Oasys
LS-DYNA Environment

Installation and Maintenance Guide for the Oasys Ltd LS-DYNA Environment Software

Linux | Version 22.0

Contents

Intended audience

This document is written for the System Manager responsible for loading and maintaining the Oasys 22.0 software. No special (engineering) knowledge of the software is required.

Further information may be obtained from:

UK	Tel:	+44 121 213 3399
	Email:	dyna.support@arup.com
China	Tel:	+86 21 3118 8875
	Email:	china.support@arup.com
India	Tel:	+91 40 6901 9723 / 98
	Email:	india.support@arup.com
USA	Tel:	+1 415 940 0959
	Email:	us.support@arup.com
Web		https://www.oasys-software.com/dyna/

or contact your local Oasys Suite distributor.

1 IMPORTANT CHANGES FOR OASYS 22.0

1.1 Licensing

The Oasys 22.0 uses LM-X from X-Formation for licensing.

LM-X is a well-known provider of licensing solutions, and it is likely that many Oasys Ltd customers already have an LM-X license service running for other CAE tools.

The Oasys 22.0 software requires a new LM-X license server, which will be provided by Oasys Ltd or your Oasys Suite distributor. If you are using a floating license server, you will need to install the LM-X license server software, which can be done as part of the Oasys 22.0 installation.

The Oasys 22.0 LM-X license file and LM-X license daemons are backwards compatible with all Oasys Suite software releases from 15.x onwards. This means that any existing software back to and including 15.x will continue to work with new LM-X license files and servers.

We recommend that you update all your Oasys Suite license servers with the files shipped with the Oasys 22.0 software.

1.2 Changes to Installation Organisation

The installation directory structure and nomenclature use the same organisation as Oasys 19.x to 17.x. Users of those releases should find the description below familiar, users migrating directly from an earlier release will find that some file names have changed and should read this section carefully.

The software is only available for 64-bit architecture (from Oasys 14.0 onwards). However, we have retained the "_64" suffix in the executable names both for backwards compatibility and to make it clear that these are 64-bit executables.

1.2.1 Executable filenames now contain minor version numbers

Prior to Oasys 14.0, the executable names only contained the major revision numbers, for example primer***22***_64.exe. Some users found that if a minor release, for example 22.0, was issued this caused confusion because the executable name did not change, making it hard to tell executables apart solely by their filenames; however other users preferred this system since it meant that the generic filename was always the most up to date version.

To try to solve this problem, and to please both schools of thought, the file naming convention has now been changed to include the minor version number:

name {major version} {_minor version} {_size} .exe

For example: primer***22***_*0*_***x64***.exe is PRIMER major release ***22***, minor release *0*, 64 bits.

To preserve backwards compatibility with previous naming conventions, and to please those preferring the old generic naming convention, symbolic links defining the generic names are also created as part of the installation process.

For example: primer22_64.exe ➔ primer22_0_64.exe (where ➔ is a symbolic link)

If a minor version (e.g. 22.***1***) of major release 22 is issued in the future, and the files are installed in the same directory then:

The new executables (e.g. primer22_*1*_64.exe) will be distinct.

The symbolic links will be updated so that the generic name points to the most recent minor release.

For example: primer22_64.exe ➔ primer22_*1*_64.exe

This updating of the symbolic links has consequences when one programme runs another, see the next section on usage of generic names.

(A symbolic link on Linux is a reference to a file, not the file itself. The syntax for creating a link is:

`ln -s` *actual_filename name_of_link*

For example, to set up a symbolic link for PRIMER:

```
ln -s  primer22_0_64.exe  primer22_64.exe
```

Deleting the link (e.g. **`rm primer22_64.exe`**) does not delete the actual file that it points to. If you want to change a link you will need to delete it before recreating it.

Deleting the actual file does not delete the link but leaves it "hanging" and pointing to nowhere.)

1.2.1.1 The software itself defaults to the generic names

Some pieces of Oasys software reference other programmes within the suite. For example:

- REPORTER can run PRIMER, D3PLOT and T/HIS,
- D3PLOT can run PRIMER and T/HIS
  and so on.

Within the software the default names used for running the other executables are the generic ones, i.e., no minor version suffix. For example, when REPORTER wishes to run PRIMER it will, by default, run the executable name primer22_64.exe.

This means that when a minor release is installed, the default will be for the most recent executable to run in this context. It is possible to override these defaults by using preferences, see section 4.

If you wish to segregate minor versions, for example you wish REPORTER 22.0 to run PRIMER 22.0 and REPORTER 22.1 to run PRIMER 22.1, then it will be necessary to place the new minor release in a separate installation directory.

Please contact Support for further information if you need more advice about this.

1.3 Supported architecture

From Oasys 14.0 onwards the software is only available in 64-bit form for x86-64 hardware.

This means that all the executables, including the LM-X licensing software, will only run on x86-64 hardware running a 64-bit operating system.

Oasys 22.0 has been tested on the following versions of Linux:

- Red Hat Enterprise Linux (RHEL) 8
- SuSE Enterprise 12.3

The standard Linux download is the RHEL 8 build since that has been found to run on all the modern Linux installations we have tested. If you require one of the other builds, please contact Support.

1.4 End of Support for RHEL 7

RedHat Enterprise 7 Linux reached “End of life” on June 30th 2024.

1.4.1 Oasys Suite software on RHEL 7

We will not release a RHEL 7 version of the Oasys Suite software version 22.

1.4.2 LMX Licence server on RHEL 7

We will continue to provide a RHEL 7 version of the LMX licence server for the life of V22, which is expected to extend to spring 2026. See section 8.2.2 for more details and download instructions.

If withdrawal of support for RHEL 7 creates problems for you please contact us as soon as possible so that we can discuss possible solutions.

1.5 Legacy Font support

If the software works “out of the box” for you and the fonts look acceptable you do not need to consider the contents of this section. However older machines may present problems, in which case read on…

Oasys 22.0 uses Freetype fonts on Linux by default (Versions 16.0 and earlier used "legacy" core X11 fixed fonts). The major differences are:

- Freetype has a much wider range of font typefaces.
- Freetype supports anti-aliasing, giving fonts a smoother appearance.
- The default proportional font in the user interface is now DejaVu Sans Condensed.

On most computers, especially those with a more recent version of Linux, the Freetype fonts will look much better than the old X11 ones. However, appearance is subjective, and some people find anti-aliased fonts look “fuzzy”, especially on lower resolution displays. Therefore, support for the old X11 fonts has been retained, users can switch back to these by turning off anti-aliasing in the Display, Menu_attributes control panel.

Most modern Linux installations do not load these legacy fonts by default, so if turning off anti-aliasing causes any of the following problems:

- Messages about missing fonts when software starts.
- Some fonts are missing in the user interface.
- Some or all fonts look wrong.

The problem will be that “core X11 fonts” have not been loaded onto the system and need to be installed. A good online resource for a range of common Linux versions is:

https://pkgs.org/download/xorg-x11-fonts-75dpi

Alternatively search for “xorg” and “fonts” in your installation media. Typical results for common Linux versions are listed below. You will need root privileges to install these, so

unless you are familiar with working as root and using commands such as "rpm", "yum" or "yast" please seek help from your IT department or alternatively contact Support.

1.5.1 RedHat / CentOS

```
xorg-x11-fonts-100dpi
xorg-x11-fonts-75dpi
xorg-x11-fonts-ISO8859-1-100dpi
xorg-x11-fonts-ISO8859-1-75dpi
xorg-x11-fonts-Type1
xorg-x11-fonts-misc
```

You do not have to install all of these.

The 75dpi and 100dpi font packages are the same typefaces at different resolutions. Surprisingly the 75dpi version tends to look better and is recommended.

1.5.2 SUSE 11

```
xorg-x11-fonts-core
xorg-x11-fonts
```

2 INSTALLATION ORGANISATION

2.1 Oasys 22.0 Installation Organisation

In Oasys 22.0, an option is provided to separate a top-level “administration” directory from the “installation” one where the executables are located.

For large installations on many machines this allows central configuration and administration files to exist in one place only, but executables to be installed locally on users’ machines to give better performance.

Oasys 22.0 also allows for the following items to be configured:

- The location for user manuals and other documentation.
- The definition of a user’s home directory.
- The definition of the temporary directory for scratch files.

In addition, parsing of the “oa_pref” (preferences) file will now handle environment variables, so that a generic preference can be configured to give a user-specific result, and preferences may be “locked” so that those set at the administration level cannot be changed by users.

These changes are entirely optional, and users performing a simple installation on a single machine do not need to make any changes to their existing installation practice.

Here are some diagrams which illustrate how installation might be carried out in various scenarios.

a) Single user installation on one machine

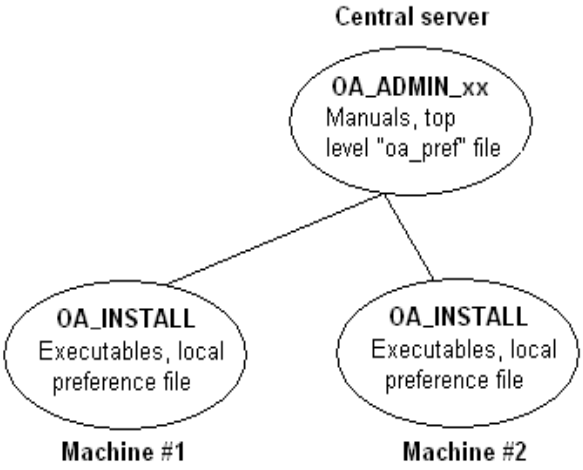
There is no need to worry about separating administration and installation directories, and the default installation of all files in and below the single installation directory will suffice.

b) A few machines on a small network, each user has their own machine

The top-level administration directory can be installed on a network server, possibly also locating the manuals centrally.

Each user's machine has its own "installation" directory to give good performance, but there is no need to manage home or temporary directories centrally since each user "owns" their machine.

If network performance is good an alternative would be to install executables on the central server, meaning that local OA_INSTALL directories are not required.



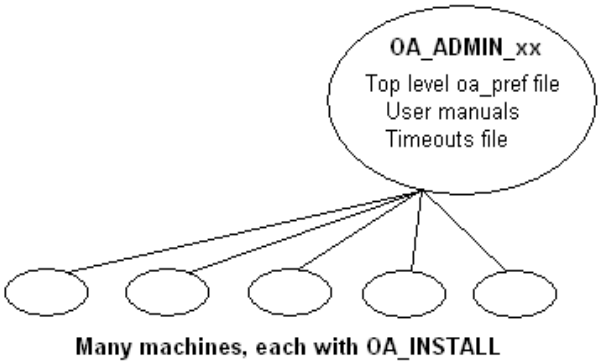
c) Large corporate network

The top level oa_pref file will set the "home" directory for users so that their home directory is the same regardless of the machine they use.

Timing out of idle licenses is managed centrally via the "timeouts" file.

Corporate policies can also be enforced if required by "locking" preferences in the top level oa_pref file.

Depending on network size & performance executables and manuals could be located on each machine, or on local server hubs, or centrally.



These configurations are not mandatory and are simply examples, you should choose the one that suits your needs.

Note the "_xx" in OA_ADMIN_xx and OA_INSTALL_xx refers to a version number, ie OA_ADMIN_22 for Oasys 22.0. This suffix is not required, but it is recommended as it will provide an easy way of organising parallel installations of future releases on a single machine.

Note also that while the various directories (OA_ADMIN_xx, OA_INSTALL_xx, OA_MANUALS, etc) can be defined by environment variables this is not recommended because it is inflexible, and also it would not permit two different installations to have different directories on the same machine.

It is recommended that the options in the top level oa_pref file to define these directories are used instead, since this encapsulates the definitions in a single place, permits multiple installations to co-exist on the same machine, and makes administration easier. See "oa_pref file options" in the table below.

2.1.1 Details of directory names

Directory	Status	Directory Content and purpose	oa_pref file option
OA_ADMIN_xx **or** **OA_ADMIN**	*Optional*	Top level configuration files. (**xx** = **22** for Oasys 22.0, thus **OA_ADMIN_22**) Admin level oa_pref file Other configuration files Timeout configuration file The generic version of this name, **OA_ADMIN** will be searched for if no release-specific version is set.	
OA_INSTALL_xx **or** **OA_INSTALL**	Required	All executables Installation level oa_pref file	**oasys*OA_INSTALL**
OA_MANUALS	*Optional*	Specific directory for user manuals. If not defined, then will search in: **OA_ADMIN_xx/manuals** (xx = major version number) **OA_INSTALL/manuals**	**oasys*manuals_dir**
OA_HOME	*Optional*	Specific "home" directory for user. If not defined will use: **$HOME** (Unix/Linux) **%USERPROFILE%** (Windows)	**oasys*home_dir**
OA_TEMP	*Optional*	Specific "temporary" directory for user. If not defined will use: **P_tmpdir** (Unix/Linux) **%TEMP%** (Windows)	**oasys*temp_dir**

OA_INSTALL_xx

Previously the software used the **OA_INSTALL** (renamed from **OASYS**) environment variable to locate the directory the software was installed in.

On LINUX systems the "oa_22" script that starts Oasys SHELL automatically sets this environment variable and passes it to any application started from the SHELL. If you run applications directly from the command line and bypass the SHELL, then you should set **OA_INSTALL** so that the software can locate manuals and other required files.

OA_ADMIN_xx

Users wishing to separate configuration and installation directories will be able to do so by making use of the new top-level **OA_ADMIN_XX** directory (**OA_ADMIN_22_** for Oasys 22.0).

If the **OA_ADMIN_XX** directory is used it will be necessary to set up an environment variable of this name to refer to it, however this should normally be the only environment variable required in the whole installation.

2.1.2 Dynamic configuration using the top level oa_pref file

While all the **OA_...** directories may be specified by environment variables of the same name, it is recommended that you do not do this but instead use the facility to set non-standard directory names dynamically using preferences in the top level oa_pref file.

For example:

Oasys 22.0	**Oasys 22.1**
Top level directory **OA_ADMIN_22**	Top level directory **OA_ADMIN_221**
oa_pref file in **OA_ADMIN_22** contains: **oasys*OA_INSTALL:** *<pathname for **22.0** installation>* **oasys*manuals_dir:** *<pathname for **22.0** manuals>* **oasys*home_dir:** *<pathname for home directory>* **oasys*temp_dir:** *<pathname for temporary files>*	oa_pref file in **OA_ADMIN_221** contains: **oasys*OA_INSTALL:** *<pathname for **22.1** installation>* **oasys*manuals_dir:** *<pathname for **22.1** manuals>* would almost certainly be unchanged between major versions, although they could be different if desired

For example: If the Oasys 22.0 software has been installed in **/home/oa22** , then:

```
oasys*install_dir: /home/oa22
```

will enable all users' installations to find their locally stored executables.

Pathnames using environment variables will be deconstructed during oa_pref file reading, and this can be exploited to set user-specific paths using a generic definition. For example:

```
oasys*home_dir:  $HOME/oa22
```

would set a home directory.

2.1.3 The hierarchy of oa_pref file reading

The oa_pref preference file contains code-specific preferences that can be used to modify the software behaviour.

This file can be located in multiple locations which are searched in following order:

OA_ADMIN_xx / OA_ADMIN	Top level configuration
OA_INSTALL_xx / OA_INSTALL	Installation level
OA_HOME	User's personal "home" file
Current working directory	File specific to the current directory (rarely used)

The rules for reading these files are:

- If a given directory does not exist, or no file is found in that directory, then no action is taken. This is not an error.
- A more recently read definition supersedes one read earlier. Therefore, "local" definitions can supersede "global" ones (unless they are locked).
- If two or more of the directories in the table above are the same, then that file is only read once from the first instance.

More information about preferences, including the ability to “lock” them, is given in section 4.

2.1.4 Protection and ownership of installation directories.

Oasys Suite does not require Administrator / Root privileges for installation.

It is recommended, but not required, that **OA_ADMIN_xx** and **OA_INSTALL_xx** directories be protected “read and execute only” for unprivileged users. If top level preferences are to be locked or idle time-outs configured, then write protection will be required to prevent users from subverting these settings.

2.2 Pre-Installation

The LINUX installation files can be downloaded from the following website:

https://www.oasys-software.com/dyna/ downloads tab.

All the installation files are supplied as a single gzipped TAR file.

There is a single LINUX installation package containing 64-bit versions of D3PLOT, T/HIS, PRIMER, REPORTER and the associated SHELL and job submission software. (32-bit executables are no longer supported from Oasys 14.0 onwards.)

If you are going to install a license server on a different platform to that which you are running the software on, then you can download just the LM-X tools for the machine type you want to use as the license server.

After downloading the installation file, you should copy it to a directory where you can uncompress it and then untar it.

```
tar zxvf install_22.tar.gz
```

This should produce a directory called `install_22_64` containing the following files:

```
environment.tar
libraries.tar
licutil.tar
manuals.tar.gz
oasys_lmx_server22_0.tar
peripheral.tar
setup.csh
workflows.tar
```

As part of the installation process, you will need to select the license type. If you are using a license server, you will need to know the name of the license server (and the port number if this has been set). If you are using a node-locked license, then you will need to know the full pathname of where the license file is located.

If you are going to set up a separate OA_ADMIN administration directory, then you should also know the pathname for the directory that you want to use as the installer script will prompt you for it.

If you are going to set up an LMX licence server (optional) you will need root privileges on the machine if you wish this to be installed as and to run using user root.

The Oasys 22.0 will include library dependency checks in the installation script. This will ensure that the necessary system libraries are present on your machine prior to setup. The dynamic library dependencies and the RedHat packages that can install them are the following:

RedHat packages	Dynamic libraries
libXau	libXau.so
libX11	libX11.so
libX11-xcb	libX11-xcb.so
libxcb	libxcb-randr.so, libxcb-shm.so, libxcb-sync.so, libxcb-xfixes.so, libxcb-render.so, libxcb-shape.so, libxcb-xkb.so, libxcb.so
xcb-util-cursor	libxcb-cursor.so
xcb-util-wm	libxcb-icccm.so
xcb-util-image	libxcb-image.so
xcb-util-keysyms	libxcb-keysyms.so
xcb-util-renderutil	libxcb-render-util.so
xcb-util	libxcb-util.so

libxkbcommon	libxkbcommon.so
libxkbcommon-x11	libxkbcommon-x11.so

If any of the above libraries are not present on your machine, the installation script will inform you and give you a chance to abandon the installation. From experience, most of these should already be installed by default, apart from libxcb-cursor.so.

2.3 Single User / Single Machine Installation

If you are installing the software on a single machine, it is recommended that the software is installed on a local disk.

2.3.1 Installation

a) To start the installation process run

`setup.csh`

from the command line in the `install_22_64` directory.

```
[dyna71@vdglin28 ~/install_22_64]$ ./setup.csh
Oasys Ltd LS-DYNA Environment 22.0 Installation
=======================================================

This script will install the following programs on vdglin28

     D3PLOT 22.0
     PRIMER 22.0
     REPORTER 22.0
     SHELL 22.0
     T-HIS 22.0

Checking prerequisites ...

All library prerequisites are installed.

Installation directory : /home/dyna71/install_22_64/oa22
```

b) If some library dependencies are missing, these will be listed as below, and you will have to choose whether to continue with the installation regardless or to abandon the setup and install the prerequisites (see section 2.2).

```
Checking prerequisites ...

libxcb-cursor.so not found

Some library prerequisites are missing.

Would you like to still continue with the Oasys Ltd LS-DYNA Environment
installation? (Y/N) y

Installation directory : /home/dyna71/install_22_64/oa22
```

c) When prompted enter the full pathname of the directory that you want to install the software in

```
Do you want to change the installation directory? (Y/N/Quit) y
```

```
Enter the FULL PATH of the directory into which you want to
put the software.

 ? : /home/test/oa22_test_install

Installation directory : /home/dyna71/oa22_test_install

Are you sure you want to install in this directory? [Y/N] y

Oasys Ltd LS-DYNA Environment will be installed in the directory:

/home/dyna71/oa22_test_install

Copying files ......Copying manuals ......Uncompressing manuals
......Unpacking manuals .......... Complete
Unpacking license util files ..... Complete
Unpacking environment ...... Complete
Unpacking workflows ...... Complete
Unpacking Oasys Ltd LS-DYNA Environment Software ... Complete
Unpacking libraries ........... Complete
Uncompressing files ........Making soft links ... Complete
Installing oa_pref file ...

Configuring script files ...
```

d) You will then be asked if you want to configure the oa_22 shell to use a licence server or a local node-locked licence.

```
Do you want to set up the Oasys Ltd LS-DYNA Environment to use a LMX
License server? [Y/N]
```

If you answer “Y” you do not set up the actual licence server at this stage, that happens later in section 3 of this guide, you simply configure the ARUP_LICENSE_PATH environment variable in the oa_22 shell to point to this server. If you do not know the name or IP address of the server just type in something, it can be replaced later. This example uses “testserver”.

```
Enter the hostname/ip address of the server
? : testserver
Using: setenv ARUP_LICENSE_PATH @testserver
Are you sure you want this to be your Oasys LMX server? [Y/N] Y
```

If you answer “N” to the question about setting up a licence server, the installer assumes that you have a node-locked licence file called arup.lic and configures ARUP_LICENSE_PATH to point to that:

```
Using: setenv ARUP_LICENSE_PATH $OA_INSTALL/arup.lic
*************************************************************************
If you already have a node locked license copy it into the oa22 directory
*************************************************************************
```

e) The installer will then unpack the files necessary to set up an LMX licence server into a sub-directory, regardless of which option you chose at step (c). You do not have to do anything with these files at this stage, it is simply in preparation for using them later if you choose to set up a licence server. (See section 3.1)

```
Creating installation files for LMX server ......
Unpacking LMX files .....

The LMX server installation files have been installed in
/home/dyna71/22_test_install/lmx-5.6.4

If you want to install the LMX License server run lmx-enduser-
tools_v5.6.4_linux_x64.sh after this installation script has completed.
```

f) The installer will ask if you want to set up an OA_ADMIN directory.

```
Do you want to set up an OA_ADMIN directory? [Y/N]
```

This directory is optional. It can be useful in a corporate environment when you wish to have a central location for important files which you do not want to have to duplicate over many machines, but in a small or single machine environment it is not necessary. If you answer "Y":

```
Enter the FULL PATH of the OA_ADMIN directory

 ? : /home/dyna71

OA_ADMIN directory : /home/dyna71

Are you sure you want this directory to be your OA_ADMIN directory? [Y/N] y
```

The installation script has now finished.

```
Installation script has run OK

Please read the Installation and Maintenance Instructions for details on
how
to obtain your license codes.

Installation script has run successfully.

The following files can now be removed:
environment.tar, oasys_lmx_server22_0.tar, licutil.tar, peripheral.tar,
libraries.tar, workflows.tar, setup.csh, manuals.tar.gz.tar, lmx.tar,
install.tar, peripheral.tar, libraries.tar, setup.csh
```

2.3.2 Post Installation

a) The Oasys Suite software is designed to be run via the command script "oa_22". As part of the installation process several Environment Variables will have been automatically set up within this script. See section 3.1 for more details on these Environment Variables and how to modify them.

b) Configure the preference file "oa_pref", (see section 4)

c) Optional – Configure Oasys SHELL for submitting Ansys LS-DYNA analysis (see section 6).

2.3.3 Making the oa_22 file accessible to users

The Oasys 22.0 software is designed to be accessed via the command “oa_22”. For more information on how to make this command available to all users, see section 2.6.

2.4 Multiple Machine Network Installation

Installing the software onto a network drive for access from multiple machines.

2.4.1 Installation

a) To start the installation process run

```
setup.csh
```

from the command line.

b) If some library dependencies are missing, these will be listed in the terminal, and you will have to choose whether to continue with the installation regardless or to abandon the setup and install the prerequisites (see section 2.2).

c) When prompted enter the full pathname of the directory that you want to install the software in and the license information. If you do not know the name of the license server or if you have not yet obtained a node locked license file, then you can enter any machine name / filename and correct them later (see section 3).

d) After entering the license information, the installation process will continue, and you will be offered the opportunity to set up an OA_ADMIN directory (see section 2.1.1).

e) The installer should then complete the installation without prompting for any more information.

2.4.2 Post Installation

a) The software is designed to be run via the command script “oa_22”. As part of the installation process a number of Environment Variables will have been automatically setup within this script. See section 3.1 for more details on these Environment Variables and how to modify them.

b) Configure the preference file “oa_pref”, (see section 4)

c) Optional – Configure Oasys SHELL for submitting Ansys LS-DYNA analysis (see section 6).

2.4.3 Making the oa_22 file accessible to users

The Oasys 22.0 software is designed to be accessed via the command “oa_22”. For more information on how to make this command available to all users, see section 2.6.

2.5 Multiple Machine Local Installation

If you are going to install the software on multiple machines, then you can either follow the procedure outlined in section 2.4 for each machine or you can install the software once and then copy the installation to each machine.

2.5.1 Installation

a) To start the installation process run

```
setup.csh
```

from the command line

b) If some library dependencies are missing, these will be listed in the terminal, and you will have to choose whether to continue with the installation regardless or to abandon the setup and install the prerequisites (see section 2.2).

c) When prompted enter the full pathname of the directory that you want to install the software in and the license information. If you do not know the name of the license server or if you have not yet obtained a node locked license file, then you can enter any machine name / filename and correct them later (see section 3).

d) After entering the license information, the installation process will continue, and you will be offered the opportunity to set up an OA_ADMIN directory (see section 2.1.1).

e) The installer should then complete the installation without prompting for any more information.

2.5.2 Post Installation

a) The software is designed to be run via the command script “oa_22”. As part of the installation process several Environment Variables will have been automatically setup within this script. See section 3.1 for more details on these Environment Variables and how to modify them.

b) Configure the preference file “oa_pref”, (see section 5)

c) Optional – Configure Oasys SHELL for submitting Ansys LS-DYNA analysis (see section 6).

After you have configured the preference file the complete installation directory can be copied to the other machines.

2.5.3 Making the oa_22 file accessible to users

The Oasys 22.0 software is designed to be accessed via the command “oa_22”. For more information on how to make this command available to all users, see section 2.6.

2.6 Making the oa_22 file accessible to users

The Oasys Suite software is designed to be run via the command script “oa_22”. This command must be set so that all users can run the software with a single command. The way you go about this is up to you: the following are simply suggestions, you may prefer other methods.

(1) **Set up a symbolic link in a directory accessed by all users.**

On most systems each user's path is set up at login time to include directories that contain generally used commands and files. For example, many systems include the /usr/local/bin directory. Putting a symbolic link in such a directory that points to the oa_22 shell is a straightforward way to provide access to it for all users. You do this by going to that directory and typing the command:

```
ln -s pathname/oa_22  oa_22
```

Where *pathname* is the directory of OA_INSTALL_xx

(2) **Set up an "alias" for selected users.**

You may wish to restrict access to the software to a sub-set of users, in which case a more elegant solution might be to add an "alias" to their individual ".cshrc" files. (This assumes that they are running C shell.) You would do this by adding the line:

```
alias oa_22 'pathname/oa_22'
```

to their ".cshrc" files for csh and tcsh users, or by adding a similar line to the .bashrc file for sh and bash users.

3 CUSTOMISING THE OASYS SHELL

On LINUX systems the Oasys SHELL is accessed via the "oa_22" command. If you have installed the software using the install script, then the oa_22 command file (in the /executables directory) will automatically be updated to contain the correct path for the directory the software was installed in and the name of the license server.

In addition to specifying the installation directory and the license server the "oa_22" command file can also be set several other options on LINUX systems.

After installing the software, the "oa_22" command file should contain the following. (This example assumes the software was loaded in directory */prg/oa22/test_install* and that the license server is running on a machine called *licserver*. You will see the values you entered in section 2 above)

```
#!/bin/csh -f
  onintr start_flush
#
# Set OA_INSTALL to point to the directory containing the software
#
  setenv OA_INSTALL "/prg/oa22/test_install"
#
# Set OA_ADMIN directory
#
# setenv OA_ADMIN
#
# Set ARUP_LICENSE_PATH to either the Oasys LM-X license file or
# the license server
#
# e.g  setenv ARUP_LICENSE_PATH     $OA_INSTALL/arup.lic
#   or setenv ARUP_LICENSE_PATH     @hostname
#
# setenv ARUP_LICENSE_PATH  $OA_INSTALL/arup.lic
#
#
# Set LSTC_FILE to either the lstc license file or the server
#
# e.g. setenv LSTC_LICENSE local
#      setenv LSTC_FILE $OA_INSTALL/LSTC_FILE
#
# e.g. setenv LSTC_LICENSE_SERVER  hostname
#      setenv LSTC_INTERNAL_CLIENT OFF
#      setenv LSTC_LICENSE network
#
  setenv LSTC_FILE $OA_INSTALL/LSTC_FILE
#
#
# Other environment variables
#
  setenv USERID           `whoami`
  set noglob
#
```

```
# This environment variable gives a more stable animation frame rate on
# machines equipped with NVidia graphics cards
#
  setenv __GL_CONSTANT_FRAME_RATE_HINT  1
#
# Set EDITOR (if not set) to the command to invoke an external editor. This
# EDITOR is currently used for editing comment lines in Oasys PRIMER.
#
# if(! $?EDITOR) then
# setenv EDITOR /usr/bin/kedit # LINUX
# endif
#
# Environment variables for post processors
#
# If FILE_SKIP has not been set then set it to 5
#
  if(! $?FILESKIP) then
    setenv FILE_SKIP 5
  endif
#
# Now start the main shell executable
#
  set cwd = `pwd`
  setenv PWD $cwd
  $OA_INSTALL/xshell_22_64 $*
#
# exit
#
exit:
  exit
```

Customising the shell requires you to edit or define the environment variables listed in sections 3.1 (licensing) and 3.2 (directories and options) below.

3.1 Environment Variables for licensing

This section describes the process of creating environment variables for licensing.

The syntax in the examples below is for C shell (csh) since that is what the oa_22 shell is written in. For users more familiar with Bourne shell (sh) or Bourne Again shell (bash) the syntax for setting environment variables in the two different types of shell is:

csh and tcsh: **`setenv NAME value`**
sh and bash: **`export NAME=value`**

If you are setting up variables elsewhere on your system, please use the syntax appropriate for the shell being used in that context.

3.1.1 Setting the ARUP_LICENSE_PATH / LMX_LICENSE_PATH <option> environment variables

Either ARUP_LICENSE_PATH (preferred) or LMX_LICENSE_PATH environment variables can be used to locate a valid license for the Oasys software. It is recommended that ARUP_LICENSE_PATH is used as this can speed up the checkout of licenses on systems where LMX_LICENSE_PATH is used to find other license servers as well.

3.1.1.1 Floating Network License

If the software will be run using a license server this variable should be set to point to the license server machine using the machine's *hostname*:

`setenv ARUP_LICENSE_PATH` *`@hostname`*

or if a non-default port has been specified for the license server:

`setenv ARUP_LICENSE_PATH` *`port@hostname`*

If you are using a triad license server (known as High Availability Licensing or HAL for LM-X) then you should specify all three license servers:

`setenv ARUP_LICENSE_PATH` *`port1@host1:port2@host2:port3@host3`*

(Note when installing on both Windows and Linux

> *On **Linux**, as shown above, multiple server names are separated by **colons***
> *On **Windows** multiple server names are separated by **semi-colons***

Take care if copying environment variable strings between operating systems!)

3.1.1.2 Fixed Stand-alone (node-locked) Licenses

If the software will be using a node locked license file this variable should be set to point to the location of the license file:

`setenv ARUP_LICENSE_PATH` *`licence_dir/`***`arup.lic`**

Where *licence_dir* is the directory in which you have placed the licence file. Normally this will be the software installation directory, but it can be any directory you wish.

3.1.2 Setting the LSTC_FILE / LSTC_LICENSE_SERVER <option> environment variables

This is required to set up licensing for the Ansys LS-DYNA software itself. If this machine will not run Ansys LS-DYNA jobs locally, for example because you only run jobs in batch on a remote system, you do not need to configure these variables.

On LINUX machines Ansys LS-DYNA can use either a floating license system or a node-locked license.

3.1.2.1 Floating Network License

If you are using the floating license system then the variables **LSTC_LICENSE_SERVER**, **LSTC_INTERNAL_CLIENT** and **LSTC_LICENSE** should be set as follows:

```
setenv LSTC_LICENSE network

setenv LSTC_LICENSE_SERVER hostname(of license server

setenv LSTC_INTERNAL_CLIENT off (or on)
```

Setting LSTC_INTERNAL_CLIENT to “off” forces Ansys LS-DYNA to use an external executable “lstc_client” to communicate with the license server rather than the dyna executable itself. The executable lstc_client must be in the search path of the user executing Ansys LS-DYNA.

The use of the external program has two potential benefits firstly it allows the latest version of the licensing software to be used. Secondly, licenses are returned quicker to the license pool if the Ansys LS-DYNA executable terminates abnormally.

If you are using a triad license server then you should specify all three license servers:

```
setenv  LSTC_LICENSE_SERVER '(host1 host2 host3)'
```

3.1.2.2 Node locked License

If you are using a node-locked license, then the environmental variable LSTC_LICENSE should be set to “local”, and the environmental variable LSTC_FILE should be set to the full pathname of the license file.

By default, this file should be called 'LSTC_FILE’, and it should be in the 'executables' directory.

```
setenv LSTC_LICENSE local

setenv LSTC_FILE install_dir/LSTC_FILE
```

Where *install_dir* is the directory in which you have placed the licence file.

3.2 Optional Environment Variables

The following optional environment variables may, if defined, require modifying in accordance with your system layout:

Variable name	Purpose
OA_INSTALL	Defines the installation directory for the V22 software
OA_ADMIN	Defines an optional higher level administration directory.
MENU_AUTO_CONFIRM	Defines the default action to be taken when the software prompts the user for a response.
FILE_EXIST_ACTION	Defines the default action to be taken when a file to be written already exists on disk.
ECHO_PREFERENCE	Option to list all the preferences read from the various “oa_pref” files.

3.2.1 OA_INSTALL

During the installation process oa_22 shell will be pre-configured to set this environment variable to the directory in which the software was installed. If you plan to run a standard installation from this directory you do not need to change this.

If you move the software somewhere else, or if you set up your own scripts to run the software, you must set OA_INSTALL to define the directory where the software is installed. For example, if the installation directory has become:

```
/prg/oa22/alternative_install
```

Then this line should be set to:

```
setenv OA_INSTALL "/prg/oa22/alternative_install"
```

3.2.2 OA_ADMIN / OA_ADMIN_22

If a top-level administration directory is to be used, then OA_ADMIN_22 (for Oasys 22.0) must be defined on all machines on which the software is to be run. This variable should be set to the full pathname of the administration directory used for version 22.

```
setenv   OA_ADMIN_22   pathname
```

If you have an admin directory that is used for multiple versions of the Oasys Suite software, you should use the non-version-specific alternative instead:

```
setenv   OA_ADMIN   pathname
```

3.2.3 Setting MENU_AUTO_CONFIRM

This variable is often used when replaying command files which, when recorded, paused and asked the user to confirm things (for example, HELP and Warning messages). Possible options for this variable are true and false.

```
setenv   MENU_AUTO_CONFIRM   true  or  false
```

If the variable is set (*true*), then these will not pause and will behave as if the user had pressed "OK" - meaning that command files can play back without user intervention. As a general rule this variable should not be set for interactive usage but may be required when performing “batch” type operations. The default if not defined is *false*.

3.2.4 FILE_EXIST_ACTION

This variable controls the action to be taken when opening a file for output, and the file already exists. Possible options for this variable are "none", overwrite, and append.

```
setenv   FILE_EXIST_ACTION   none  or  overwrite  or  append
```

Normally you will be prompted for the action to be taken when a file selected for output already exists. However, if this variable is set to overwrite or append then the relevant action will be taken automatically.

This is generally used when playing automatic post-processing batch scripts and should not be set for normal interactive usage. The default action if undefined is *none*.

3.2.5 ECHO_PREFERENCE

If this variable is set to "1" then any command line arguments used to start T/HIS, PRIMER or D3PLOT will be echoed to the screen along with any settings read from preference files.

```
setenv   ECHO_PREFERENCE   1
```

This option can be helpful for batch processes since it will give a record of which preferences were read, in what order and from what sources. It can be very useful for diagnosing problems where settings seem to have unexpected initial values.

4 SETTING UP USER PREFERENCES

4.1 The ‘oa_pref’ file

This file contains code-specific preferences that can be used to modify the behaviour of the software suite. It is optional, and where entries (or the whole file) are omitted, programs will revert to their default settings.

4.1.1 ‘oa_pref’ naming convention and locations

The preferences are stored in a file called "oa_pref". This file can exist in multiple locations which are searched in the following order:

1. The optional administration directory defined by the environmental variable (**$OA_ADMIN** or **$OA_ADMIN_xx** - where xx is the release number).
2. The site-wide installation directory defined by the environment variable (**$OA_INSTALL**).
3. The user's home directory **$OA_HOME** which defaults to: **$HOME** on Linux.
4. The current working directory.

(see Section 2 for an explanation of the directory structure).

All four files are read (if they exist) with the last preference read being the one used; this means the file can be customised for a particular job or user if necessary.

Files do not have to exist in any of these locations; if none exists, the programme defaults will be used.

Typically, the following should be set:

1. Organisation-wide options in the version in **$OA_ADMIN_xx** and/or **$OA_INSTALL**.
2. User-specific options in **$OA_HOME**.
3. Project-specific options in the current working directory.

4.1.2 File Format

The file contains preferences for:

- All the software (lines commencing oasys*)
- SHELL (lines commencing shell*)
- THIS (lines commencing this*)
- D3PLOT (lines commencing d3plot*)
- PRIMER (lines commencing primer*)
- REPORTER (lines commencing reporter*)

All lines take the format:

<program name> * <preference name> : <preference value>.

The general copy of the preference file should be present in the **$OA_ADMIN_XX** and/or **$OA_INSTALL** directory. This should contain the preferences most suitable for all software users on the system.

An individual's specific preferences file can be stored in the individual's home area or **$OA_HOME**. This can be used to personally customise the software to the individual's needs.

Whenever a program with preferences in the oa_pref file is fired up, the program will take preferences in the following order:

1. from the general preference file in the **$OA_ADMIN_XX** directory (if it exists)
2. then the **$OA_INSTALL** directory
3. then from the file in the user's home area (**$OA_HOME**)
4. then from the current working directory

Preferences defined in the general oa_pref file can be superseded by preferences of the same name in the user's personal file, but they cannot be removed by it.

4.1.3 Locking preferences

Preferences can be locked, meaning that once read from an oa_pref file their value will not change if subsequently read from a different file. Since files are read in the hierarchy “admin => install => user” this means that a preference which is locked at the admin or install level cannot be changed locally by a user, which gives a way of enforcing organisation-wide settings.

To lock a preference, use the syntax **'program#'** rather than **'program*'**.

An example of the file is shown below to illustrate the content of the file:

```
# Preferences file for software.
#
# Preferences for SHELL
shell*queue_cpu: 0
#
# Preferences for THIS
this*laser_paper_size: A4
#
# Preferences for D3PLOT
d3plot*overlay_colour: grey
#
# Preferences for PRIMER
primer*overlay_mode off
```

An example of a locked preference would be:

```
primer#background_colour: white
```

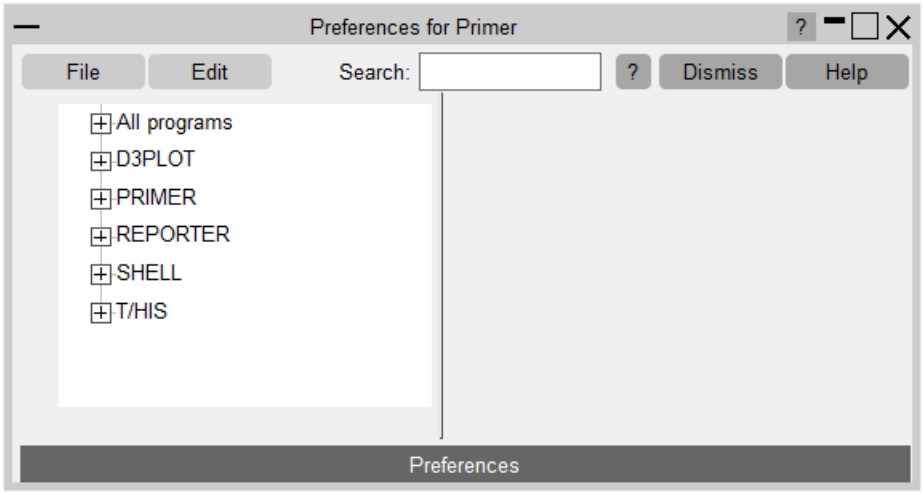
Note usage of “**#**” instead of “*****”.

4.2 The Preferences Editor

The editor can be accessed from within the SHELL or from within D3PLOT, T/HIS, PRIMER or REPORTER. The preference settings for each program are listed in the appropriate manual.

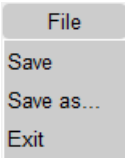
4.2.1 The Preferences Editor Layout

The preferences editor window is divided into two frames with a menu bar across the top.



4.2.2 Menu Bar

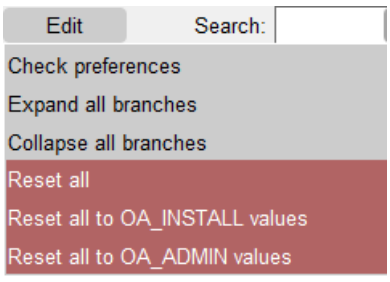
File options:



Save/Save as… : Save current preference settings. This will save the personal oa_pref file in the user's home directory. Only those preferences which differ from the preferences saved in the general oa_pref file will be saved.

Exit: Exit the preferences editor without saving.

Edit options:



Check Preferences: Checks the current preferences for any errors. These errors will be listed in a separate window detailing the preferences with the errors and the nature of those errors

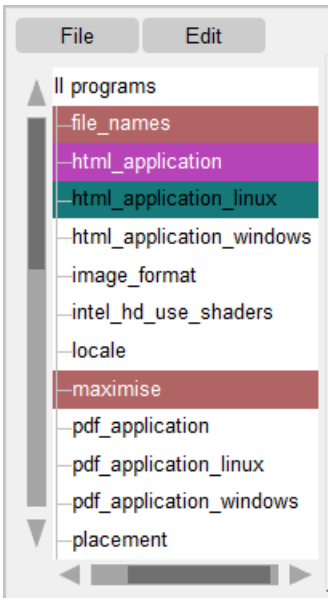
Expand all branches: Expands the categories in the left-hand frame.

Collapse all branches: Collapses the categories in the left-hand frame.

Reset all: Resets all values.

Reset all to OA_INSTALL values: Resets all values to the defaults stored in the main $OA_INSTALL preference file.

4.2.3 The Preferences Editor Left Hand Frame



The left-hand frame will contain the names of all preferences available to set. Preferences will be listed under the headings: PRIMER, D3PLOT, T/HIS, REPORTER and SHELL according to which program they are applicable to.

These categories can be expanded to reveal their respective preferences/contracted to hide their preferences by clicking on the box to the left of the respective category, alternatively, use the edit drop down menu and select expand all branches or collapse all branches.

Green	Means that the option has been read from your $HOME/$USERPROFILE file.
Red	Means that the option has been read from the $OA_INSTALL file.
Magenta	Means that the option had been read from the $OA_ADMIN file.

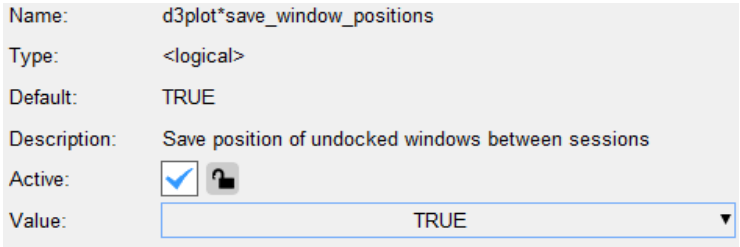
Preferences which are not highlighted indicate preferences that have not been set.

Preferences in **bold** type indicate preferences which have not been assigned the default value.

A list of all the preferences available and their default value can be found in any oa_pref file written by the preferences editor.

4.2.4 The Preferences Editor Right Hand Frame

The right-hand frame will contain information about the currently selected preference and provides the opportunity to edit this preference:



- **Name:** States the name of the currently selected preference.
- **Type:** Specifies the type of variable applicable to this preference.
- **Default:** States the default value of the preference.
- **Description:** Provides a brief description of the function performed by this preference.
- **Active tab:** Highlighted in Green when the preference has been assigned a value. Press this tab to activate/ deactivate the currently selected preference. If the currently selected preference was defined in the general oa_pref file, deselecting this will bring up an error message as it is not possible to deselect preferences stored in the general oa_pref file.
- **Value:** States the currently selected value for the preference. Clicking on the arrow to the left of this box brings up a drop-down menu which lists the possible values this preference can take and allows the user to select one of these values.

4.3 Locking Preferences

Preferences can be locked. Beside each option in the preference editor is a padlock symbol. If the symbol is green then the option is unlocked, if it is red then it is locked. If a preference option has been locked in a file that the user cannot modify then an error message will be generated if the user tries to edit that option.

If a user manually edits the "oa_pref" file to try and set an option that has been locked in another preference file, then the option will be ignored in the user's preference file.

An unlocked preference is defined in the oa_pref file by:

```
<programme> * <preference> :   <value>
```

A locked preference replaces the "*" with a "#", thus:

```
<programme> # <preference> :   <value>
```

5 AUTOMATIC LICENSE TIMEOUTS

5.1 Configuring automatic timeouts

Each application can be setup to exit automatically if it remains idle for a specified time. When the application exits it will automatically release any licenses that are being used and return them to the pool of free licenses.

The automatic license timeouts are controlled by a file called '**`timeouts`**' located in the directory defined by the **`OA_ADMIN_xx`** or **`OA_INSTALL`** environment variable.

The format of this file is:

<application name> <idle time> <grace period> (<%age in use>)

e.g.

```
#
primer      60   5   80
d3plot      60   5   50
this        60   5
#
```

The times are defined in minutes. The idle time should be > 0 and the grace period should be ≥ 0, both times are required.

The "%age in use" column is optional and may be omitted. If defined it should be a value in the range 1 to 100 which is a percentage of licenses in use for that product. The timeout process will only take effect if more than this percentage of licenses are in use, meaning that if usage is below this percentage a session will be allowed to remain open indefinitely.

If this column if omitted an implicit value of 0% is assumed, meaning that timeouts will occur regardless of the number of licenses checked out for that product.

Any line in the file starting with '#', '%' or '$' is counted as a comment line.

Blank lines are ignored

Input is not case-sensitive

Input is free format, but each programme's settings must be on a single line.

When the idle time is exceeded a warning message will be displayed within the application's master window. This message will be displayed for the grace period specified; the application will be terminated if no response is detected. Giving a response resets both <idle> and <grace> counters so that a further <idle time> must elapse before a further warning is issued.

Automatic timeouts are only active if this "timeouts" file is present, and then only for products with entries in the file. If it is not defined, or a product does not have an entry, no timeouts will take place, and sessions will be allowed to remain open indefinitely.

5.1.1 What happens to the program when it terminates

If programs terminate due to a license timeout the following occurs:

- PRIMER: a copy of any models currently loaded will be saved in the user's home area or $OA_HOME if defined, then it will exit.
- D3PLOT: will just exit.
- T/HIS: will just exit.

In all cases, the controlling terminal window receives a message explaining what has happened and why; this window will remain on both Windows and Linux platforms.

The warning notice is displayed within the master window of the application, not on the desktop. This is intentional to prevent users starting the application to grab a license then iconising/minimising it until they need it as the warning message will not be seen if the application is minimised.

5.1.2 Auto-Termination message in the LMX log file

A message will be written to the LMX log file when a process is auto-terminated. This will be of the typical form:

`Auto-termination of <`*`code`*`> (pid <`*`ppp`*`> on <`*`host`*`>) after <`*`mm`*`> minutes idle time...`

Where <*code*> is PRIMER, D3PLOT, etc
<*ppp*> is the process id
<*host*> is the machine hostname
<*mm*> is the number of idle minutes

This makes it possible to detect how often auto-timeout is happening, which can be particularly useful when trying to track down reasons for batch processes being terminated.

5.1.3 Protecting the timeouts file against tampering

The timeouts file must be write-protected against users either by protecting the file, or the directory in which it exists, otherwise users will be able to change the file content.

5.2 Interrogating LM-X license usage

The LM-X utility "lmxendutil" is shipped as part of the standard installation and will be installed in the same directory as the other executables.

The status of license usage can be listed at any time by using the command '**`$OA_INSTALL`**_*xx*`/lmxendutil -licstat`', which will list all licenses checked out from servers known to this machine.

Further commands are available: the command '**`$OA_INSTALL`**_*xx*`/lmxendutil -help`' will list all the available options.

5.2.1 Obtaining more information about LM-X licensing.

You will find a recent end user's guide to LM-X licensing in the document LMX-*date-version*.pdf which is in directory $OA_INSTALL/manuals/lmxuser.

To get the most up to date documentation on LMX see https://docs.x-formation.com/display/LMX or search online for "lmx license manager documentation".

6 CUSTOMISING SHELL FOR ANSYS LS-DYNA JOB SUBMISSION

In addition to accessing the Oasys Suite software, the Oasys SHELL can be used to submit Ansys LS-DYNA jobs. To use the SHELL to submit Ansys LS-DYNA the following should be configured:

1. General Submission Options
2. The versions of Ansys LS-DYNA available
3. Queuing Options
4. MPI commands for MPP submission

For more details on how to perform all of these please see the Oasys SHELL manual.

7 TUNING THE GRAPHICS DRIVER

Oasys Suite software makes intensive use of 3D graphics, putting a lot of stress on the graphics card. High-performance workstations and PCs tend to have one of the following cards installed:

- NVIDIA Quadro series, or sometimes GeForce (really a gaming card)
- AMD/ATI FirePRO series, or sometimes Radeon (really a gaming card)

It is our experience that as of late 2015 the up-to-date drivers for these cards will work satisfactorily with Oasys Suite software without further tuning.

If you experience problems the first step should be to install the most recent graphics driver for your card, which can be found at:

NVIDIA http://www.nvidia.com (Choose “Drivers”)

AMD/ATI http://www.amd.com (Choose “Drivers + support”)

If you still experience problems, typically visual artefacts and/or “stuttery” animation performance, the diagnostic process below may help. However, the advice here is only relevant for older cards and drivers and it is recommended that you contact Support for advice if you have problems.

7.1 Finding out what graphics card and driver are installed

Unfortunately, there is no ready-made tool on Linux to provide details of the graphics card installed, but the following procedure should work:

Type **`glxinfo | grep -i string`** which should give card manufacturer and name.

For example, on a machine with an AMD/ATI card this might produce:

```
OpenGL vendor string: ATI Technologies inc
OpenGL renderer string: ATI FirePro V7750 (FireGL)
OpenGL version string: 3.3.10225 Compatibility Profile FireGL
```

And on a machine with an NVIDIA card:

```
OpenGL vendor string: NVIDIA Corporation
OpenGL rendered string: Quadro FX 3800/PCI/SSE2
OpenGL version string: 3.3.0 NVIDIA 256.35
```

Once you know the make of the card you can then look in file /var/log/Xorg.0.log for more information about its driver. The actual filename may vary with the version of Linux, but something like the following should work, the example here being for an NVidia card:

```
grep -i nvidia /var/log/Xorg.0.log | grep -i driver
```

Which should produce something like:

```
(II) Loading /usr/lib64/xorg/modules/drivers/nvidia_drv.so
(II) NVIDIA dlloader X driver 256.35 Wed Jun 16 18:45:02 PDT 2010
(II) NVIDIA Unified driver for all Supported NVIDIA GPUs
```

From which you can discern that the driver release is 256.35 dated 16th June 2010.

It is recommended that if your graphics driver is significantly out of date that you consider upgrading it to a more recent version. This is not mandatory, and if the machine is working

well there is a strong case for “if it isn’t broken, don’t fix it”; but certainly, the first step to be taken if graphics problems arise is to upgrade an out-of-date driver.

7.2 RedHat Machines with native Nouveau graphics

RedHat Linux operating systems, and thus also CentOS, come with the native “Nouveau” graphics driver by default. Testing shows that on a graphics card designed for good 3d performance you will get better speed (typically 2x) and dramatically improved reliability if you replace this with a bespoke driver from your graphics card manufacturer. Oasys Ltd strongly recommend that you do this.

Before installing the new driver search online for “replace nouveau driver with *my card manufacturer*” and follow the instructions. This is because first you have to prevent Nouveau being loaded into the Linux kernel, and only then can you load the new driver which makes the job a two-stage process.

7.3 Advice for graphics on Linux machines without local displays (e.g. clusters)

You may wish to connect to a remote cluster that has performed your analysis and display results graphically on your desktop without having to drag the results files back. In this situation by far the best solution is:

- Set up a virtual display on the remote machine.
- Connect to it via a “thin wire” tool such as VNC.
- If you require 3d graphics the remote machine will need to have VirtualGL installed.

“Thin wire” tools detect the changes on the remote display as they occur, compress only these differences and send the results to your desktop where they are decompressed and displayed. The result is not as good as having a workstation on your desk, but it is usually more than acceptable even over a connection with poor bandwidth.

An “old school” alternative is to connect to the remote machine using raw X11. However, this will be horrendously slow and is really only acceptable for text operations. It *is* possible to display OpenGL graphics this way, but the speed is glacial.

7.3.1 Accessing a remote Linux machine from the Windows Desktop

If your desktop machine is running Windows and you do not have a “thin wire” solution available, you will need to install some emulation software which supports the X11 protocol in order to display terminal windows and graphics on your Windows desktop. It will be slow, but it will work.

The MobaXterm emulator for Windows (https://mobaxterm.mobatek.net/) is the best software we are currently aware of for this purpose as it supports both X11 and OpenGL. It is free for personal use, and also free in a corporate environment if installed personally. Please read the licence carefully if you plan to install it.

Configuring remote displays is beyond the scope of this guide. If you need help, please contact Support.

8 THE LM-X LICENSING SYSTEM

For Oasys 22.0 the software has been compiled using version 5.6.4 of LM-X.

Oasys Suite's LM-X licensing is also backwards-compatible with all Oasys Suite versions back to and including 15.x, meaning that these earlier versions will continue to work when you update your licence server to the latest version.

The following details show how to configure the LM-X license manager for Oasys 22.0.

8.1 Introduction

If you are using a node-locked license that does not require a floating license server, please refer to section 8.2.6 directly.

If you are using LM-X floating license server, please start from the Installation-Preparation section and follow the guide.

Useful cross-references of terminologies between LM-X and the previous FLEXlm system are included in Appendix 8.4.

8.2 Installation

This section details the installation process of the LM-X Licensing System.

8.2.1 Preparation

This section summarises the preparatory steps to install and run the LM-X license server on Linux:

- Determine the OS platform for the license server
- Check the system requirements for the license server
- Check the system requirements for the license server
- Obtain a valid floating license file for the license server HostID
- Download, install and configure the LM-X license server software to serve the floating license. (If you have performed a normal installation, see section 2, you will already have the LMX server files in `installation_dir/lmx-5.6.4`)

8.2.2 Supported Platforms

Oasys Suite's LM-X license server software is available for 64-bit Windows and Linux systems. All the files needed to install LM-X license server can be obtained from the Oasys Suite website. By default, a floating server license will be provided for a physical machine.

8.2.2.1 Support for the LMX licence server on RHEL 7 Linux

RedHat Enterprise 7 Linux reached “End of life” on June 30th 2024, therefore we will not release a RHEL 7 version of the Oasys 22 software suite.

However, we appreciate that some users maintain licence servers on legacy systems therefore a RHEL 7 version of the LMX licence server only will continue to be available for the life of Oasys 22. This can be downloaded from:

https://www.oasys-software.com/dyna/wp-content/uploads/2025/04/oasys_lmx_server22_0_rhel7.tar.gz

This legacy server version will be withdrawn at next major release of the Oasys Suite, version 23 expected in Spring 2026. If this will cause you problems, please contact Support to discuss solutions.

8.2.2.2 Compatibility with other license server software

Besides running Oasys Suite's LM-X license server, you can also run multiple other LM-X license servers (for other software) on the same physical machine. You just need to specify different unique TCP ports for each LM-X server, in the configuration (.cfg) files.

LM-X license server also does not interfere with FLEXlm-based license server, if they have different unique server TCP ports specified.

8.2.3 System Requirements

This section details the system requirements for running LM-X License Server.

8.2.3.1 System Requirements for LM-X License Server

- **CPU**

Generally, the LM-X license server will use very little CPU resource.

- **Disk Storage Space**

The LM-X license server software requires about 50 MB of disk storage space to install. Generally, a minimum of 500 MB of storage space should be sufficient to store license server log files.

- **Memory**

The system RAM used by LM-X license server varies, with typical memory usage in the order of 100s of MB.

- **Network**

Modern networks running via Ethernet or high-speed WiFi should be sufficient. The license server uses TCP/IP for server-client communications and only uses one specified TCP port for these purposes. The default port is 6200 and can be changed in the configuration file.

- **Multiple Server and High Availability Licensing (HAL)**

LM-X supports both HAL and multiple-server lists. HAL requires three configured servers, with a quorum of two active servers needed to serve up the pool of floating licenses. This allows one of the three machines to go down without affecting license availability.

Multiple license servers can also be used to divide up the total floating license pool, and Oasys Suite clients can access the licenses via a server list specified in the client machine's environment variable

8.2.4 Obtaining HostID

For floating server license, this will be the computer that will act as the LM-X license server.

For node-locked license, this will be the computer(s) where the Oasys Suite software will be used.

To generate this information, run `lmxendutil -hostid` (lmxendutil tool from the LM-X End-users Tools package) on the computer of interest. lmxendutil can be downloaded for Linux here.

Example:

```
lmxendutil -hostid

LM-X End-user Utility
Copyright (C) 2002-2024 X-Formation. All rights reserved.

ETHERNET: ens5
HostID: 0A1B2C3D4E5F

HOSTNAME: computer
HostID: computer

USERNAME: pcuser
HostID: pcuser
```

Send the full text output generated (like the example above) to your Oasys Suite distributor with your license request, noting whether it is for node-locked license or for floating server license.

8.2.5 Installing LM-X License Server on Linux

On Linux, you will need root permission to install and setup the LM-X license server software to run as a system service (recommended). If you do not have such permission, or do not want to set up LM-X the licence server as a service, you can choose to skip the relevant steps during the installation process.

Network traffic on the port used by the LM-X license server (defaults to TCP port 6200) will need to be allowed. You may need to enable such network traffic on both the license server and the Oasys Suite client machines if you have any firewall or security software running.

8.2.5.1 Install the LM-X License Server software

When installing the Oasys 22.0 software, the installation process will have put the LMX licence server software in *installation_dir*/lmx-5.6.4.

Alternatively, the LM-X license server can be downloaded https://www.oasys-software.com/dyna/, downloads tab, Oasys server licensing.

1. The standard LMX installer options presume that you have root permission and will default to installing files in system directories such as /usr; it will also allow you to set up the server as a system service. If you do not have root permission, you will have to install it in directories to which you have permission and skip the service setup.

The following examples presume that your current working directory is where the server software has been downloaded, and that you do have root permission. Comments have been added to explain what to do if you do not have root permission.

```
[root@vdglin28 lmx-5.6.4]# sh lmx-enduser-tools_v5.6.4_linux_x64.sh

Verifying archive integrity... All good.
Uncompressing LM-X Enduser Tools v5.6.4  100%

LM-X End-user Tools 5.6.4 installer.
Copyright (C) 2002-2024 X-Formation. All rights reserved.

-- You must accept the terms of the End User License Agreement (EULA)
before installing and using LM-X End-user Tools.

-> X-Formation EULA [REJECT/accept/display]: accept
```

If you are not running as root you will need to select an alternative directory to which you have write access at the next question.

```
-> Enter installation directory [/usr/lmx-5.6.4]:

-- You can optionally install LM-X license server.
-- To install LM-X license server, you must have a liblmxvendor.so
-- library, which is supplied by your application vendor.

-> Do you want to install LM-X license server? [Y/n]: Y

-- LM-X License Server requires the liblmxvendor.so library.
-- Please contact your license server vendor if you have
-- not obtained this library yet.
-- The library will be copied from chosen path
-- to /usr/lmx-5.6.4.
```

A standard download and install as performed in section 2 above will have placed file liblmxvendor.so in *installation_directory*/ lmx-5.6.4, the same directory as the script you are running. In this example that is `/home/dyna71/22_test_install/lmx-5.6.4`

```
-> Enter path to search for liblmxvendor.so: [/root]:
/home/dyna71/22_test_install/lmx-5.6.4

-- Searching for liblmxvendor.so in /home/dyna71/22_test_install/lmx-
5.6.4... done.

   [0] /home/dyna71/22_test_install/lmx-5.6.4/liblmxvendor.so

-> Enter a number corresponding to liblmxvendor.so file path in the above
list [0]:
```

If you are not running as root you will need to select your current username at this point.

```
-> Run LM-X License Server under a different username than the current
[root]:
-> Are you sure you want to run  as root? [N/y]: y
-> Do you want to extract files to /usr/lmx-5.6.4? [Y/n]: y

-- Copying files...  done.
```

If you are not running as root, you will not be able to install a startup script used by the system, so you will have to answer “N” and skip the step below.

```
-> Installation of a startup script requires root privileges. Do you want
to continue? [Y/n]: y

-- Creating /etc/systemd/system/lmx-serv-5.6.4.service init script...
done.

-> Do you want to start LM-X License Server 5.6.4 automatically during
system startup? [Y/n]: y

-- Registering lmx-serv-5.6.4.service with systemctl...  done.

-> Do you want to start LM-X License Server 5.6.4 now? [Y/n]: y

-- Starting LM-X License Server 5.6.4... done.
-- To access the UI please use License Server Client.

-- Installation of LM-X End-user Tools 5.6.4 completed successfully.
-- For detailed installation log see /var/log/lmx serv installation.log.
```

2. Once the installer has completed, you should be able to navigate to the directory where the server was installed, in this example `/usr/lmx-5.6.4`, and check the installed files.

```
[root@vdglin28]# cd /usr/lmx-5.6.4
[root@vdglin28 lmx-5.6.4]# ls -l
-rwx------. 1 root root    18400 Apr 25 12:08 liblmxvendor.so
-rw-------. 1 root root  9692045 Apr 25 12:08 LicserverClient.jar
-rwx------. 1 root root  9262864 Apr 25 12:08 lmxendutil
-rwx------. 1 root root 10273048 Apr 25 12:08 lmx-serv
-rw-------. 1 root root    16152 Apr 25 12:08 lmx-serv.cfg
-rw-r--r--. 1 root root     1152 Apr 25 12:08 lmx-serv.log
-rw-r--r--. 1 root root        4 Apr 25 12:08 lmx-serv.pid
-rw-------. 1 root root    15749 Apr  6 11:47 lmx-serv.cfg
```

Please note that the license server configuration is stored in plain text in the lmx-serv.cfg file, including the LM-X license server remote access password. It is your (or your system administrator's) responsibility to limit access to this file, to prevent problems caused by misconfiguration.

8.2.5.2 Install your floating license file

1. Your floating license file (arup.lic file) is provided by Oasys Ltd or your Oasys Suite distributor.
2. If you do not have a license file, please contact your Oasys Suite distributor. You will need to provide the hostname and Ethernet HostID of your license server, as described in section 8.2.4.
3. Please place your floating license .lic file in the LM-X server <install_directory>, in the example above this is `/usr/lmx-5.6.4`
4. When the LM-X license server (lmx-serv executable) is started, it should be able to automatically find the license .lic file(s) in the <install_directory>. If necessary, use the relevant line `LICENSE_FILE = <licensefilepath>` in the lmx-serv.cfg file to point to the correct license file.

8.2.5.3 Configure the LM-X license server

1. The LM-X license server configurations are in the lmx-serv.cfg file.
2. If necessary (e.g. if you are running multiple LM-X license servers for software other than Oasys Suite), change the default port number from 6200 to an available TCP port by editing the TCP_LISTEN_PORT = <port> line in lmx-serv.cfg.
3. Change the REMOTE_ACCESS_PASSWORD in the `REMOTE_ACCESS_PASSWORD = <password>` line in lmx-serv.cfg, which is used with the `lmxendutil` tool to remotely stop/restart the license server and remove licensed users. Please see section 8.3 of this guide

8.2.6 Using LM-X Node-Locked License on Linux

In order to obtain a node-locked license, you will need to provide the hostname and Ethernet HostID of the client machine(s) that will be running Oasys Suite.

1. To obtain the HostID, please refer to section 8.2.4.
2. Send the resulting HostID text output to your Oasys Suite distributor.
3. Once we have received both the machine HostID information file and a signed copy of our Standard License Agreement, we will issue your Oasys Suite license file, `arup.lic`, to you directly via email.
4. Save the node-locked license `arup.lic` file in a local directory on the machine.
5. Set an environment variable called `ARUP_LICENSE_PATH` to point to `arup.lic` file. For example if using Bash shell:

   ```
   export ARUP_LICENSE_PATH=/path/to/license/arup.lic
   ```

   or if using a Cshell

   ```
   setenv ARUP_LICENSE_PATH /path/to/license/arup.lic
   ```

6. Start-up Oasys Suite and the software should automatically find the node-locked license.

8.3 Operations

This section describes the operation and maintenance of Oasys Suite's LM-X license server.

8.3.1 License Server Operations

This section details the operation of Oasys Suite’s LM-X license server.

8.3.1.1 LM-X Programs

X-Formation provides the LM-X license server tools and programs, including **lmx-serv** and **lmxendutil**.

Tool	File Name	Description
LM-X End-user utility	lmxendutil	Command line tool that lets you get the HostID values for the computer system and run operations on an LM-X license server.
LM-X License Server	lmx-serv	Running this application starts the LM-X license server. It reads the associated configuration .cfg 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.

8.3.1.2 lmx-serv

Running this application starts the LM-X license server. At a minimum, a valid configuration file must reside in the installation directory and a valid license file must be obtained to run the license server. All user settings can be specified in a valid .cfg file.

```
lmx-serv [options]
```

Execution options for **`lmx-serv`**
`-b` = Run license server in background `-c <config_file>` = Specify which config file to use `-l <license_path>` = Specify license file or path to license file(s) `-lf <logfile>` = Specify path to logfile `-port <port_num>` = Specify TCP port number to use `-h` = Show help info for lmx-serv

8.3.1.3 lmxendutil

Command line tool that lets you get the HostID values for the computer system, display license statistics, restart and stop license server, remove users, etc.

```
lmxendutil [options]
```

Execution options for **`lmxendutil`**
`-hostid` = Display HostIDs for this system `-licstat [-host <host> -port <port> etc.]` = Display license statistics (run `lmxendutil -help` for full list of options) `-restartserver [-host <host> -port <port> -password <password>]` = Restart license server `-shutdownserver [-host <host> -port <port> -password <password>]` = Stop a license server `-removeuser -clientusername <user> -clienthostname <clienthost> [-host <host> -port <port> -password <password>]` = Remove a specific user at a specific host from a license server `-help` = Show help info for `lmxendutil`

8.3.1.4 LM-X Configuration File (.cfg)

The .cfg file is also known as the Options file and allows the license administrator to control various operating parameters of LM-X license server. A complete listing of the options is listed in the sample below for reference:

```
# LM-X License server sample configuration file
#
# Copyright (C) X-Formation. All rights reserved.
#
# https://www.x-formation.com
#

#************************************************
# lmx-serv.cfg notes:
#
# 1) Any line beginning with a '#' is a comment.
# 2) User and host names are case-insensitive, but you're advised to
#    use those present in the log file to avoid typos.
# 3) License clients can be specified by user name (USER),
#    or computer name (HOST), or IP address (IPADDR).
#************************************************

#************************************************
# TCP/UDP port number the license server will listen on.
# TCP port is used for data traffic protocol.
# UDP port is used for automatic server discovery protocol.
#
# The default TCP port is 6200.
# The UDP port is fixed to 6200 and cannot be changed.
# See http://www.iana.org/assignments/port-numbers
#************************************************
TCP_LISTEN_PORT = 6200

#************************************************
# 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), separated
# by a space.
# 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.
#
# Syntax:
# TCP_BIND_ADDRESS = <IP_address_1 IP_address_2>
#
#************************************************
# Example:
# TCP_BIND_ADDRESS = 192.168.21.321 8000:8000:8000:8000:abcd:1234:12df:fd54

#************************************************
# Specify High Availability Licensing (HAL) servers.
# HAL enables 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.
#
# Syntax:
#
# HAL_SERVER<server_number> = [port]@hostname
# or
# HAL_SERVER<server_number> = [port]@IP_address
#
# Port is optional.
#
# Important: The HAL_SERVER list must be identical
# on all your servers for HAL to function properly.
#
# See the LM-X End Users Guide for further information
# about setting up HAL servers.
#
#************************************************
# Examples:
# HAL_SERVER1 = 6200@server1
# HAL_SERVER2 = 6200@server2
# HAL_SERVER3 = 6200@server3

#************************************************
# Set the log file path:
# It is preferred to write out the full path.
#
#************************************************
# Examples:
# LOG_FILE = c:\program files\lmx-server.log
# LOG_FILE = /home/user1/lmx-serv.log
LOG_FILE = /path/to/license/server/lmx-serv.log

#************************************************
# Set the log file format.
# The following formats are valid:
# NORMAL, EXTENDED
# Setting the log file format to 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., which
# is useful for debugging purposes.
```

```
#
#************************************************
# Examples:
LOG_FORMAT = NORMAL

#************************************************
# Exclude messages from the log.
# The following messages can be excluded:
# CHECKOUT, CHECKIN, STATUS, BORROW, BORROW_RETURN,
# REMOVE_USER, REMOTE_RESTART, REMOTE_SHUTDOWN or
# AUTOMATIC_DISCOVERY.
#
# Syntax:
# LOG_EXCLUDE = <message1, message2, etc.>
#
#************************************************
# Example:
# LOG_EXCLUDE = CHECKOUT, CHECKIN, STATUS

#************************************************
# Set the minimum elapsed time for user removal.
# This will set a minimum time that must elapse from the connection
# before a user can be removed using lmxendutil.
# This time is entered in seconds, and 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.
#
#************************************************
# Example:
# MIN_USER_REMOVE_TIME = 120

#************************************************
# Set a license file path:
#
# On Windows: If no file is set, the license server
# will look for <vendor>.lic in the same directory as the license server.
# On Unix: If no file is set, the license server will look for
# /usr/x-formation/<vendor>.lic
#
# In both cases, the filenames must be lowercase.
#
# You can specify one or multiple paths as needed.
#
#************************************************
# Examples:
# LICENSE_FILE = d:\server\network.lic
# LICENSE_FILE = c:\extra_file.lic
# LICENSE_FILE = /home/user1/floating_license.lic
# LICENSE_FILE = /home/user1/floating_license2.lic
LICENSE_FILE = /path/to/license/server/arup.lic

#************************************************
# Specify a pay-per-use usage database, which can be used for billing
# purposes.
#
# The format of this database and an example of data printout is
# described in the LM-X end user documentation.
#
#************************************************
# Examples:
```

```
# USAGE_DATABASE = d:\server\usage.db
# USAGE_DATABASE = /home/user1/usage.db

#************************************************
# Specify pay-per-use detail level.
# NORMAL includes basic usage information.
# EXTENDED includes user information in addition
# to the basic usage information.

# USAGE_LEVEL = NORMAL

#************************************************
# Specify the number of actions after which
# pay-per-use database records will be committed
# to the pay-per-use database file.

# USAGE_WRITE_INTERVAL = 1000

#************************************************
# Enable pay-per-use username anonymization. Usernames
# will be hashed and stored in database anonymously.
# By default, anonymization is disabled.

# USAGE_ANONYMIZATION = TRUE

#************************************************
# Specify the remote administration password that is used when remotely
# stopping and restarting the license server and removing users from it.
#
# The password is case-sensitive.

REMOTE_ACCESS_PASSWORD = H@rdT0GuessPassword

#************************************************
# Enable fast queuing when license queuing is enabled.
#
# 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.
#
# Syntax:
# FAST_QUEUE = <feature1, feature2, etc.>
# or
# FAST_QUEUE = ALL
#
#************************************************
# Example:
# FAST_QUEUE = f2, d5, app2

#************************************************
# Group user names, host names or IP addresses
# to reduce redundancy in configuration file.
#
# Syntax:
# GROUP_<group name> = <list of members>
#
```

```
#*********************************************
# Example:
# GROUP_admins = joe bob
# GROUP_users = admins harry
# GROUP_hosts = host1 host2

#*********************************************
# Allow/deny specific clients the ability to use 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.
#   - For ALLOW_IPADDR_* and DENY_HOST_* rules, you can specify addresses
using IPv4 and IPv6.
#     If you are using both protocols, ensure that you have set rules for
both of them.
#
# Syntax:
# ALLOW_IPADDR_ALL = <one or more IP addresses>
# ALLOW_IPADDR_<feature name> = <one or more IP addresses>
# (For IPv4 must be either specific A.B.C.D or with wildcards A.*.B.*)
# (For IPv6 must be either specific A:B:C:D:E:F:G:H or with wildcards
A:*:C:*:E:*:G:*)
# DENY_IPADDR_ALL = <one or more IP addresses>
# DENY_IPADDR_<feature name> = <one or more IP addresses>
# (For IPv4 must be either specific A.B.C.D or with wildcards A.*.B.*)
# (For IPv6 must be either specific A:B:C:D:E:F:G:H or with wildcards
A:*:C:*:E:*:G:*)
# ALLOW_HOST_ALL = <one or more hostnames or "localhost" for current
machine>
# ALLOW_HOST_<feature name> = <one or more hostnames or "localhost" for
current machine>
# DENY_HOST_ALL = <one or more hostnames or "localhost" for current
machine>
# DENY_HOST_<feature name> = <one or more hostnames or "localhost" for
current machine>
# 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>
#
#*********************************************
# Example 1:
# ALLOW_IPADDR_ALL = 192.168.1.* 192.168.2.*
# ALLOW_USER_ALL = Administrator root
# DENY_IPADDR_ALL = *.*.*.*
# This will allow only clients on 2 subnets, user Administrator and
# root from any host and deny everyone else. This applies
# to all features.
#
# Example 2:
# DENY_HOST_f2 = localhost untrusted crackerjack
# ALLOW_IPADDR_f2 = 192.168.*.*
# DENY_IPADDR_f2 = *.*.*.*
# This 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.
#
# Example 3:
# ALLOW_IPADDR_ALL = 2001:0db8:85a3:0000:0000:8a2e:0370:*
2001:0db8:85a3::8a2e:a460:* 1:5567::12c5:*
# DENY_IPADDR_ALL = *:*:*:*:*:*:*:*
```

```
# DENY_IPADDR_ALL = *.*.*.*
# This will allow only clients on 3 IPv6 subnets.
# This applies to all features and users.
#
# Example 4:
# DENY_USER_ALL = admins
# ALLOW_HOST_f1 = hosts
# This will deny all members of group admins and allow all
# host names from group hosts to get feature f1.

#************************************************
# Allow/deny specific clients from borrowing licenses.
#
# Syntax:
# ALLOW_BORROW_IPADDR_ALL = <one or more hosts>
# ALLOW_BORROW_IPADDR_<feature name> = <one or more hosts>
# (Must be either specific A.B.C.D or with wildcards A.*.B.*)
# DENY_BORROW_IPADDR_ALL = <one or more hosts>
# DENY_BORROW_IPADDR_<feature name> = <one or more hosts>
# (Must be either specific A.B.C.D or with wildcards A.*.B.*)
# 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>
#
#************************************************
# Example 1:
# ALLOW_BORROW_USER_ALL = daisy harry tom
# DENY_BORROW_HOST_ALL = server1 machine5
# DENY_BORROW_IPADDR_ALL = 192.168.3.* 192.168.4.*
# This will allow the specific users, and deny host and
# IP addresses on the list from borrowing any feature.
# Everyone else will be allowed.
#
# Example 2:
# ALLOW_BORROW_USER_f2 = lazyjack rabbit joeuser
# DENY_BORROW_IPADDR_f2 = *.*.*.*
# This will allow the specific users and deny everyone
# else from borrowing f2.
#
# Example 3:
# DENY_BORROW_USER_f2 = users
# This will deny all members of group users from borrowing
# feature f2.

#************************************************
# Limit the number of licenses that can be used by individual users
# or groups to implement fair/desired distribution of licenses.
#
# Syntax:
# 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>
# (Host must be specified completely A.B.C.D or with wildcards A.*.B.*)
#
# 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.
#
#************************************************
# Example 1:
# LIMIT_USER_f2_5 = harry joe sam
# LIMIT_IPADDR_f3_3 = 192.168.2.* 192.168.4.*
#
# Example 2:
# LIMIT_USER_ALL_1 = users


#************************************************
# Reserve a number of licenses that can be used by individual users
# or groups to implement fair/desired distribution of licenses.
#
# Syntax:
# 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>
# (Host must be specified completely A.B.C.D or with wildcards A.*.B.*)
#
# 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.
#
#************************************************
# Example 1:
# RESERVE_USER_f2_5 = harry joe sam
# RESERVE_IPADDR_f3_3 = 192.168.2.* 192.168.4.*
#
# Example 2:
# RESERVE_USER_f1_5 = users admins
# RESERVE_HOST_f2_3 = hosts

#************************************************
# Limit the number of licenses that can be borrowed to prevent
# all licenses from being borrowed at the same time.
#
# Syntax:
# BORROW_LIMIT_COUNT_ALL = <limit count>
# BORROW_LIMIT_COUNT_<feature name> = <limit count>
#
#************************************************
# Example 1:
# BORROW_LIMIT_COUNT_f2 = 1
# BORROW_LIMIT_COUNT_ABCDEF = 5

#************************************************
# Limit the number of hours licenses can be borrowed
# to prevent licenses from being borrowed for too long.
#
# Syntax:
# BORROW_LIMIT_HOURS_ALL = <limit hours>
# BORROW_LIMIT_HOURS_<feature name> = <limit hours>
#
#************************************************
# Example:
# BORROW_LIMIT_HOURS_f2 = 1
# BORROW_LIMIT_HOURS_ABCDEF = 5

#************************************************
```

```
# Specify how often to rotate the log file.
# Valid values are "day," "week," or "month."
# The log file rotation occurs at midnight for any of these settings.
# Setting this to any value other than those given above disables log file
rotation.
#
# Syntax:
# LOGFILE_ROTATE_INTERVAL = <rotation_interval>
#
#************************************************
# Example:
# LOGFILE_ROTATE_INTERVAL = day

#************************************************
# Specify licenses directly within the configuration file.
#
# Specify any features from one or more license files
# to eliminate the need for both a license file and
# configuration file for the license server.
# The content must be specified within the __START_LICENSE__
# and __END_LICENSE__ clauses.

__START_LICENSE__

# Example:
#
# FEATURE f1
# {
#   VENDOR = XYZ
#   ...
# }

__END_LICENSE__

#************************************************
```

8.3.1.5 Stopping the LM-X License Server

The LM-X server can be stopped remotely by running the following command:

```
lmxendutil -shutdownserver -host <host> -port <port> -password <password>
```

You will need the REMOTE_ACCESS_PASSWORD that was set in the `REMOTE_ACCESS_PASSWORD = <password>` line in the lmx-serv.cfg file.

Alternatively, if you have installed the licence server as a system service you will be able to stop, start and restart it using the `systemctl` utility on the host machine. For a full list of options see man systemctl but the most commonly used will be

`systemctl start lmx_service_name`	to start the server
`systemctl stop lmx_service_name`	to stop the server
`systemctl restart lmx_service_name`	to restart the server

As a last resort, while logged in to the license server machine as the user that ran the LM-X license server, execute `` `kill <pid>` `` command where <pid> is the process ID for lmx-serv. The <pid> can be found in the lmx-serv.pid file that was created when the LM-X server was started, or it can also be found near the top of the LM-X server .log file, similar to the example shown below. Delete the lmx-serv.pid afterwards if you do this.

Example log file showing **<pid>**
[2020-01-01 11:00:00] LM-X License Server on machinename (Linux_x64) [2020-01-01 11:00:00] Copyright (C) 2002-2019 X-Formation. All rights reserved. [2020-01-01 11:00:00] License server has pid **1357**. [2020-01-01 11:00:00] Serving licenses for vendor ARUP.

In the example above, `kill 1357` will stop the LM-X server.

8.3.1.6 Environment Variables for Licensing

The ARUP_LICENSE_PATH environment variable is set to point to the license file/server.

Variable	Description
ARUP_LICENSE_PATH	Sets the path to the node-locked license file or address of the LM-X license server. Multiple input can be combined using : (colon character) on Linux.

8.3.1.7 Floating Network Server License

Either ARUP_LICENSE_PATH (preferred) or LMX_LICENSE_PATH can be set to locate a valid license for the Oasys Suite software. ARUP_LICENSE_PATH is recommended for faster checkout of licenses.

Set the environment variable ARUP_LICENSE_PATH and point it to the license server host along with an optional port (defaults to port 6200). The following formats are both legal:

```
ARUP_LICENSE_PATH = hostname%port
ARUP_LICENSE_PATH = port@hostname
```

If you are using a HAL license server then you should specify all three license servers, as described in section 8.3.2.

8.3.1.8 Fixed stand-alone (node-locked) license

If the Oasys Suite software will be using a node-locked license file, this variable should be set to point to the location of the license file, for example:

```
ARUP_LICENSE_PATH = <install_directory>/arup.lic
```

8.3.2 High Availability Licensing (HAL)

Activating HAL introduces fault tolerance, because the licensed applications no longer depend on a single point of failure on a single license server.

8.3.2.1 How HAL 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 Oasys Suite distributor.

Note
1. HAL requires three license server machines capable of serving the licenses and having stable network connection between the servers. Network problems will make the system unstable and license checkouts unreliable. HAL also requires the connecting clients to be able to connect to all three servers. 2. HAL does not increase the number of available licenses or features or provide any load-balancing of the three license servers. It is meant to only provide a fault-tolerant license management solution in case of hardware failure.

8.3.2.2 How to install HAL license servers

1. Decide the primary, secondary, and tertiary servers, with the following roles:

HAL server Number	Role
1 - Primary	This HAL server can allow clients to both checkout and borrow licenses, just like a normal license server.
2 - Secondary	If the primary HAL server is down, this secondary server can allow clients to checkout licenses.
3 - Tertiary	This tertiary HAL server will deny all requests but is required as a part of the "quorum of two" configuration to ensure high availability.

2. Edit the config file (lmx-serv.cfg) to add the lines below to specify the three servers that will be used in your HAL configuration.

```
HAL_SERVER1 = port@primaryServer
HAL_SERVER2 = port@secondaryrServer
HAL_SERVER3 = port@tertiaryServer
```

3. Install the same HAL-enabled license arup.lic file on all three servers.
4. Start all three license servers.
5. Open the log file to verify that the HAL license servers are started and working normally, indicated by the line "Ready to serve..." as shown in the following example:

```
[2019-11-29 11:03:50] License server using TCP IPv4 port 6200.
[2019-11-29 11:03:50] License server using TCP IPv6 port 6200.
```

```
[2019-11-29 11:03:50] License server using UDP IPv4 port 6200.
[2019-11-29 11:03:50] Reading licenses...
[2019-11-29 11:03:50] License file(s):
[2019-11-29 11:03:50] ./arup.lic
[2019-11-29 11:03:50] Log file path: /path/to/license/server/lmx-serv.log
[2019-11-29 11:03:50] Log to stdout: No
[2019-11-29 11:03:50] Log format: Normal
[2019-11-29 11:03:50] Configuration file path: /path/to/license/server/lmx-
serv.cfg
[2019-11-29 11:03:50] Serving following features:
[2019-11-29 11:03:50] arup (v2019.1231) (2 license(s)) shared on: HOST USER
CUSTOM license type: exclusive
[2019-11-29 11:03:50] d3plot (v2019.1231) (2 license(s)) shared on: HOST
USER CUSTOM license type: exclusive
[2019-11-29 11:03:50] primer (v2019.1231) (2 license(s)) shared on: HOST
USER CUSTOM license type: exclusive
[2019-11-29 11:03:50]
[2019-11-29 11:03:50] HAL: Peer server: 6200@secondaryserver
[2019-11-29 11:03:50] HAL: Peer server: 6200@tertiaryserver
[2019-11-29 11:03:50] HAL: This license server is configured as a HAL
MASTER.
[2019-11-29 11:03:50] HAL: CHECKOUT requests on this license server are not
allowed!
[2019-11-29 11:03:50] HAL: BORROW requests on this license server are not
allowed!
[2019-11-29 11:03:50] To administrate the license server go to your enduser
directory and run the License Server Client.
[2019-11-29 11:03:50] Ready to serve...
[2019-11-29 11:03:55] HAL: Connection with HAL peer 6200@secondaryserver is
up!
[2019-11-29 11:03:55] HAL: CHECKOUT requests on this license server are
allowed!
[2019-11-29 11:03:55] HAL: BORROW requests on this license server are
allowed!
[2019-11-29 11:04:15] CHECKOUT by user@domain [192.168.1.2]: arup
[2019-11-29 11:04:15] CHECKOUT by user@domain [192.168.1.2]: primer
[2019-11-29 11:04:22] CHECKIN by user@domain [192.168.1.2]: primer
[2019-11-29 11:04:22] CHECKIN by user@domain [192.168.1.2]: arup
```

It may take up to 30 seconds, when the connection between the servers is detected, for the log file to report that requests on the server are allowed.

Note: you must disable or configure your firewall on each HAL server to allow the necessary network traffic for HAL to function properly.

8.3.2.3 Setting up client machines to use HAL

The proper Linux environment variable format for a HAL license setup is shown below, with the servers listed in order of their roles of primary, secondary, and tertiary server.

Example:

```
ARUP_LICENSE_PATH=6200@primaryServer:6200@secondaryServer:6200
@tertiaryServer
```

8.3.3 Usage Logs

The LM-X license server can produce a log file that details activity such as client connections or disconnections, license checkout/checkin, and another server activity. The log file may also contain exit signals.

In the configuration .cfg 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 statistic
- 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.

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

8.3.4 Usage data in the log file

From V20 onwards some very simple usage data is recorded in the LM-X log file. A typical example is

```
[2023-02-16 16:55:43] Clicked Tools: Safety by John.Doe@machine_xyz_123: primer 0.0 [33984]
[2023-02-16 16:55:44] Clicked Dummies by Jane.Doe@machine_pqr_789: primer 0.0 [33985]
```

This information is not transmitted to Oasys Ltd in any way, it remains private on your system.

The purpose of this logging is to provide clients with a more granular view on product usage which can optionally be shared with Oasys Ltd in a cut-down form that will inform our development and optimisation efforts and support improvements to the product and to the user experience.

We will provide analysis tools which allow you to extract this information from the log file and view it through defined reports which will enhance understanding of usage via a number of views, providing rich insight over and above what can be gained from license management systems. Provision of data collected from these tools to Oasys Ltd will be entirely under the control of the client, with only non-sensitive, user-anonymous and visible information being generated for this purpose.

8.4 Appendices

8.4.1 License File Format

The basic format of the license file is described here. The example below shows one typical FEATURE block — there may be many of these in a license file.

```
FEATURE primer
{
VENDOR=ARUP COUNT=2 VERSION=2021.1231 END=2021-12-31 SHARE=HOST|USER|CUSTOM
LICENSEE="Oasys Suite customer"
OPTIONS="UNLIMITED"
KEY=Qb0yo]tpFa[6b12rjU7JXXQljy8I47XD6kMPlFNuroJP2R9pzbI7JpCaSlOrSCGrv9cekuZ
w7ykYjRwY3nWrn0p1xMXRSTlWmuMR \

BRJhWI3CG0XQ15anuHUHszCmFeiO2[YA0]5bSnuNypPWtUzqKNQUlBF8lrj0AnNe6WfyORsLxxN
92HJv7yfpmbAFKXXzPOXL3z6Q \

ftoaOUBJsAo2K3ABG3HI7krIt0OFXDlI[XgGnh2zTqsXASFeLMBrLLJnob3K6vlckoTCzUsEEGx
uNDu]VX8ucecmNg[m]NBiYNMp \

bbbfoXBXaEB5UL8NI2FtlxKG4woyvdwfGlb66iP57DLylTfAtI4TfHVfF]nFfF[285RIJKXvYQJ
PDAYjchvM7HLM2QImJI1lY8gD \

PUi52D]UGvDzSvsksjpl62JDLABkqtTV3rznwZuOQJIkKP45EaqMXs0IQu]ffCWA4zGsBidDGRc
igEPW6hfpskBXSknNfWqX81jy \
    Y7RNiwl]v4aXTuaQ8X6UTq]gd6iiZhuUJvEotyKdaA**
}
```

8.4.2 Extended Licenses for Multiple Programs

A PRIMER floating server license can be extended to be used by the Oasys post-processing software (D3PLOT and T/HIS). Short-term trial licenses for the Oasys post-processing software are also available. Please contact your local distributor for more information.

Situation	License details
Extend PRIMER floating server licenses to work with D3PLOT and T/HIS.	primer + primer_post floating server license An individual using PRIMER and D3PLOT on their machine will use two PRIMER licenses. An individual using PRIMER, D3PLOT and T/HIS will also use two PRIMER licenses. In this instance, D3PLOT and T/HIS share a PRIMER license. D3PLOT and T/HIS can be prevented from using PRIMER licenses by setting the following preference in the oa_pref file. oasys*post_uses_primer = FALSE
PRIMER customer with trial access to D3PLOT and T/HIS for floating server licenses.	primer + post_trial floating server license An individual can use PRIMER, D3PLOT and T/HIS simultaneously on their machine. Doing so will use one ‘primer’ server license and one ‘post_trial’ server license. Once the trial license expires, only PRIMER can be accessed.
PRIMER customer with trial access to D3PLOT and T/HIS for node-locked licenses.	primer + post_trial node-locked license An individual can use PRIMER, D3PLOT and T/HIS simultaneously on the machine with the node-locked license. Once the trial license expires, only PRIMER can be accessed.

D3PLOT customer with trial access to T/HIS. This will enable the use of the D3PLOT-T/HIS link.	d3plot + post_trial An individual can use D3PLOT and T/HIS simultaneously, utilising the features enabled by D3PLOT-T/HIS link. Once the trial license expires, only D3PLOT can be accessed.

8.4.3 Licenses for Single or Multiple Programs

You can buy floating server or node-locked licenses which allow access to all programs in the Oasys Suite software.

It is also possible to buy floating server or node-locked licenses for individual programs.

Program	License required
PRIMER	primer
D3PLOT	d3plot
T/HIS	this
D3PLOT and T/HIS link	d3plot + this
REPORTER	reporter*
All programs in the Oasys Suite	primer, d3plot, this + reporter

*REPORTER is also able to run without the reporter license. In this situation the software checks for any available Oasys license and then releases it again.

8.4.4 Restricted-use Licenses for All Programs

We provide restricted-use licenses free of charge through our website for certain domain names, for example for students at UK Universities.

These licenses can also be sold commercially by a local distributor.

Similar licenses are available, restricted to a different number of nodes or curves.

Program	License
All programs in the Oasys Suite, restricted to models with less than 10,000 nodes (PRIMER and D3PLOT) and 12 curves (T/HIS).	primer, d3plot and this licenses restricted

8.4.5 Oasys REPORTER and SHELL Licensing

REPORTER:

If you have licenses for any of our programs, you are licensed to use REPORTER to interact with that program.

For example, if you have a “primer” license, you can use PRIMER, or use REPORTER to create reports with PRIMER objects in them.

SHELL:

The Oasys SHELL can be used without a license.

8.4.6 Using the Extended PRIMER License – FAQ's

1. License check-out priority – When customer has both the extended PRIMER license (primer + primer_post) and D3PLOT license (d3plot), which license will be checked out first when running D3PLOT?

   D3PLOT will always look for a D3PLOT license first. If no D3PLOT licenses are available, it will then try and use a PRIMER license. If D3PLOT uses a PRIMER license, then by default a window is displayed warning the user about this.

2. Can a user on one machine have an unlimited number of PRIMER sessions with one primer license (as was previously the case)?

   This has not changed if they are running versions 17, 16, or 15 – if a user runs multiple copies of PRIMER on the same machine, then they all share a single license.

3. Can you let me know how to prevent D3PLOT and T/HIS using a PRIMER license?

   To disable license sharing the following preference can be set:

   d3plot*post_uses_primer: FALSE (disables D3PLOT from using a PRIMER license)

   this*post_uses_primer: FALSE (disables T/HIS from using a PRIMER license)

   oasys*post_uses_primer: FALSE (disables D3PLOT & T/HIS from using a PRIMER license)

4. How many extended PRIMER licenses does an individual use?

   D3PLOT (or T/HIS) using a PRIMER license is counted separately to a user running PRIMER so an individual on one terminal, running the following combinations of program uses these licenses:

1 x PRIMER only	1 primer license
2 x PRIMER	1 primer license
PRIMER + D3PLOT	2 primer licenses
2 x PRIMER + 2 x D3PLOT	2 primer licenses
PRIMER + T/HIS	2 primer licenses
PRIMER + T/HIS + D3PLOT	2 primer licenses (D3PLOT and T/HIS share one)

8.4.7 LM-X Error Codes

The following table lists the possible error codes that are returned upon any failure:

Return Code #	Return Code	Description
0	LMX_SUCCESS	Operation successful.
1	LMX_UNKNOWN_ERROR	Unknown error occurred.
2	LMX_INVALID_PARAMETER	Invalid input parameter.

Return Code #	Return Code	Description
3	LMX_NO_NETWORK	Unable to initialize network subsystem.
4	LMX_BAD_LICFILE	License file is using unknown/invalid syntax.
5	LMX_NO_MEMORY	No more available memory.
6	LMX_FILE_READ_ERROR	Unable to read file.
7	LMX_BAD_DATE	Invalid date.
8	LMX_BAD_KEY	Invalid license key.
9	LMX_FEATURE_NOT_FOUND	Feature not found.
10	LMX_BAD_HOSTID	HostID does not match license.
11	LMX_TOO_EARLY_DATE	Software activation date is not yet reached.
12	LMX_TOO_LATE_DATE	Software expired.
13	LMX_BAD_VERSION	Software version does not match license.
14	LMX_NETWORK_ERROR	Unexpected network-related error occurred.
15	LMX_NO_NETWORK_HOST	Unable to connect to license server.
16	LMX_NETWORK_DENY	Rejected actively from license server.
17	LMX_NOT_ENOUGH_LICENSES	Request for more licenses than available on license server
18	LMX_BAD_SYSTEMCLOCK	System clock has been set back.
19	LMX_TS_DENY	Feature not allowed to run on terminal server clients.
20	LMX_VIRTUAL_DENY	Feature not allowed to run on a virtual machine.

Return Code #	Return Code	Description
21	LMX_BORROW_TOO_LONG	The specified borrow period is too long.
22	LMX_FILE_SAVE_ERROR	Unable to save file.
23	LMX_ALREADY_BORROWED	Feature already borrowed.
24	LMX_BORROW_RETURN_ERROR	Unable to return borrowed feature.
25	LMX_SERVER_BORROW_ERROR	Deprecated. License server returned borrow error.
26	LMX_BORROW_NOT_ENABLED	Borrow functionality not enabled on client side.
27	LMX_NOT_BORROWED	The feature that was attempted to be returned was not borrowed.
28	LMX_DONGLE_ERROR	Dongle is not attached or does not function correctly.
29	LMX_SOFTLIMIT	Request exceeds the number of softlimit licenses available.
30	LMX_BAD_PLATFORM	Platform not permitted by license.
31	LMX_RESET_SYSTEMCLOCK_EXCEEDED	Deprecated. Number of allowed reset system clock attempts exceeded.
32	LMX_TOKEN_LOOP	Infinite token loop detected.
33	LMX_BLACKLIST	Feature is blacklisted.
34	LMX_VENDOR_DENY	Feature checkout rejected by vendor-defined rules.
35	LMX_NOT_NETWORK_FEATURE	Unable to use local license as a network license.
36	LMX_BAD_TIMEZONE	Checkout is not permitted in the client time zone.
37	LMX_SERVER_NOT_IN_USE	License server is not currently in use.

Return Code #	Return Code	Description
38	LMX_LICSERVICE_ERROR	Deprecated. Problem with License Distribution Service.
40	LMX_NOT_IMPLEMENTED	Functionality not implemented.
41	LMX_BORROW_LIMIT_EXCEEDED	License server limitation on number of borrowed features exceeded.
42	LMX_SERVER_FUNC_ERROR	License server function error occurred.
43	LMX_HEARTBEAT_LOST_LICENSE	License is lost due to heartbeat failure.
44	LMX_SINGLE_LOCK	Unable to obtain single-usage lock.
45	LMX_AUTH_ERROR	Cannot authenticate user on license server.
46	LMX_NETWORK_SEND_ERROR	Error sending message over network.
47	LMX_NETWORK_RECEIVE_ERROR	Error receiving message over network.
48	LMX_QUEUE	Feature has been queued.
49	LMX_BAD_SECURITY_CONFIG	LM-X security configuration file mismatch.
50	LMX_FEATURE_HAL_MISMATCH	Feature has different HAL settings than other features on the same license server.
51	LMX_NOT_LOCAL_FEATURE	Unable to use network license as a local license.
52	LMX_FEATURE_NOT_REPLACEABLE	Unable to replace missing feature.
53	LMX_HOSTID_NOT_AVAILABLE	HostID is not available on the current machine.
54	LMX_FEATURE_ALREADY_RESERVED	Feature is already reserved.
55	LMX_FEATURE_ALREADY_CHECKED_OUT	Feature is already checked out.

Return Code #	Return Code	Description
56	LMX_RESERVATION_NOT_FOUND	Reservation not found.
57	LMX_API_NOT_REENTRANT	Calling an API function from a callback function is not allowed.
58	LMX_LICENSE_UPLOAD_ERROR	Problem with license file upload.
59	LMX_INTERNAL_LICENSE_NOT_EMBEDDED	Internal LM-X license file is not embedded.
60	LMX_SYSTEM_INTERPROCESS	Interprocess resource locking error.
61	LMX_CANNOT_LOAD_SHARED_LIBRARY	Cannot load LM-X library. (We recommend that you check the permissions for the C:\Users\USERNAME\AppData\Local\Temp folder.)
62	LMX_SERVER_VERSION_TOO_LOW	License server version is lower than the client.
63	LMX_VENDOR_NAME_MISMATCH	License vendor names do not match.
64	LMX_SECURITY_CONFIG_NOT_EMBEDDED	LM-X security configuration file is not embedded.

8.4.8 To uninstall the LM-X License Server

1. Stop the License Manager. (`systemctl stop` … or `lmxendutil -shutdownserver` … as described in section 8.3.1.5)
2. Remove the `lmx-5.6.4` directory containing the LM-X license server files. In the example above, installed using root privileges, this is `/usr/lmx-5.6.4`.
3. If the LM-X license server was setup to auto-start (as a system service)
   - Remove the corresponding service script. In the example above this will be `/etc/system/service/lmx-serv-5.6.4.service`.
   - Then reset system services with `systemctl daemon-reload` followed by `systemctl reset-failed`

8.4.9 Cross-references between LM-X and FLEXlm

This section provides some basic cross-reference information for customers familiar with FlexNet/FLEXlm.

8.4.9.1 License File

LM-X and FLEXlm license files are similar — they are both plain text files containing `feature` blocks. Unlike for FLEXlm, you should not need to edit the LM-X license file that you receive from your Oasys Suite distributor.

8.4.9.2 License Paths

Both LM-X and FLEXlm use environment variables to define the license paths. For HAL or multiple-server setup, define a list separated by : (colon character) on Linux.

License Type	FLEXlm Values	LM-X Values
Floating server	OASYS_LICENSE_FILE=port@host	ARUP_LICENSE_PATH=port@host
Node-locked	OASYS_LICENSE_FILE=<PATH>/oasys_flexlm.dat	ARUP_LICENSE_PATH=<PATH>/arup.lic

8.4.9.3 Comparison of license server setup

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

FlexNet/FLEXlm	LM-X
License server Windows: lmgrd.exe Linux: lmgrd	License server Windows: lmx-serv.exe Linux: lmx-serv
Vendor daemon Windows: vendord.exe Linux: vendord	Vendor daemon Windows: lmx-serv.exe Linux: lmx-serv
License file: oasys_flexlm.dat	License file: arup.lic
Option file: vendord.opt	Configuration file: lmx-serv.cfg

For LM-X, instead of specifying port numbers, SERVER lines and optional information in the license file and option file (for FLEXlm), 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 when running the license server.

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 *arup.lic*

8.4.9.4 Comparison of license server parameters

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 <clienthost> -host <host> -port <port> -password <password>`