the registry before continuing. For information on backing up the registry, visit support.microsoft.com and type "registry editor" into the "Search" box. Instructions for working with the registry editor vary depending on your Windows version.)

1. From the Windows Start menu, type **Run** and press **Enter**.

2. From the Run dialog, type **regedit** and click **OK** to start the registry editor.

3. In the Registry Editor, open HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services.

4. For IPV4, open Tcpip, or for IPV6, open Tcpip6.

5. Select the registry subkey **Parameters**, and check the right panel for the registry entries MaxUserPort and TcpTimedWaitDelay.

   If these entries do not exist, create them:

   a. Right-click on Parameters.
   b. From the shortcut menu, select **New**, and then select **DWORD (32-bit) value**. A new registry entry, New Value #1, is added to the right side of the Registry Editor.
   c. Change the name of the new entry to MaxUserPort.
   d. Repeat steps a through c, changing the name of the second new entry to TcpTimedWaitDelay.

6. Change the value of the MaxUserPort and TcpTimedWaitDelay entries:

   a. Select the entry.
   b. Press **Enter**, or right-click on the entry and select **Modify**. This will open the Edit DWORD Value dialog.
   c. Change the Value setting for MaxUserPort to 65534, and the Value setting for TcpTimedWaitDelay to 30.

47

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High Availability Licensing

High Availability Licensing (HAL) is an important feature for applications that require high availability. Activating HAL introduces fault tolerance, because the licensed applications no longer depend on a single point of failure.

How High Availability Licensing works

HAL uses three license servers, each assigned a specific role. The first license server is the primary server and allows clients to both checkout and borrow licenses. The second license server can allow clients to checkout licenses only, in the event the first license server is down. The third license server denies all requests, but is required as part of the configuration to ensure high availability. To use HAL, your license must be HAL-enabled by your vendor. See Enabling and configuring HAL for information about using the web-based UI to set up HAL license servers.

HAL requires a stable network connection between the servers. Too many network problems will make the system unstable and license checkouts unreliable.

Note that a license server can serve either a HAL-enabled license or normal network license, not both. You should also note that HAL license servers do not communicate with one another except for information about which one is up and being active or passive. Information about other states, such as borrowing a license or queuing licenses, is not exchanged between HAL license servers.

48

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How to install HAL license servers

The following steps describe how to easily install HAL (High Availability License) license servers on Windows.

1. Enable and configure HAL using the LM-X License Server Client (LicserverClient.jar).

   HAL requires a set of 3 license servers. Each HAL license server has a fixed role, as described in the following table:

HAL License Server Number	Role
1	This HAL license server can allow clients to both checkout and borrow licenses, exactly like a normal license server.
2	In the event that HAL license server #1 is down, this server can allow clients to checkout licenses, but will deny borrow requests.
3	This HAL license server will deny any requests, but is required as a part of the configuration to ensure high availability.

   You must specify the three servers in the license server configuration file for *each of the three servers* that will be used in your HAL configuration. To ensure the configuration files are identical, you may wish to edit one configuration file and copy the file to the other two servers. (The servers may have different settings throughout the configuration file as needed, but the HAL settings must be identical.)

2. Open the log file to verify the HAL license servers are started and working normally, indicated by the line "Ready to serve..." as shown in the following example. (This example is the log file for a master server; that is, the server specified as HAL_SERVER1 in the configuration file.)

```
[2016-01-21 16:13:04] License server using TCP IPv4 port 6200.
[2016-01-21 16:13:04] License server using UDP IPv4 port 6200.
[2016-01-21 16:13:04] Logfile path: lmx-server.log
[2016-01-21 16:13:04] License file(s):
[2016-01-21 16:13:04] C:\LM-X\xformation.lic
[2016-01-21 16:13:04] Serving following features:
[2016-01-21 16:13:04] f1 (v1.5) (5 licenses) license type: exclusive
[2016-01-21 16:13:04]
[2016-01-21 16:13:04] Minimum user remove time set to 120 seconds.
[2016-01-21 16:13:04] Ready to serve...
[2016-01-21 16:13:04] HAL: This license server is configured as a HAL MASTER.
[2016-01-21 16:13:04] HAL: Peer server: my_#2_server:6200
[2016-01-21 16:13:04] HAL: Peer server: my_#3_server:6200
[2016-01-21 16:13:04] HAL: CHECKOUT requests on this server are NOT ALLOWED!
[2016-01-21 16:13:04] HAL: BORROW requests on this server are NOT ALLOWED!
[2016-01-21 16:13:04] HAL: Connection with HAL peer my_#2_server:6200 is up!
[2016-01-21 16:13:04] HAL: Connection with HAL peer my_#3_server:6200 is up!
[2016-01-21 16:13:19] HAL: CHECKOUT requests on this server are ALLOWED!
[2016-01-21 16:13:19] HAL: BORROW requests on this server are ALLOWED!
```

Note that the log file for the servers specified as HAL_SERVER1 and HAL_SERVER2 in the configuration file (the servers that allow requests) may initially indicate that the server is not allowing requests. However, within 30 seconds, when the connection between the servers is detected, the log file will report that requests are allowed.

For more information, please refer to Enabling and configuring HAL.

As for normal license servers, the log file will indicate the cause of any problems running the HAL servers. Note: you must disable or configure your firewall on each HAL server for HAL to function properly.

49

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Setting up HAL servers on AWS

You can set up High Availability Licensing (HAL) servers on Amazon Web Services (AWS) EC2, as described here.

Every EC2 instance has both a public and private address. The LM-X server requires that HAL license server settings are identical for all three HAL peers (redundant servers). To provide access for redundant EC2 machines and ensure that the LM-X server will recognize the HAL type, use the private IP address for the LM-X configuration and map the private IP addresses to their corresponding public IP addresses.

For Linux, set this mapping in the /etc/hosts file. For Windows, set this mapping in the {Windows folder}\System32\drivers\etc\hosts.

Example

The following shows an example for three EC2 instances with a Linux OS.

For this example, the private IP to public IP mappings are as follows:

HAL1: Private IP - 172.31.5.33, Public IP - 34.253.25.122
HAL2: Private IP - 172.31.6.253, Public IP - 34.245.22.38
HAL3: Private IP - 172.31.10.194, Public IP - 46.137.69.84

The configuration settings to add to LM-X for the example mappings are as follows:

HAL_SERVER1 = 6200@172.31.5.33
HAL_SERVER2 = 6200@172.31.6.253
HAL_SERVER3 = 6200@172.31.10.194

The settings to add to the /etc/hosts file for the example mappings are as follows:

172.31.5.33 34.253.25.122
172.31.6.253 34.245.22.38
172.31.10.194 46.137.69.84

It is recommended to use an Elastic IP address to reserve your public IP address. For more information about using Elastic IP addresses, see https://repost.aws/knowledge-center/intro-elastic-ip-addresses.

After completing the setup steps as described in the example above, you must start or restart the LMX server.

When setting up HAL from the LM-X License Server Client, the server state "Down" indicates that the private IP isn't reachable from outside the network.

Troubleshooting

Always check the logs after setting up HAL to ensure that HAL has been set up correctly and to verify that a connection has been made.

The most common mistakes that may occur when setting up HAL on AWS include the following:

- The LMX server port is not reachable
- The private IP address is not reachable from outside the network (indicated by the server state being reported as "Down" when setting up HAL from the LM-X License Server Client)
- The public IP address was changed (and didn't use Elastic), but the host map was not updated accordingly
- The public IP address was used instead of the private IP address in the HAL configuration

For more information about AWS addressing, see the official AWS website at https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-instance-addressing.html.

For more information about LM-X's HAL feature, see High Availability Licensing.

50

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Pay Per Use feature

The Pay Per Use feature captures license usage in a pay-per-use database which can then be sent to the vendor upon request. The database is authenticated, and its contents can be validated by the vendor.

For example, if you have an unrestricted use license that is paid for based on monthly usage, your vendor can request that you write the usage information to a pay-per-use database each month, and send the database file to them for billing purposes.

Usage databases use SQLite, a free open source database. You can find out more about SQLite at http://www.sqlite.org.

51

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Enabling and using usage databases

The information on this page refers to LM-X v4.4 or newer, which added the USAGE_WRITE_INTERVAL setting. This setting is not available in previous versions of LM-X.

The vendor enables Pay Per Use by editing the USAGE_DATABASE entry (disabled by default) in the license server configuration file. The configuration file contains a description and examples for using the USAGE_DATABASE setting. (For information on configuring Pay Per Use, see License server configuration file and Enabling and configuring license server logging.)

You can edit the USAGE_LEVEL setting in the configuration file to specify whether to generate a STANDARD report that does not include user information, or an EXTENDED report that includes the username, hostname and IP address for each checkout and checkin request. The USAGE_LEVEL setting is set to STANDARD in the configuration file by default. In addition, you can set the USAGE_WRITE_INTERVAL option in the configuration to specify the number of pay-per-use actions (checkouts, checkins, etc.) that should occur before pay-per-use records will be written to the usage database file. Note that records will immediately be written to the database file when the server is shut down.

The usage database can be verified and printed to screen using the lmxendutil -readusagedb command. (See LM-X End-user utility for information about using this command.) This command reads the database, performs a verification, and prints the usage table content to the screen. You can review the content to ensure its validity by verifying the ID ranges; however, never attempt to manipulate the database.

52

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Database structure

The usage database contains several tables; however, the only table that may be accessed is named usage. The other tables are for authentication purposes only.

The contents of the usage table are described below.

Table name	Columns	Description
usage	(id integer primary key, time integer, action text, comment text, auth text)	This table contains usage information. Each row in the table contains a timestamp, an action that occurred, comments on additional information if applicable, and authentication information.

The time format used in the time integer column is "time_t," which you can find out more about by going to: http://en.wikipedia.org/wiki/Time_t.

The action text column will contain one of the following:

Action	Description
STARTUP	Indicates the license server started up. The comment text column is empty.
SHUTDOWN	Indicates the license server was shut down. The comment text column is empty.
CHECKOUT	Indicates a checkout was performed. The comment text column contains additional information related to the checkout, including the feature name, a unique id of the specific feature (in case there are multiple licenses on the server of the same feature name), and a count. For example, (FEATURE: UNLIMITED UNIQUEID: 5E7100EE3F98F68F559AB09D57AA8BA154F77907A48D2487 COUNT: 1 SOFTLIMIT_EXCEEDED: FALSE). SOFTLIMIT_EXCEEDED indicates whether the number of licenses specified for softlimit licensing has been exceeded.
CHECKIN	Indicates a checkin was performed. The comment text column contains additional information related to the checkin, in the same manner as for CHECKOUT.
USAGE	Specifies the current usage of a particular feature. This is the sum of all checkouts, checkins, and borrows that have occurred. The comment text column contains additional information related to the usage, in the same manner as for CHECKOUT. For example, (FEATURE: UNLIMITED UNIQUEID: 1ECA6DB5DDEAA15E565AE7C78AFBB6F67DC9F35593CCBFB0 COUNT: 2 SOFTLIMIT_EXCEEDED: FALSE USERNAME: Administrator HOSTNAME: amilo IPADDRESS: ::1) The above example shows the syntax for USAGE_LEVEL set to EXTENDED, which includes USERNAME, HOSTNAME, and IPADDRESS (see Enabling and using usage databases).

53

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Usage table example

The following is a partial example of a usage table printout.

```
Timestamp: 2009-01-30 07:37:06 Action: CHECKOUT Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 3
Timestamp: 2009-01-30 07:37:06 Action: USAGE Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 402
Timestamp: 2009-01-30 07:37:06 Action: CHECKOUT Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 3
Timestamp: 2009-01-30 07:37:06 Action: USAGE Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 405
Timestamp: 2009-01-30 07:37:06 Action: CHECKIN Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 32
Timestamp: 2009-01-30 07:37:06 Action: USAGE Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 373
.
.
.
Timestamp: 2009-01-30 07:37:08 Action: CHECKIN Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 61
Timestamp: 2009-01-30 07:37:08 Action: USAGE Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 0
Timestamp: 2009-01-30 07:37:08 Action: CHECKOUT Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 500
Timestamp: 2009-01-30 07:37:08 Action: USAGE Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 500
Timestamp: 2009-01-30 07:37:08 Action: CHECKIN Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 500
Timestamp: 2009-01-30 07:37:08 Action: USAGE Comment: FEATURE: TEST_MULTIUSER
UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 0
Timestamp: 2009-01-30 07:37:08 Action: SHUTDOWN Comment:
```


54

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Borrowing a license

LM-X License Manager supports license borrowing, which lets you use a network license without being connected to the license server. Borrowing is commonly used in cases such as taking a laptop computer home for the weekend or for traveling off-site, giving you access to the software when a connection to the network is not possible.

Your software vendor must allow license borrowing for it to be available for your use. In some cases, the vendor may supply an interface for borrowing or returning licenses. Otherwise, you can borrow and do an early return of licenses by setting an LM-X environment variable specifically for this purpose.

Use the following steps to borrow a license using an LM-X environment variable. (Instructions given for accessing environment variable settings are for Windows 7. Please see your OS documentation or your system administrator for instructions on editing environment variables for your specific OS.)

1. Open the Windows Control Panel and select **System and Security**.
2. Select **System** from the System and Security options.
3. Select **Advanced system settings** from the list of options in the left column of the System window.
4. From the System Properties dialog that appears, select **Environment Variables**...
5. Under System variables, select **New.**..
6. For the Variable name, enter LMX_BORROW or vendor_BORROW (where vendor is the name of the software vendor for the software to be borrowed). Set the value to the number of hours for which you want to borrow the license. This number cannot be greater than the number of hours the software vendor allows.
7. Click **OK** to add the variable.
8. Click **OK** from the Environment Variables dialog to save your changes, and then click **OK** from the System Properties dialog.
   If you're running the application, be sure to restart it after setting the environment variable change to ensure that the settings are picked up. The license will be borrowed the next time you checkout the license and will be available for the specified duration, after which the application will no longer be available without connecting to the license server.
9. If you want to do an early return of the license at any time before its expiration, repeat the steps above to access the environment variables, then select LMX_BORROW from the list of environment variables, and click **Edit**.
10. Change the value to -1 (or any negative value). This will return the license so it's once again available for other users to check out.

Note: You can query the server to see whether a license is borrowed at any time using the LM-X End-user Configuration Tool or LM-X End-user utility, lmxendutil.

In very rare cases, the client may not receive a borrowed license due to network problems that occur at the exact time a license is being borrowed. Because borrowing is not transaction based, the server may see the borrow as successful and will not allow the client to attempt another borrow. Instead, a second borrow request will fail with the message "Feature already borrowed on server." The client must then wait until the borrow time expires to successfully borrow a license if this network problem occurs.

55

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Automatic server discovery

LM-X License Manager's automatic server discovery allows a client application to find license servers on the network automatically. This feature eliminates the need for end users to enter server information and makes it easy for system administrators to move from one license server to another without notifying users. Automatic server discovery is performed only when the license server is unavailable or the feature couldn't be found on the known license servers. Otherwise, a local cache is used, making this feature unobtrusive and lightweight.

Note: Automatic server discovery works only on local networks and will not work on WAN or VPN connections.

If your software vendor allows automatic server discovery to be used for its licenses, you can enable it by setting an LM-X environment variable specifically for this purpose, as described below. (Instructions given for accessing environment variable settings are for Windows. Please see your OS documentation or your system administrator for instructions on editing environment variables for your specific OS.)

1. Open the Windows Control Panel and select **System and Security**.
2. Select **System** from the System and Security options.
3. Select **Advanced system settings** from the list of options in the left column of the System window.
4. From the System Properties dialog that appears, select **Environment Variables**...
5. Under System variables, select **New**...
6. For the Variable name, enter LMX_AUTOMATIC_SERVER_DISCOVERY or vendor_AUTOMATIC_SERVER_DISCOVERY (where vendor is the name of the software vendor for which to use automatic server discovery) and set the value to 1 (or any other integer) to enable it.
7. Click **OK** to add the variable.
8. Click **OK** from the Environment Variables dialog to save your changes, and then click **OK** from the System Properties dialog to close it.

56

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Queuing licenses

License queuing, which must be enabled by your vendor, helps you implement fair usage when licenses may not be immediately available. This feature is particularly useful for jobs scheduled for automatic execution.

Without queuing enabled, checkout requests are immediately denied if the required license(s) are unavailable. If queuing is enabled, its behavior is determined by the vendor; for example, applications may be placed on hold until the necessary license(s) become available. Contact your vendor for information about how license queuing has been implemented for your licenses. All license requests are appended to the end of the queue by default, regardless whether the request can be fulfilled immediately.

To enable license queuing, set the LM-X environment variable LMX_QUEUE, as described below (see also Environment variables). (Instructions given for accessing environment variable settings are for Windows 7. Please see your OS documentation or your system administrator for instructions on editing environment variables for your specific OS.)

1. Open the Windows Control Panel and select **System and Security**.
2. Select **System** from the System and Security options.
3. Select **Advanced system settings** from the list of options in the left column of the System window.
4. From the System Properties dialog that appears, select **Environment Variables...**
5. Under System variables, select **New...**
6. For the Variable name, enter LMX_QUEUE or *vendor*_QUEUE (where *vendor* is the name of the software vendor for which to use license queuing) and set the value to 1 (or any positive number) to enable it.
7. Click **OK** to add the variable.
8. Click **OK** from the Environment Variables dialog to save your changes, and then click **OK** from the System Properties dialog to close it.

Alternatively, you can enable fast queuing, which allows requests to be fulfilled immediately when possible. Fast queuing can allow smaller license requests to be processed more promptly and help ensure higher license utilization. However, because it might enable users to bypass the queue, it does not necessarily implement fairness.

For example, if a client is waiting for two licenses, and only one license is immediately available, another client that needs only one license can bypass the queue and take the single license without waiting.

To enable fast queuing, edit the FAST_QUEUE option in your license server configuration file. You can enable fast queuing for specified features or for all features; for example:

```
FAST_QUEUE =  f1, f3
or
FAST_QUEUE = ALL
```


57

Logs

LM-X includes the following logs.

Log	Description

License server log	This log lists server actions that are helpful for debugging. You can configure this log for normal or extended detail, as well as set rotation intervals, name and path, in the license server configuration file.
	
	Example of normal license server log:
	
	`[2010-10-07 10:53:46] LM-X License Server v3.6 build 7504 on Konradm-PC (Win32_x86)`
	`[2010-10-07 10:53:46] Copyright (C) 2002-2010 X-Formation. All rights reserved.`
	`[2010-10-07 10:53:46] Website: http://www.lm-x.com http://www.x-formation.com`
	`[2010-10-07 10:53:46] License server has pid 4676.`
	`[2010-10-07 10:53:46] Serving licenses for vendor XFORMATION.`
	`[2010-10-07 10:53:46]`
	`[2010-10-07 10:53:46] License server using TCP IPv4 port 6200.`
	`[2010-10-07 10:53:46] License server using TCP IPv6 port 6200.`
	`[2010-10-07 10:53:46] License server using UDP IPv4 port 6200.`
	`[2010-10-07 10:53:47] Reading licenses...`
	`[2010-10-07 10:53:47] License file(s):`
	`[2010-10-07 10:53:47] C:\x-formation\lm-x\win32_x86_vc2008\../../../../out/`
	`win32_x86/win32_x86/../examples/network/network.lic`
	`[2010-10-07 10:53:48] Log file path: C:\x-formation\lm-x\win32_x86_vc2008\`
	`licserver-accept-examples.log`
	`[2010-10-07 10:53:48] Log to stdout: Yes`
	`[2010-10-07 10:53:48] Log format: Normal`
	`[2010-10-07 10:53:48] Configuration file path: C:\x-formation\lm-x\win32_x86_vc2008\`
	`../../lmx-serv-examples.cfg`
	`[2010-10-07 10:53:48] Serving following features:[2010-10-07 10:53:48] f1 (v1.5)`
	`(5 license(s)) license type: exclusive`
	`[2010-10-07 10:53:48] f2 (v1.0) (5 license(s)) shared on: HOST USER license type: additive`
	`[2010-10-07 10:53:48] f2 (v1.0) (10 license(s)) license type: additive`
	`[2010-10-07 10:53:48] borrow (v1.0) (1 license(s)) license type: exclusive`
	`[2010-10-07 10:53:48] LicensedExampleClass (v1.0) (1 license(s)) license type: exclusive`

Extended client log	This log lists client actions, entirely for diagnostic purposes. This log is disabled by default. You can enable it using the LMX_EXTENDED LOG environment variable as described in Environment variables.
	
	This log will be generated or appended to every time a checkout request occurs.
	
	Example:
	
	`[2010-10-14 11:49:35] LM-X Extended Client Log`
	`[2010-10-14 11:49:36]`
	`[2010-10-14 11:49:36] Machine settings:`
	`[2010-10-14 11:49:36] Username: pkukielka`
	`[2010-10-14 11:49:36] Hostname: SUPPORT2-PC`
	`[2010-10-14 11:49:36] Vendor name: XFORMATION`
	`[2010-10-14 11:49:36] Working directory: c:\x-formation`
	`[2010-10-14 11:49:36] Platform: Win32_x86`
	`[2010-10-14 11:49:36] Version: 6.1`
	`[2010-10-14 11:49:36] Virtual machine: No`
	`[2010-10-14 11:49:36] Terminal server session: No`
	`[2010-10-14 11:49:36]`
	`[2010-10-14 11:49:36] Environment variables:`
	`[2010-10-14 11:49:36] LMX_AUTOMATIC_SERVER_DISCOVERY = <not set>`
	`[2010-10-14 11:49:36] LMX_QUEUE = <not set>`
	`[2010-10-14 11:49:36] LMX_PROJECT = <not set>`
	`[2010-10-14 11:49:36] LMX_BORROW = 1`
	`[2010-10-14 11:49:36] LMX_LICENSE_PATH = <not set>`
	`[2010-10-14 11:49:36] LMX_CONNECTION_TIMEOUT = 30`

58

lmxendutil - licstat output	This report contains license usage statistics, lists which users are currently using which licenses on a specific license server, and gives information on the borrow, grace and trial licenses currently checked out. See LM-X End-user utility for information on generating this report.
	
	Example:
	
	`LM-X End-user Utility v3.5`
	`Copyright (C) 2002-2010 X-Formation. All rights reserved.`
	`Searching all license paths and performing automatic server discovery...`
	`++++++++++++++++++++++++++++++++++++++++`
	`LM-X License Server on 6400@192.168.22.103:`
	`Server version: v3.6 Uptime: 0 hour(s) 0 min(s) 4 sec(s)`
	`----------------------------------------`
	`Feature: two_licserver Version: 1.0 Vendor: XFORMATION`
	`Start date: NONE Expire date: NONE`
	`Key type: EXCLUSIVE License sharing: VIRTUAL`
	`10 of 10 license(s) used:`
	`10 license(s) used by hg@vista-x64 [::1]`
	`Login time: 2010-10-14 15:37 Checkout time: 2010-10-14 15:37`
	`++++++++++++++++++++++++++++++++++++++++`
	`LM-X License Server on 6200@192.168.22.103:`
	`Server version: v3.6 Uptime: 0 hour(s) 0 min(s) 23 sec(s)`
	`----------------------------------------`
	`Feature: f3 Version: 1.5 Vendor: XFORMATION`
	`Start date: NONE Expire date: NONE`
	`Key type: EXCLUSIVE`
	`0 of 5 license(s) used`
	`----------------------------------------`
	`Feature: f2 Version: 1.0 Vendor: XFORMATION`
	`Start date: NONE Expire date: NONE`
	`Key type: EXCLUSIVE License sharing: VIRTUAL`
	`0 of 5 license(s) used`
	`----------------------------------------`
	`Feature: grace Version: 1.0 Vendor: XFORMATION`
	`Start date: NONE Expire date: NONE`
	`Key type: EXCLUSIVE License sharing: VIRTUAL`
	`0 of 5 license(s) used`

lmxendutil - licstatxml output	This report contains license usage statistics and lists currently used licenses on a specific license server as XML. See LM-X End-user utility for information on generating this report.
	
	Example:
	
	`<?xml version="1.0" encoding="UTF-8"?>`
	`<LM-X STAT_VERSION="3.6">`
	`<LICENSE_PATH TYPE="NETWORK" HOST="6200@rafal-PC" SERVER_VERSION="3.6" UPTIME="0`
	`\\hour(s) 0 min(s) 30 sec(s)" STATUS="SUCCESS">`
	`<FEATURE NAME="f1" VERSION="1.5" VENDOR="XFORMATION" END="2018-01-01"`
	`\\USED_LICENSES="0" TOTAL_LICENSES="5" SHARE="VIRTUAL"/>`
	`<FEATURE NAME="f2" VERSION="1.0" VENDOR="XFORMATION" END="2018-01-01"`
	`\\USED_LICENSES="0" TOTAL_LICENSES="5" SHARE="HOST ,USER ,VIRTUAL"/>`
	`<FEATURE NAME="f2" VERSION="1.0" VENDOR="XFORMATION" END="2018-01-01"`
	`\\USED_LICENSES="0" TOTAL_LICENSES="10" SHARE="VIRTUAL"/>`
	`<FEATURE NAME="borrow" VERSION="1.0" VENDOR="XFORMATION" USED_LICENSES="0"`
	`\\TOTAL_LICENSES="1" SHARE="VIRTUAL"/>`
	`<FEATURE NAME="LicensedExampleClass" VERSION="1.0" VENDOR="XFORMATION"`
	`\\USED_LICENSES="0" TOTAL_LICENSES="1" SHARE="VIRTUAL"/>`
	`<FEATURE NAME="prod_a" VERSION="1.0" VENDOR="XFORMATION" USED_LICENSES="0"`
	`\\TOTAL_LICENSES="5" SHARE="VIRTUAL"/>`
	`<FEATURE NAME="prod_b" VERSION="1.0" VENDOR="XFORMATION" USED_LICENSES="0"`
	`\\TOTAL_LICENSES="5" SHARE="VIRTUAL"/>`

59

Pay-per-use database file	This database file lists pay-per-use information that can be sent to your vendor for billing purposes. See Pay Per Use feature for more information.
	
	Example:
	
	`Timestamp: 2009-01-30 07:37:06 Action: CHECKOUT Comment: FEATURE: TEST_MULTIUSER`
	`UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 3`
	`Timestamp: 2009-01-30 07:37:06 Action: USAGE Comment: FEATURE: TEST_MULTIUSER`
	`UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 402`
	`Timestamp: 2009-01-30 07:37:06 Action: CHECKOUT Comment: FEATURE: TEST_MULTIUSER`
	`UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 3`
	`Timestamp: 2009-01-30 07:37:06 Action: USAGE Comment: FEATURE: TEST_MULTIUSER`
	`UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 405`
	`Timestamp: 2009-01-30 07:37:06 Action: CHECKIN Comment: FEATURE: TEST_MULTIUSER`
	`UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 32`
	`Timestamp: 2009-01-30 07:37:06 Action: USAGE Comment: FEATURE: TEST_MULTIUSER`
	`UNIQUEID: C48E3CC9D201846D8FC3F2C0B22289323D64E026750ECBFE COUNT: 373`

60

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Error messages

For a complete list of error messages that may be encountered for LM-X License Manager, please refer to Return codes.

61

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End-user solutions

The following sections offer solutions to potential problems you may encounter when using LM-X License Manager. You can also find additional topics in the LM-X Enduser section of the X-Formation Knowledgebase.

- Managing multiple programs running against multiple versions of LM-X

62

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Managing multiple applications running against multiple versions of LM-X

To manage multiple applications running against multiple versions of LM-X:

- *For local licenses*: you only need to ensure that the license path for each application is correct for its respective license.
- *For network licenses*: we recommend that you use the tools provided by your application vendor. You can easily start up multiple license servers on the same machine.

If you are certain that multiple licenses are using the same version of LM-X, you can have a single license server host multiple licenses. The easiest way to test this is to add each license to the license server configuration file and make sure that the license server still starts up.

63

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LM-X End User's FAQ

This FAQ section addresses the most commonly-asked questions about LM-X License Server. We try to regularly update this section with new information to help you quickly and easily find the information you're looking for. If you have a question that we have not answered here, please contact our support team.

You can find answers to your questions in the following sections:

Usage Information
How can I obtain LM-X License Manager dongle drivers?
BIOS/HARDDISK serial numbers disappear on Windows
Why am I getting communication errors between the client and LM-X license server?
Does LM-X License Manager allow our users to travel with their licenses?
Can end users administer and monitor their licenses?
Can I combine multiple license files into one?

64

Usage Information

How can I obtain LM-X License Manager dongle drivers?

At X-Formation we offer Sentinel HASP HL Pro dongles. For more information about downloading the latest Sentinel HASP drivers, go to End User Tools Downloads.

Note: If an LM-X dongle is plugged into a machine that does not have the dongle drivers installed, the Windows "Found New Hardware" dialog will appear. You can follow the prompts in this dialog to install the drivers using Windows update.

You may also download the dongle drivers attached to this article. If desired, software vendors can ship the drivers to customers along with the dongle.

BIOS/HARDDISK serial numbers disappear on Windows

If the serial numbers of BIOS and HARDDISK HostIDs disappear on your Windows machine, you should check if all the drivers for your motherboard are correctly installed.

Furthermore, one workaround to mitigate this problem is to use the HostID match rating setting, HOSTID_MATCH_RATE.

For more information about this problem, see Operating system issues.

Why am I getting communication errors between the client and LM-X license server?

Communication errors between the client and LM-X license server may indicate a problem with the client machine.

See Communication issues for more information.

Does LM-X License Manager allow our users to travel with their licenses?

LM-X License Manager supports a wide range of license policies, including borrowing a license. For an overview of some of the license policies that LM-X can handle, see Define a license policy.

Can end users administer and monitor their licenses?

With LM-X License Manager, software vendors can provide end users with a license file they can use as a standalone license or with a license server. Our license monitoring software, License Statistics, lets endusers monitor the use of floating or standalone licenses.

Can I combine multiple license files into one?

Although it is usually possible to combine licenses, we recommend that in most cases individual licenses are kept separate. LM-X protected applications will search specified license paths for standalone licenses until a correct license is found, so there is generally no reason for combining licenses.

65

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Troubleshooting end-user problems

If you experience problems with LM-X, we may ask you to enable extended logging, and send us the log files from the LM-X log directory.

Troubleshooting for specific issues is covered in the following sections:

Enabling extended logging in LM-X

Communication issues

Locale issues

Operating system issues

System clock check issues

System security issues

66

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Enabling extended logging in LM-X

If you experience problems with LM-X, we may ask you to enable extended logging, as described below.

Enabling extended logging for client-side logs

To enable client-side extended logging in Windows:

1. Set the environment variable LMX_EXTENDEDLOG; for example:
   ```
   $ set LMX_EXTENDEDLOG=C:\Users\john\lmx-extended.txt
   $ my-application.exe
   ```
2. Restart your licensed software.

To enable client-side extended logging in Linux:

1. Set the environment variable LMX_EXTENDEDLOG; for example:
   ```
   $ export LMX_EXTENDEDLOG="/var/log/lmx-extended.log"
   $ ./my-application
   ```
2. Restart your licensed software.

Enabling extended logging for license server

To enable extended logging for the license server in Windows or Linux, either:

- Enable extended logging in the license server configuration file.
  or
- Set the extended logging in the LM-X License Server Client.

For more information about license server logging, see License server log file.

67

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Communication issues

Failure to establish communication with the network

If communication between the client machine and the LM-X License Server cannot be established, you may see one or more of the following errors:

```
Error 3, LMX_NO_NETWORK: Unable to initialize network subsystem.
Error 15, LMX_NO_NETWORK_HOST: Unable to connect to license server.
Error 16, LMX_NETWORK_DENY: Rejected actively from license server.
```

These error codes indicate a problem with the client machine; for example, there may be no network card, the license server may be down, or user permissions may be inadequate.

Problem after establishing connection with the network

If communication between the client machine and the LM-X License Server fails, you may see the following error:

```
Error 47, LMX_NETWORK_RECEIVE_ERROR: Error receiving message over network.
```

This error indicates a problem with the client machine failing to maintain a TCP connection; for example, a firewall may be blocking a TCP connection, or connection to the server may be slow.

68

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Locale issues

"locale::facet::_S_create_c_locale name not valid" error on Ubuntu 14.04.

LM-X performs checks to verify that environment variables (for example LC_ALL or LANG) are set. If they are not set, then LM-X sets them to "C". However, if the environment variable does not point to a valid locale, then LM-X does not perform any action, because it considers such variable to be set. When LM-X is unable to find a valid locale, you will see an error similar to the following:

```
locale::facet::_S_create_c_locale name not valid
```

This is not an LM-X error, but rather indicates a problem with your local machine caused by a misconfigured locale.

You can use the following command to output information about the current locale environment on your system:

```
locale
```

To check if current locales are supported by your operating system, run the following command:

```
locale -a
```

To install the locale, run:

```
sudo locale-gen name_of_the_locale
```

For more information about locales, please refer to official Ubuntu documentation, or see the documentation relevant for your operating system.

69

Operating system issues

BIOS/HARDDISK serial numbers disappear on Windows

If the serial numbers of BIOS and HARDDISK HostIDs disappear on your Windows machine, you should check if all the drivers for your motherboard are correctly installed. This issue may occur after you have installed new firmware updates, or replaced generic Windows drivers with vendor-specific ones; for example for better OS performance, or to fix bugs.

This is not an LM-X License Manager error, bur rather indicates that the drivers provided by your hardware vendor do not work properly after update. To resolve this problem, make sure your drivers are correctly installed. Contact your hardware vendor for details on how to resolve this issue.

Mitigating the problem

One workaround to this problem is to use the HostID match rating setting, HOSTID_MATCH_RATE when locking a license to multiple HostIDs. This setting lets you specify the percentage required for a successful match, from 0 (no matching required) to 100 (exact matching required). For example, SETTING HOSTID_MATCH_RATE="50" indicates that a 50% or better match must be achieved so that the license can work. This means that you allow your users to run the software if only two out of four HostIDs values are valid.

"System time differs more than 24 hours" error

If there is a significant discrepancy between the LM-X License Server and license client, your lmx-server.log file will report an error message similar to the following:

```
[2013-09-24 11:44:07] CHECKOUT by pcuratolo@pcuratolo: FRONTEND
[2013-09-24 11:44:33] FAIL: Client pcuratolo@pcuratolo system time differs more than 24 hours. Please correct it!
[2013-09-24 11:44:33] CHECKIN by pcuratolo@pcuratolo: FRONTEND
[2013-09-24 11:44:33] FAIL: Client pcuratolo@pcuratolo system time differs more than 24 hours. Please correct it!
[2013-09-24 11:44:33] FAIL: New client pcuratolo@pcuratolo not allowed to connect.
```

This check is performed by LM-X to protect against deliberate attempts to set the system clock time in order to tamper with their license expiration time. To resolve this problem, you must ensure that server and client machine clocks are not more than 24 hours apart.

LMX_Free hangs when used within a dll file

When you have a dll, you typically have initialization code like the following:

```
BOOL APIENTRY DllMain(HANDLE hModule, DWORD ul_reason_for_call, LPVOID lpReserved)
{
    switch (ul_reason_for_call)
    {
        case DLL_PROCESS_ATTACH:
        case DLL_THREAD_ATTACH:
        case DLL_THREAD_DETACH:
        case DLL_PROCESS_DETACH:
            break;
    }

    return TRUE;
}
```

Using this code to initialize and free LM-X handles can cause LMX_Free to hang when using the DETACH handlers, because the OS can close threads without passing the information to the LM-X library. You should instead initialize LM-X by explicitly calling code to initialize and free LM-X from the exported dll interface.

70

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System clock check issues

"System clock has been set back" error

If you get a "system clock has been set back" error from LM-X License Manager, LM-X has detected that your system clock has been set back. Under some circumstances, the check can return a false positive. For example, you might have accidentally changed the clock to a future time.

To resolve this problem, you should set the system clock to the correct (present) time. If you believe the error is a mistake and your system clock seems to be correct, ask your application vendor for assistance.

For more information, see System clock check.

"WARN - License checkout not successful for session ..." error

LM-X License Manager may not work as expected if you get an error similar to the following:

```
2016-11-16 11:28:44,435 WARN - License checkout not successful for session Session ID/ Name. Error: LM-X Error:
(Internal: 98 Feature: Name of feature)
System clock has been set back from 1970-Jan-01 00:00:00
For further information go to http://www.x-formation.com
```

Assuming that LM-X client is embedded into an application running on IIS web server and, therefore, uses IIS_IUSRS identity, you need to have read access permissions to the following folder:

C:\Windows\SysWOW64\config\systemprofile\AppData\Local\x-formation

To resolve this issue, set read access permissions for IIS_IUSRS.

Why is my system clock set to a distant date in the future?

The Windows file system is based on the Gregorian calendar, which was instituted in 1582. Because of the constraints of the Gregorian calendar, you may get a “system clock has been set back” error indicating that the clock has been set back from a distant date in the future, for example:

```
System clock has been set back from 2022-Oct-16 17:30:49
```

ANSI C defines 32-bit `time_t`, which is interpreted as the number of seconds that have elapsed since 00:00:00 UTC on 1 January 1970 to 03:14:07 UTC on 19 January 2038.

LM-X License Manager uses `time_t`, because this is the only portable representation of time across operating systems. If a file from outside the span specified by `time_t` (for example 1750) is detected by Windows, the Windows API changes the time to the one that fits the range represented by the `time_t`, thereby resulting in LM-X informing the user that system clock check has been set back from a random date.

To fix this problem, reset the system clock using the LmxResetSystemClock tool to correct the time in the affected files. (See System clock check for more details.)

Problem with verifying system clock

If there is a problem with using lmxresetsystemclock.exe to synchronize your local system's clock with a remote time server, you may see the following error:

```
LM-X Error: Could not verify system clock due to failed connection with remote time server
```

To resolve this problem, it is necessary to verify that UDP port 123 (NTP protocol) is not blocked by a firewall.

71

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System security issues

"FAIL: CreateWindow > failed: 0" error

If there are problems with the socket stack and conflict between firewall or antivirus application and one of the hosts, you may see an error message similar to the following in the LM-X log file:

```
FAIL: CreateWindow > failed: 0
```

To fix this problem, you should verify your operating system security settings.

72

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LM-X Reference for FlexNet Users

This section provides a reference for users who are familiar with FlexNet/FLEXlm. You can use this reference to determine how FlexNet/FLEXlm-specific actions correspond with LM-X actions. This reference assumes you have experience using FlexNet/FLEXlm.

73

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Comparison of license files

LM-X licenses are text files, just like FlexNet/FLEXlm licenses. A typical LM-X license looks like the following example.

```
FEATURE my_app
\{
VENDOR = XFORMATION
VERSION = 1.0
END = 2015-03-27
LICENSEE = "COMPANY_ABC"
KEY = RNCLMCH561O4622J8JAA5U0EROSHD9RA22E5HOFEQSKVSTA5RO \
VGK7M5884EEI9V1PRB97BBAIH5AN4PU73LGUQDSDM
\}
```

LM-X has the same concept of features and vendors that FlexNet/FLEXlm does. However, the LM-X format is easier to understand, because everything is marked by specific keywords.

For more information about LM-X license files, see License files.

74

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Comparison of license paths

You use license paths to describe where licenses are found. In FlexNet/FLEXlm, the environment variable LM_LICENSE_FILE or *VENDOR*_LICENSE_FILE defines where the application should look for a license. With LM-X, you use the variable LMX_LICENSE_PATH or *VENDOR*_LICENSE_PATH.

The following tables show examples of specifying the path to a local license.

FlexNet/FLEXlm	LM-X
Windows: LM_LICENSE_FILE=C:\application\license.dat Unix: LM_LICENSE_FILE=/usr/application/license.dat	Windows: LMX_LICENSE_PATH=C:\application\myapplication.lic Unix: LMX_LICENSE_PATH=/usr/application/myapplication.lic

Examples of specifying the path to a network license:

FlexNet/FLEXlm	LM-X
Windows: LM_LICENSE_FILE=port@host Unix: LM_LICENSE_FILE=port@host	Windows: LMX_LICENSE_PATH=port@host Unix: LMX_LICENSE_PATH=port@host

75

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Comparison of license server setup

When setting up a network license, you must set up a license server. The table below specifies the files required for a network license setup and how they relate to FlexNet/FLEXlm files.

FlexNet/FLEXlm	LM-X
License server Windows: lmgrd.exe Unix: lmgrd	License server Windows: lmx-serv.exe Unix: lmx-serv
Vendor daemon Windows: *vendord*.exe Unix: *vendord*	Vendor daemon Windows: lmx-serv.exe Unix: lmx-serv
License file license.dat	License file networkapp.lic
Option file *vendord*.opt	Configuration file lmx-serv.cfg

Note that lmgrd and the vendor daemon are collected into one license server in LM-X.

Instead of specifying port numbers, SERVER lines and optional information in the license file and option file, you specify this information in the license server configuration file, lmx-serv.cfg. Some settings, such as license file and log file paths and port number, may also be specified at the command line, as described in Running the license server from a command line.

When you want to set up your network license server, make sure that you have the lmx-serv executable, lmx-serv.cfg, and your network license.

76

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The LM-X License Server

The LM-X License Server works in the same way as a FlexNet/FLEXlm license server. It serves licenses by listening on a specific TCP port and allowing you to check out licenses for network use or for borrowing, if enabled by your application vendor. Additionally, the server uses UDP for automatic server discovery. This enables applications to find the server without specifying a hostname.

Under Windows, you can run the license server in the console or as a service that runs in the background. Under Unix, you can run the license server in the foreground or background.

77

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Comparison of license server parameters

To see and change license server parameters, refer to the chart below.

Action to perform	FlexNet /FLEXlm	LM-X
See if the license server is up or who is using the license server	lmutil lmstat lmutil lmdiag	lmxendutil -licstat -host *host* -port *port*
See the hostid of the client or server machine	lmutil lmhostid	lmxendutil -hostid
Remotely shutdown the license server	lmutil lmdown	lmxendutil -shutdownserver -host *host* -port *port* -password *password*
Remotely restart the license server	lmutil lmreread	lmxendutil -restartserver -host *host* -port *port* -password *password*
Remove a user from the license server	lmutil lmremove	lmxendutil -removeuser -clientusername *username* -clienthostname *host* -host *host* -port *port* -password *password*

78

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Administration

The following sections describe the administrative functions of the LM-X web-based UI, which are located as sub-tabs under the Administration tab. Many settings in the Administration sub-tabs give you a user interface for modifying the contents of the configuration file; for example, setting values for HAL servers, the Pay Per Use database, logging, etc.

To ensure that the administrative functions are accessed only by authorized administrators, you must enter a valid password to open the Administration tab. The password is stored in the configuration file and can be seen when setting up the license server.

79

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Managing licenses

To manage licenses, go to the License Management sub-tab under the Administration tab. From this page, you can activate (download) a license from License Activation Center (LAC). In addition, you can upload license files; for example, a file that your vendor has sent to you via email or a license that you have previously activated and want to upload to the server.

- To activate a license, enter the activation key, and then click **Activate**. The activation key is added and automatically activated.
- To reactivate a license, click the **Reactivate** icon ( ) in the Action column for the license you want to reactivate. The license is removed and activated again.
- To delete a license, click the **Delete** icon ( ) in the Action column for the license you want to remove.
- To upload existing license files from LAC, click **Upload License File**, and then save the file to the desired location using the Upload File dialog that appears.

For general information about LAC, see Introduction to License Activation Center. For information about activating licenses in LAC, see License Activation Center End User Guide.

80

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Enabling and configuring HAL

To enable and configure High Availability Licensing (HAL), go to the High Availability Licensing sub-tab under the Administration tab.

1. To enable HAL, check the "Enable" checkbox.
2. Configure the HAL servers by entering the server information under the Configuration area.
3. To save your changes, click **Save**. You must restart the server for your changes to take effect. You can cancel any changes not yet saved by clicking **Cancel**.

For more information about HAL, see High Availability Licensing.

For information about setting up HAL for AWS, see Setting up HAL servers on AWS.

81

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Enabling and configuring Pay Per Use

To enable and configure Pay Per Use, go to the Pay Per Use sub-tab under the Administration tab.

- To enable Pay Per Use, check the **Enable** checkbox.
- Under the Configuration area, you can:
  - Change the Pay Per Use database name if desired.
  - Specify the desired format (Normal or Extended).
  - If using Extended format, you can also enable "Usage Anonymization," which hashes the usernames in the database. After turning this option on, you cannot undo the anonymization of the usernames in the database. Therefore, although this setting can be enabled or disabled at any time, we recommend that it remains set either on or off to avoid having a partially anonymized database.
- To download the Pay Per Use database file (for example, to deliver it to your vendor), click **Download** and select the desired location and file name for the file using the Save dialog that appears.
- To save your changes, click **Save**. You must restart the server for your changes to take effect.
- You can cancel any changes not yet saved by clicking the **Cancel** button.

For more information about how to use and configure Pay Per Use, see Pay Per Use feature.

82

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Enabling and configuring license server logging

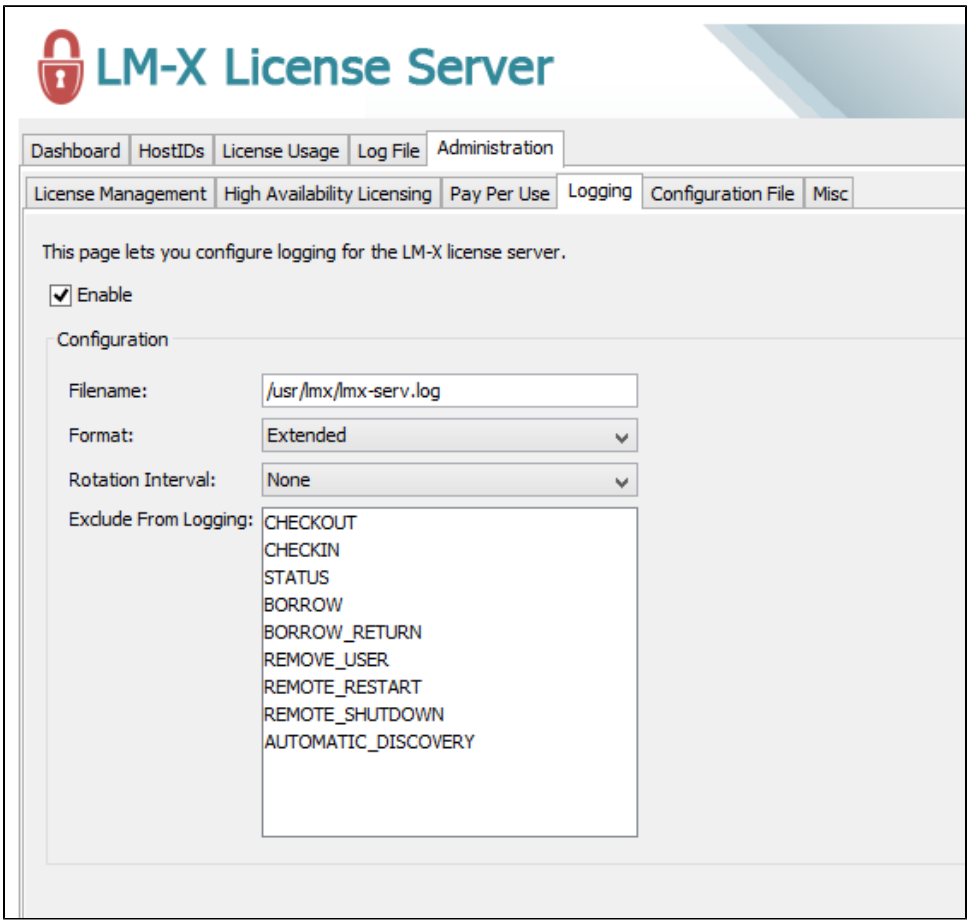
To enable and configure license server logging, go to the Logging sub-tab under the Administration tab.

1. To enable Logging, check the **Enable** checkbox.
2. Under the Configuration area, you can specify the name for the log file, the format of the file (Normal or Extended), the rotation interval (None, Daily, Weekly or Monthly) to use for removing older data, and any LM-X messages to exclude from logging.

   When using extended logging note that:

   - Extended logging results in greater detail in the log file.
   - Extended logs can be imported into License Statistics to obtain denied request statistics.
3. To save your changes, click **Save**. You must restart the server for your changes to take effect.

   The following is an example of enabling extended logging.



For more information about license server logging, see License server log file and License server configuration file.

83

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Editing the configuration file

The Configuration File sub-tab under the Administration tab lets you review and change the LM-X License Server configuration file.

- After making changes to the configuration file, click **Save**. You must restart the server for your changes to take effect.
- You can cancel any changes not yet saved by clicking the **Cancel** button.

84

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Miscellaneous settings

The Misc sub-tab under the Administration tab lets you configure settings for TCP, remote access and user removal. From this page, you can:

- Specify the TCP port number in the TCP Listen Port field. (For more information about the TCP Listen Port, see License server configuration file.)
- Enter a password for remote access to the license server in the Remote Access Password field. You must verify the password by entering it again in the Confirm Password field.
- Enable user removal by checking the Enable User Removal checkbox.
- Set the minimum time for user removal. The value for user removal must be no less than 120 (seconds). (For more information about user removal, see License server configuration file.)

85

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Removed features

This section includes documentation for functionality that no longer applies to the current version of LM-X. If you are running an older version of LM-X, you may refer to these sections for information applicable to your LM-X version.

Removed or outdated functionality includes:

Feature	Removed in
Installing and uninstalling a license server on Windows	v4.4.3
Installing a license server on Mac OS X	v4.4.3
LMX_AtExit	v4.6
Web-based UI	v4.8

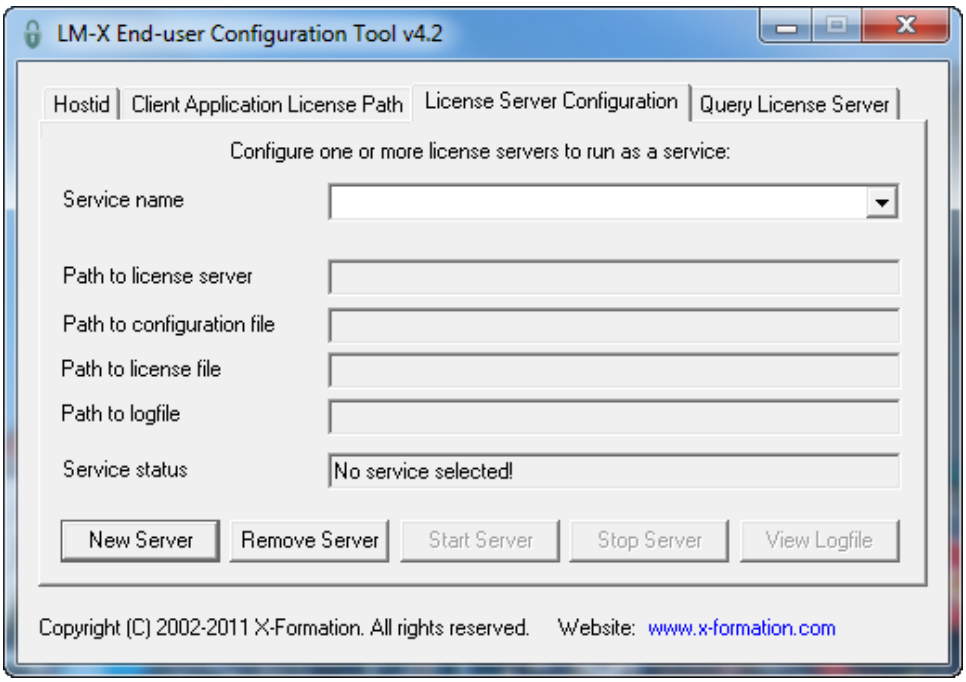
86

Installing and uninstalling a license server on Windows

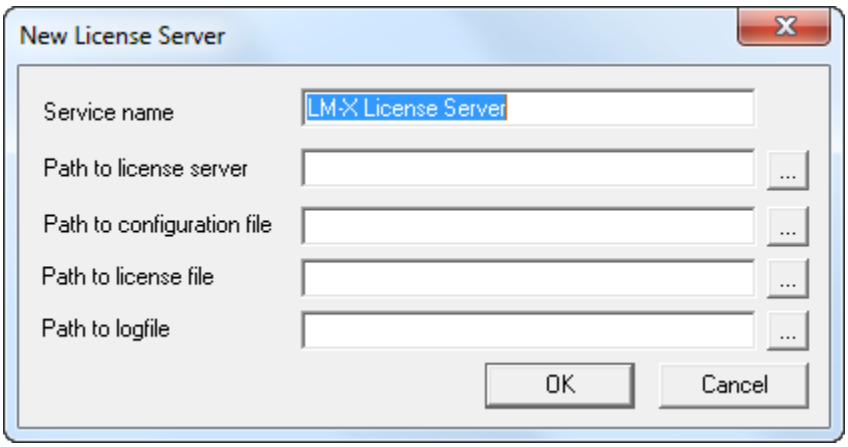
The information on this page refers to versions prior to 5.5, which extended the LICENSE_FILE setting to support specifying a license directory, and changed the LICENSE_FILE setting name to LICENSE_PATH.If you are using a previous version of LM-X, please see the documentation for the previous version.

The following steps describe how to easily install a license server as a service on Windows using the LM-X End-user Configuration Tool (Windows only). If you are using a HAL (High Availability License) server configuration, see High Availability Licensing for HAL-specific installation information.

1. Copy lmx-serv.exe and, if your vendor included a configuration file, lmx-serv.cfg into the directory where your server will reside. For example, C:\Program Files\Application.
2. Start the LM-X End-user Configuration Tool, lmxconfigtool.exe.
3. Click the **License Server Configuration** tab. This tab lets you manage license servers, including adding a new server, starting, stopping, and removing the server, monitoring its status and viewing its logfile.



4. In the License Server Configuration tab, click **New Server**.



5. In the New License Server dialog, specify the path to the license server location. For example, C:\program files\application\lmx-serv-*vendor*.exe. (You may browse for the file using the ... button.)
6. If your vendor included a configuration file, browse for and select the configuration file location. For example, C:\program files\application\lmx-serv.cfg. (You may browse for the file using the ... button.)
7. Additionally, you may add an optional license file and logfile to be used. Note that the logfile will override any settings for logfiles in the configuration file.
8. Click **OK** to install the license server as a service. (**Note**: The license server will not start until you reboot your computer or start it by clicking **Start Server**. You will do this later.)
9. If your vendor supplied a configuration file (lmx-serv.cfg by default), open it in a text editor, such as Notepad, and edit the entries for LOG_FILE and LICENSE_PATH to reflect the correct paths for your log file and license file.

If you specified a license file in the dialog, it will be read in addition to any specified in the configuration file. If you specified a logfile in the dialog, it will override any settings in the configuration file. (You may also need to make additional settings in the configuration file depending on your specific needs. For example, if you are using HAL licensing, you must edit the HAL settings as specified in How to install HAL license servers.)

10. In the License Server Configuration tab, click **Start Server**.
11. Click **View Logfile** to verify the license server is started and working normally, indicated by the line "Ready to serve..." as shown in the following example.

```
[2009-01-25 20:43:07] LM-X License Server v2.1 on amilo (Win32 x86)
[2009-01-25 20:43:07] Copyright (C) 2002-2009 X-Formation. All rights reserved.
[2009-01-25 20:43:07] Website: http://www.lm-x.com http://www.x-formation.com
[2009-01-25 20:43:07] License server has pid 17228.
[2009-01-25 20:43:07] Serving licenses for XFORMATION.
[2009-01-25 20:43:07] License server using TCP port 6200.
[2009-01-25 20:43:07] License server using UDP port 6200.
[2009-01-25 20:43:07] Logfile path: lmx-server.log
[2009-01-25 20:43:07] License file(s):
[2009-01-25 20:43:07] application.lic
[2009-01-25 20:43:07] Serving following features:
[2009-01-25 20:43:07] F3 (v1.5) (5 licenses) license type: exclusive
[2009-01-25 20:43:07] F2 (v1.0) (5 licenses) license type: exclusive
[2009-01-25 20:43:07] Ready to serve...
```

If there are any problems running the license server, the log file will indicate the cause of the problem. If you cannot find a log file, check to make sure that the correct configuration file was specified in step 6, and the configuration file contains the correct information. (Also see Limitations for installing LM-X License Server as a service, below.)

Limitations for installing LM-X License Server as a service

When installing LM-X License Server as a service, you should note the following limitations:

- The display name of installed LM-X license server service must be unique; if LM-X end-user tools have already been used with the LM-X License Server as a service, you must exercise care to use a different display name in subsequent installations.
- Two distinct LM-X license servers cannot be run as a service using liblmxvendor.dll files from the same vendor; for example, Server A can run with liblmxvendor.dll issued by vendor "XF", and Server B with "XFORMATION", but Server C can run with neither "XF" or "XFORMATION".

Uninstalling LM-X License Server

To uninstall LM-X License Server on Windows:

1. Uninstall the license server using the command line or LM-X End-user Configuration Tool.
2. Remove environment variables (you may use the Client Application License Path tab in the LM-X End-user Configuration Tool).
3. Delete the remaining files such as License server configuration file, utilities, etc.

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Installing a license server on Mac OS X

The information on this page refers to versions prior to 4.4.3, which introduced an installation program that installs both the license server and the end-user tools. Manual installation is no longer required for Mac OS X.

The attached script can be used to run a Mac OS X license server at system startup. This file must be placed in the /System/Library/LaunchDaemons/ directory.

All files used by the license server (licenses, logfile, configuration file, server executable) should be placed in /usr/xformation and must be accessible for the "daemon" user. General privileges can be set to 755 using chmod, as follows:

chmod -R 755 /usr/x-formation

The owner and group for the license server executable must have sufficient rights to run it, which you can set using the commands chown and chgrp.

Download file
com.xformation.lmx.plist

89

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LMX_AtExit

The information on this page refers to versions prior to 4.6, which removed the LMX_AtExit function.

The LMX_AtExit function registers functions that are to be called at program termination.

Prototype

```
LMX_STATUS LMX_AtExit
(
        AtExit_pfn Func
);
```

Parameters

Func

[in] Function to be called at cleanup.

Return values

On success, this function returns the status code LMX_SUCCESS.

On failure, this function returns an error code in the format described in Return codes.

Remarks

LMX_AtExit is used to register cleanup functions that access the LM-X API.

Note: Cstdlib's atexit(), WinApi's_onexit(), and static object destructors are not supported and will result in undefined behavior.

90

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Web-based UI

The information on this page refers to versions prior to 4.8, which replaced web-based UI with LM-X License Server Client.

LM-X License Manager includes a web-based UI that helps you to monitor and manage your LM-X License Server. The LM-X web-based UI runs on most popular browsers. For complete system requirements for the web-based UI, please see System requirements for UIs.

Using the web-based UI, you can:

- View information and statistics about the LM-X License Server.
- Restart or shut down the license server.
- View the LM-X server's HostIDs (unique machine values that can be used to lock a license file to a host), such as Ethernet, Hostname, IP Address, etc.
- View license usage statistics for the current license server, as well as for borrow, grace and trial licenses.
- View and edit the configuration file. (A password is required to access the configuration file.)
- View and search for entries in the log file.

91