

**The MOSEK installation manual.
Version 6.0 (Revision 137).**



www.mosek.com

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Contact information

Phone +45 3917 9907

Fax +45 3917 9823

WEB <http://www.mosek.com>

Email sales@mosek.com
support@mosek.com
info@mosek.com

Sales, pricing, and licensing.

Technical support, questions and bug reports.

Everything else.

Mail MOSEK ApS
C/O Symbion Science Park
Fruebjergvej 3, Box 16
2100 Copenhagen Ø
Denmark

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Chapter 1

License conditions and supported platforms

1.1 License conditions

Before installing MOSEK please read the license conditions. The current license conditions are found at:

<http://www.mosek.com/license/>

1.2 Supported operating systems

Table 1.1 shows which operating systems are supported by each platform specific download.

1.3 AMPL availability

The MOSEK command line tool is capable of working with the AMPL shell. Moreover, on several platforms MOSEK ships with the AMPL shell. Table 1.2 shows on which platforms the AMPL shell is included and the MOSEK command line tool includes the AMPL link.

1.4 MATLAB toolbox availability

Table 1.3 shows on which platforms and for which MATLAB versions the MOSEK optimization toolbox is available.

Platform		
Discription	Type	OS Version
Linux 32 bit x86	linux32x86	RedHat Enterprise 5+
Linux 64 bit x86	linux64x86	RedHat Enterprise 5+
MAC OSX 32 bit x86	osx32x86	10.5+
MAC OSX 64 bit x86	osx32ppc	10.5+
Solaris 32 bit x86	solaris32x86	10+
Solaris 64 bit x86	solaris64x86	10+
Solaris 32 bit Sparc	solarissparc	9+
Solaris 64 bit Sparc	solarissparc64	9+
Windows 32 bit x86	win32x86	XP/2003/Vista+
Windows 64 bit x86	win64x86	XP/2003/Vista+

Table 1.1: Supported operating systems

Platform type	AMPL	
	shell	link
linux32x86	Yes	Yes
linux64x86	Yes	Yes
osx32x86	Yes	Yes
osx64x86		Yes
solaris32x86		
solaris64x86		
solarissparc	Yes	Yes
solarissparc64		Yes
win32x86	Yes	Yes
win64x86	Yes	Yes

Table 1.2: AMPL availability.

Platform type	MATLAB version	
	R2006B-R2009A	R2009b
linux32x86	Yes	Yes
linux64x86	Yes	Yes
osx32x86	Yes	Yes
osx64x86		Yes
solaris32x86		
solaris64x86		
win32x86	Yes	Yes
win64x86	Yes	Yes

Table 1.3: MATLAB support

Platform type	Language			
	C/C++	Java	.NET	Python
linux32x86	Yes	1.5+		2.5+ (-3.0+)
linux64x86	Yes	1.5+		2.5+ (-3.0+)
osx32x86	Yes	1.5+		2.5+ (-3.0+)
osx64x86	Yes	1.5+		2.5+ (-3.0+)
solaris32x86	Yes	1.5+		
solaris64x86	Yes	1.5+		
solarissparc	Yes	1.5+		
solarissparc64	Yes	1.5+		
win32x86	Yes	1.5+	2.0+	2.5+ (-3.0+)
win64x86	Yes	1.5+	2.0+	

Table 1.4: Optimizer API availability

1.5 Optimizer API availability

The optimizer API makes it possible to deploy the MOSEK optimizers from various programming languages. Table 1.4 shows the availability of the optimizer API for the different languages on each platform. The numbers in the table show the supported version of each language.

Chapter 2

Installing the software

This section describes how to install the MOSEK software and how to verify that the software is working correctly. The packages available for download from the MOSEK homepage contain everything, i.e.

- the MOSEK library,
- the MOSEK command line tool,
- the optimizer APIs, and
- the AMPL shell.

Hence, it is sufficient to download one package for each platform.

2.1 Windows installation

First step is to download the appropriate installation file from the MOSEK website. The relevant Windows installer file is one of the following

- `moseksetupsetwin.msi` for Windows 32-bit,
- `moseksetupwin64x86.msi` for Windows x64 (AMD64 or Intel EM64T)

To install MOSEK you must have *administrative privileges*, or the installation will fail. After the installation you will be asked to reboot. This is required because otherwise changes to the environment variables will not take effect.

2.1.1 Verifying the installation

The set-up can be tested by executing the MOSEK command line tool: Open a terminal and type

```
mosek -f
```

If the set-up is correct, this will print MOSEK version information, host name, environment variables and other information.

2.2 Mac OS X installation

First, download the relevant binary package and save it to a directory where MOSEK should be installed. For Mac OS X this would be one of the files

- `mosektoolsosx32x86.tar.gz` for Mac OS X on x86 platform.
- `mosektoolsosx64x86.tar.gz` for Mac OS X on x86 platform.

Open a terminal (usually located in **Applications/Utilities**), change to the directory where the downloaded package was saved, then unpack it using a command similar to

```
tar -xzvf mosektoolsosx32x86.tar.gz
```

This will create a `mosek/6` directory containing the whole distribution. In the following we will assume that the distribution was unpacked in the home directory of a user called “NAME” – you should replace “`/Users/NAME`” by the absolute path of the location of the .

MOSEK can be used either as a stand-alone application from the command line or as a callable library from an application. This requires some manual installation steps to be completed.

2.2.1 License file set-up

The environment variable `MOSEKLM_LICENSE_FILE` must either point to a valid MOSEK license file or to a directory containing a valid MOSEK license file. This can be achieved by modifying (or creating) the

```
~/MacOSX/environment.plist
```

file so it contains an entry defining `MOSEKLM_LICENSE_FILE`, e.g.

```
<key>MOSEKLM_LICENSE_FILE</key>
<string>/Users/NAME/mosek/6/licenses/mosek.lic</string>
```

For this to take effect you must log out and log in again.

Please see the official documentation on `environment.plist` and user defined environment variables at

<http://developer.apple.com/documentation/MacOSX/Conceptual/BPRuntimeConfig/index.html>

To verify that this has taken effect, open a terminal and type

```
echo $MOSEKLM_LICENSE_FILE
```

2.2.2 Mosek binaries set-up

To use MOSEK from other applications, the system must be able to find all binary libraries used by the MOSEK library. The simplest way to ensure this is to copy or link all MOSEK libraries into a directory the system knows of, e.g. the users `lib`. This can be done from a terminal as follows:

```
mkdir ~/lib
cd ~/lib
ln -s /Users/NAME/mosek/6/tools/platform/osx32x86/bin/*.dylib .
```

where “/Users/NAME” should be replaced by the location of the MOSEK installation, and “osx32x86” by the platform name. Please note that the first command will fail if that directory already exists. To verify that it works, open a terminal and run the MOSEK command line tool by typing

```
/Users/NAME/mosek/6/tools/platform/osx32x86/bin/mosek -f
```

Furthermore, if you want to be able to run the MOSEK command line tool without typing the full path, also do the following:

```
mkdir ~/bin
cd ~/bin
ln -s /Users/NAME/mosek/6/tools/platform/osx32x86/bin/mosek .
```

Substitute as above and note that the first command will fail if the directory already exists. To verify that it works, open a terminal and run the MOSEK command line tool by typing

```
mosek -f
```

2.2.3 MOSEK/Python set-up

To use the PyMosek module from Python, run the `setup.py` for the relevant python version — either 2 or 3. The setup scripts are located in the platform directory under

```
python/2/setup.py  
python/3/setup.py
```

To make install the MOSEK/Python module as a normal user run the command

```
python setup.py install --user
```

otherwise, to make a global installation as `root`, run

```
python setup.py install
```

Note that this will install the module *only* for the Python version that the `setup.py` script is executed with.

2.3 Linux/UNIX installation instructions

First, download the relevant binary package and save it to a directory where MOSEK should be installed. For Linux that would be one of the files

- `mosektoolslinux32x86.tar.gz` for Linux on 32-bit x86,
- `mosektoolslinux64x86.tar.gz` for Linux on AMD64 or EM64T, or

For Sun Solaris it is one of the files

- `mosektoolssolarissparc.tar.gz` for 32-bit Solaris Sparc,
- `mosektoolssolarissparc64.tar.gz` for 64-bit Solaris Sparc,
- `mosektoolssolaris32x86.tar.gz` for 32-bit Solaris on Intel x86, or
- `mosektoolssolaris64x86.tar.gz` for 64-bit Solaris on Intel x86.

Open a terminal, change to the directory where the downloaded package was saved, then unpack it using a command similar to


```
tar xzvf mosektools<platform>.tar.gz
```

where <platform> is the platform type, e.g. linux32x86. This will create a mosek/6 directory containing the whole distribution.

In the following

<INSTALL_DIR>

denotes the location where MOSEK was unpacked, e.g the users home directory.

2.3.1 Environment set-up

To use the MOSEK library or command line tool, the environment variables `LD_LIBRARY_PATH` and `PATH` must include the relevant MOSEK path:

```
<INSTALL_DIR>/mosek/6/tools/platform/<PLATFORM>/bin
```

where <PLATFORM> should be replaced according to the platform, and `MOSEKLM_LICENSE_FILE` must point to the relevant license file or directory.

These values can be permanently added by appending entries to the user's

```
~/.bashrc
```

or similar, e.g assuming that

```
<INSTALL_DIR> = $HOME
```

then

```
# Change "platform" to the relevant value.
```

```
MOSEKPLATFORM=platform
```

```
export PATH=$PATH:$HOME/mosek/6/tools/platform/$MOSEKPLATFORM/bin
```

```
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$HOME/mosek/6/tools/platform/$MOSEKPLATFORM/bin
```

```
export MOSEKLM_LICENSE_FILE=$HOME/mosek/6/licenses
```

The changes will not take effect until next time the shell is started.

2.3.2 Verifying the set-up

When the environment has been set up, the next terminal that is opened should start with the correct settings. The set-up can be tested by executing the MOSEK command line tool: Open a terminal and type

```
mosek -f
```

If the set-up is correct, this will print MOSEK version information, host name, environment variables and other information. Verify that

- the `LD_LIBRARY_PATH` matches your settings,
- the `MOSEKLM_LICENSE_FILE` matches your settings, and
- the version is correct (6.0).

2.3.3 Installation of the Java optimizer API

This section can be skipped if you do not want to use the Java optimizer API.

To use this interface, the steps described in Section 2.3.1 must be completed in advance. The MOSEK class library is located in the

```
<INSTALL_DIR>/mosek/6/tools/platform/$MOSEKPLATFORM/bin/mosek.jar
```

file which must be specified either on compile-time and run-time. One way of doing this is to set the `CLASSPATH` environment variable, e.g. in the user's

```
~/.bashrc
```

or similarly as

```
export CLASSPATH=$CLASSPATH:$HOME/mosek/6/tools/platform/$MOSEKPLATFORM/bin/mosek.jar
```

This assumes that you installed MOSEK in `$HOME`.

2.3.3.1 Installation of the .NET optimizer API for MONO

This section can be skipped if you do not want to use the MOSEK/.NET API.

To use this interface, the steps described in Section 2.3.1 must be completed in advance. The MOSEK/.NET library is located in

```
<INSTALL_DIR>/mosek/6/tools/platform/$MOSEKPLATFORM/bin/mosekdotnet.dll
```

or

```
<INSTALL_DIR>/mosek/6/tools/platform/$MOSEKPLATFORM/bin/mosekdotnet64.dll
```

depending on the platform. This must be set in the `MONO_PATH` environment variable, e.g. in the user's

```
~/.bashrc
```

or similarly as

```
export MONO_PATH=$MONO_PATH:$HOME/mosek/6/tools/platform/$MOSEKPLATFORM/bin
```

This assumes that:

```
<INSTALL_DIR>=$HOME
```

Further instructions can be found in the MOSEK/.NET manual.

2.3.4 MOSEK/Python set-up

To use the PyMosek module from Python, run the `setup.py` for the relevant python version — either 2 or 3. The setup scripts are located in the platform directory under

```
python/2/setup.py  
python/3/setup.py
```

To make install the MOSEK/Python module as a normal user run the command

```
python setup.py install --user
```

otherwise, to make a global installation as `root`, run

```
python setup.py install
```

Note that this will install the module *only* for the Python version that the `setup.py` script is executed with.

Chapter 3

Installing a license

MOSEK is a licensed software product and requires a license in order to be used.

3.1 Activating a purchased license

In order to activate a purchased MOSEK license you should perform the following steps:

- Step 0 (*optional*): If you have purchased and received a dongle, then install it using the instructions available on the web page <http://www.mosek.com/dongle>
Most customers do *not* buy a dongle. If you did not purchase a dongle, then proceed to step 1.
- Step 1: Email the *host name* and *host ID* of the license server to license@mosek.com. See Chapter 7 for instructions on how to locate the host name and host ID. If you will be running more than one license server please specify how the licenses should be distributed among them.
- Step 2: You will receive your permanent license file via email from MOSEK. (The license file you receive after downloading MOSEK is *not* a permanent license file.)
- Step 3: Install the license file mentioned in step 2. Installation instructions can be found in Chapter 8. If you purchased a dongle please see the installation instructions in Chapter 6.

For a short introduction to the concepts of the license system please see the chapter 5.

3.2 Activating a trial license

It is possible to obtain a trial license for evaluation purposes. Such a license will allow you to solve large size problems for a limited period of time. A trial license should be installed using the instructions in Chapter 9.

If something goes wrong during the license installation, please contact MOSEK support at support@mosek.com. Please include as much information about the problem as possible - error messages in particular are very useful.

Chapter 4

License system FAQ

Below are some frequently asked questions related to the license system.

1. How to obtain the HOSTNAME? See Chapter [7](#).
2. How to obtain the HOSTID? See Chapter [7](#).
3. How to install a *purchased* license? See Chapter [8](#).
4. How to install a *trial* license? See Chapter [9](#).
5. How to use MOSEK from a computer other than the license server in a networked environment? If you are using Windows please see Section [8.1.2](#) otherwise see Section [8.2.2](#).
6. How to check if the license system works? If you are using Windows please see Section [8.1.2.2](#) otherwise see Section [8.2.3](#).

Chapter 5

License system concepts

This chapter introduces the basic concepts of the MOSEK license system.

5.1 How the license system works

MOSEK is a licensed software product which means you that must have a valid license in order to use MOSEK. A license is a file which specifies:

- How many copies of MOSEK you are allowed to use simultaneously.
- What features in MOSEK you are allowed to use. An example of a feature is the mixed integer optimizer (PTOM).

The license is managed by the FLEXlm ¹ license manager supplied with MOSEK. Two types of licenses exist for MOSEK:

- A floating license:

A *floating license* is tied to a particular computer acting as a *license server*. MOSEK can be used on any computer connected to the license server (usually through the local area network). In particular MOSEK can be used on the computer acting as license server.

You may think of the license server as a computer with a bag of license tokens. Whenever a client computer starts using MOSEK, a license token is requested from the license server, and when MOSEK completes it sends back the license token to the license server.

¹FLEXlm is a widely used license manager manufactured by [Acresso\(www.acresso.com\)](http://www.acresso.com).

This implies that you can't use more license tokens than you actually have at any given point in time.

The advantage of a floating license is:

1. MOSEK can run on any computer connected via the network to the license server.
 2. An unlimited number users can share a limited number of MOSEK licenses.
- A trial license:
A *trial license* is not tied to any particular computer but is time limited. A trial license is only used for evaluation purposes.

All commercial MOSEK licenses are floating licenses.

5.2 Sharing a single license between multiple non-networked computers

A license file should be tied to a dongle in order to share a single license among multiple computers not connected to a network . Please see Section 5.3.1 for further details. Most MOSEK users do not use a dongle and for most set-ups it is not advisable as it complicates the installation. A better setup for using MOSEK on computers not connected to the network is to install the license server with a single license on each non-networked machine. This will allow MOSEK to run on each machine even when disconnected from the network.

5.3 The host ID

A floating license is tied to a particular computer acting as a license server. The license server is identified using a unique ID known as the *host ID*. Usually the host ID is identical to the MAC address of a network card. Therefore, the computer needs to be equipped with a network card. However, an actual network connection is not needed as MOSEK requires only a number coded in the network card².

5.3.1 A dongle host ID

Alternatively a license can be tied to an ID in a dongle which is a small piece of hardware that is attached to a USB port. The advantage of using a dongle is that the dongle can be moved to another computer. A license can e.g be used at the office and at home without

²All network cards have a unique address known as the MAC address.

the two locations being connected by a network. Please Note that the license server software must be installed on each computer the dongle is used on. For information on how to obtain the `host` ID see Chapter 7.

5.4 Further information about FLEXlm

Further information about the FLEXlm license system is available in the [Flexlm end user manual](#) available on the MOSEK website.

Chapter 6

Dongle installation and usage

A dongle is a small piece of hardware that is inserted in the USB port. The dongle provides a unique ID (a host ID) to which the license is tied. This will allow any computer to which the dongle is connected to act as a license server and run MOSEK. For a detailed description of the license system please see Chapter 5.

Please note using a dongle to provide a host ID is optional since a network card Ethernet address can be used as a host ID.

The dongle driver and license system software must be installed on any machine the dongle will be used on. To install the dongle follow the instruction below on every machine the dongle will be used on:

- If you did not previously install the dongle driver, do so now. Installation instructions and drivers can be found on the web page:
<http://www.mosek.com/dongle>
- Email the *host name* and *host ID* of the dongle to license@mosek.com. See Chapter 7 for instructions on how to locate the host name and host ID. You will then receive the permanent license file by email.
- Make sure the hostname in the license file matches the hostname of the computer you are currently installing the license server on. The best way to do this is to set the name of the license server to `localhost`. The first line of the license file looks something like this:

```
SERVER myserver FLEXID=9-040998f8
```

Here `myserver` should be the name of the computer which you are currently installing the license server on. If this is not already set to `localhost`, please replace `myserver`

with `localhost`. The name of the license server can be changed by manually editing the license file.

The number 9-040998f8 is the *host ID*. This must match the number printed on the dongle.

- Install the license server (see Chapter 8).

6.1 Connecting the dongle

When reconnecting the dongle after use on another computer it is advisable to insert the dongle before booting the computing. If the dongle is inserted after reboot it must be attached by clicking on **Attach dongle** in **Mosek Optimization tools 6.0**.

6.2 License checkout from client computer

The machine that has the dongle connected to it and is running the license server may optionally act as license server for other machines connected to it over the network.

To see how other machines should be made to connect to the license server please see Section 8.1.2.4.

Chapter 7

Obtaining the host ID and hostname

7.1 Windows

If you have purchased a USB dongle, first install the dongle software. See Chapter 6 for installation instructions. To obtain the host ID/hostname:

- If you are using a dongle, then insert the dongle.
- In the start menu below All programs select **Mosek Optimization tools 6.0** and click on **Generate HOSTID**. MOSEK will display the HOSTNAME and the HOSTID and generate a `hostid.txt` file in the users home directory e.g

```
c:\Users\<user>\hostid.txt
```

where `<user>` is your user name.

```

C:\Windows\system32\cmd.exe

Z:\mosekprj\brn-5-0\src\flexlminstall>echo off

-----
Hostname:
dublin
-----
HOST ID from network card MAC address:
lmutil - Copyright (c) 1989-2007 Macrovision Europe Ltd. and/or Macrovision Corp
oration. All Rights Reserved.
The FLEXnet host ID of this machine is "000c29ee0db4"
-----
HOSTID from dongle (if present):
lmutil - Copyright (c) 1989-2007 Macrovision Europe Ltd. and/or Macrovision Corp
oration. All Rights Reserved.
The FLEXnet host ID of this machine is ""
lmhostid: Missing Dongle Driver. (-112,501)
-----
*****
* The above output shows your HOSTNAME and HOSTID.
* MOSEK has also written a file containing the HOSTID and HOSTNAME to:
* "C:\Users\testuser\hostid.txt"
* Please send this file to license@mosek.com to receive your license.
*****
Press any key to continue . . . _

```

- Please send the `hostid.txt` file when you asked for the hostname and host ID.

7.2 LINUX/UNIX/MAC OSX

7.2.1 Default (Ethernet address) HOSTID

If you did not purchase a dongle the `host ID` is obtained as follows:

Open a terminal and execute the command:

```
<INSTALL_DIR>/mosek/6/tools/platform/<PLATFORM>/bin/lmutil lmhostid
```

An example output is

```

lmutil - Copyright (c) 1989-2006 Macrovision Europe Ltd.
and/or Macrovision Corporation. All Rights Reserved.
The FLEXnet host ID of this machine is "00001a1a5a6a"

```

In this case the `host ID` is `00001a1a5a6a`.

7.2.2 Dongle HOSTID

If you have purchased a USB dongle, then first install the dongle software. See Chapter 6 for installation instructions. Next insert the dongle and obtain the host ID using the command

```
<INSTALL_DIR>/mosek/6/tools/platform/<PLATFORM>/bin/lmutil lmhostid -flexid
```


7.2.3 HOSTNAME

To obtain the host name open a shell and execute the command:

```
hostname
```


Chapter 8

License server installation

8.1 Windows

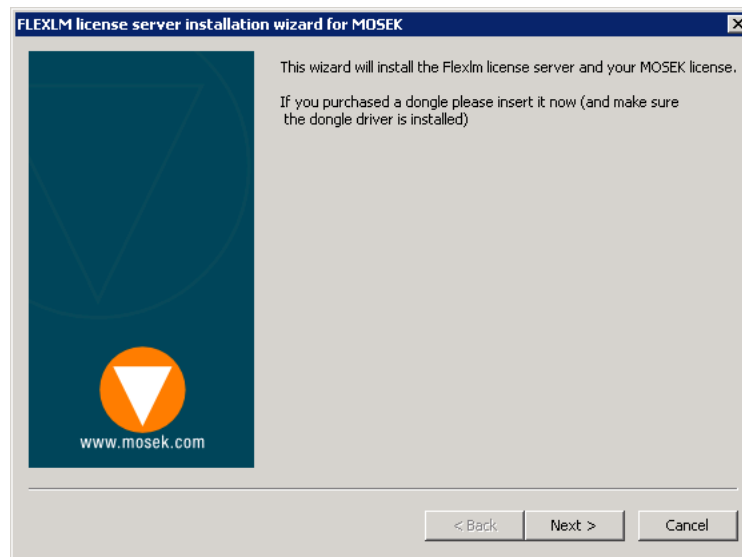
In order to use a purchased MOSEK license you must:

1. Install the license server as described in Section 8.1.1.
2. *(Optional)*: If you want to use the license from a client computer other than the one running the license server, then you should configure each client to check out the license from the license server. See Section 8.1.2 for details.

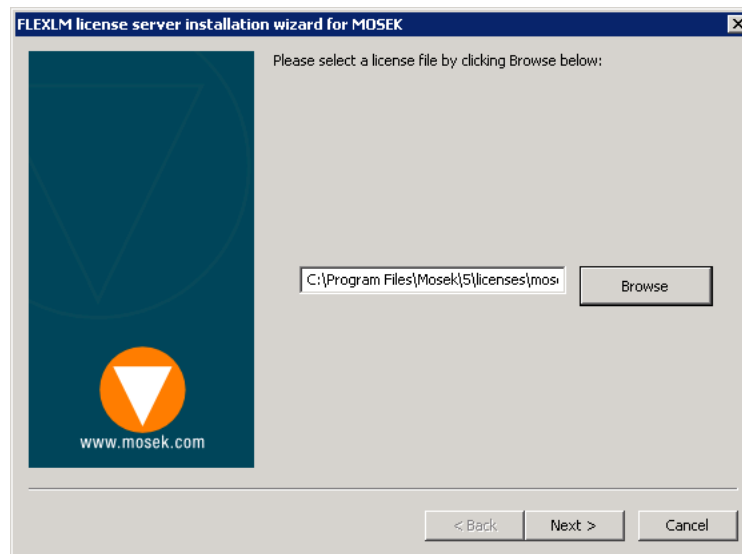
8.1.1 License server installation

Please follow the steps below to install a purchased license or to restart the license server with an new license file. **Note**: Installing the license server will remove any existing MOSEK license server services.

- First make sure you have *administrative privileges*.
- *(Optional)*: If you have purchased a dongle, insert this. If you have not already installed the dongle, do so using the instructions in Chapter 6.
- In the start menu select **Mosek Optimization tools 6.0** and click on **Install MOSEK license server** to start the license installation wizard.



- Click **Next**.
- Click **Browse** and select the license file.



- Click **Next** to install the license server.
- Click **Finish**.
- Finally, you will be asked to log out and log in again. All users on the license server must do so before they can run MOSEK.

MOSEK can now be used by any user on the computer where the license server is installed. To configure MOSEK to run on a computer other than the license server please follow the instructions in Section 8.1.2.

To share a single license between multiple computers who are not on the same network you must use a dongle. See Chapter 6 for details.

The above procedure describes how to install the license server using the MOSEK license server installation tool. Alternatively the FLEXlm installation tool `lmtools` may be used. For information about this tool and the many other options of FLEXlm please see [Flexlm end user manual](#).

8.1.2 Using MOSEK from a networked client computer

A MOSEK license can be used from any computer that can connect to the license server via a network including the license server itself. The license server should not be installed on every client computer. To use your MOSEK license from a computer other than the license server, follow the procedure below:

- Install MOSEK as described in Chapter 2.
- Replace the

```
<INSTALL_DIR>\mosek\6\licenses\mosek.lic
```

file with your permanent license file where `<INSTALL_DIR>` is the location of your MOSEK installation.

- Verify that MOSEK can now check out a license from the server by performing the step described in Section 8.1.2.2.

MOSEK will then check out the license from the license server. Please note that on the client machine the license files only function is to identify the name of the license server. For information on how to change the license server used please see Section 8.1.2.4.

8.1.2.1 License file search path

The location of the license file used is controlled by the

`MOSEKLM_LICENSE_FILE`

environment variable. The default value for a Windows installation performed with the automatic installation tool is

```
<INSTALL_DIR>\mosek\6\licenses\mosek.lic
```

For information on changing this variable see Section [8.1.2.4](#).

8.1.2.2 Verifying that the license system works

In the start menu select **Mosek Optimization tools 6.0** and click on **Test license system**. The message

```
*****
A license was checked out correctly.
*****
```

will appear if the license system works correctly. If the license does not check out correctly please contact MOSEK support at support@mosek.com. Please include the error messages in your email.

8.1.2.3 Controlling port usage and firewall access

The MOSEK license server installation automatically creates exceptions for the programs

- `lmgrd.exe` and
- `MOSEKLM.exe`

in the “Windows firewall”. This is required to access the license server from a remote computer. For other firewalls than the standard “Windows firewall” manual configuration may be required.

The license server consists of two daemons

- `lmgrd.exe`: The license server daemon running as a service,
- `MOSEKLM.exe`: A daemon started by `lmgrd`

each of which needs an open port in the firewall. To specify which port number each service should use you must change the license file. The first two lines in a standard MOSEK license files looks like this:

```
SERVER my_server 123456789ABC
VENDOR MOSEKLM
```

To instruct `lmgrd.exe` to use port 27000 and `MOSEKLM.exe` to use port 3084 change the first two lines of the license file to:

```
SERVER my_server 123456789ABC 27000
VENDOR MOSEKLM port=3084
```

After changing the license file reboot your computer for the changes to take effect and configure your firewall to allow access to the chosen port numbers which in this case are 27000 and 3084. Finally, it is a good idea to check if the port is open by using the telnet command as follows

```
telnet my_server 27000
```

on the client computer(s). You will get an error message similar to this:

```
Connecting To birkende...Could not open connection to the host,
on port 27000: Connect failed
```

if the port is not open.

Also see the [Flexlm end user manual](#) for more information.

8.1.2.4 Locating the license server / reducing checkout overhead

In the following section we describe how to connect to the license server. We will also discuss how to reduce license checkout overhead by configuring the way a client machine locates the license server. In general this overhead is very low and will have an impact only if the license is checked out frequently.

Per default the client computer running MOSEK locates the license server by reading the first line of the license file, which e.g look like this:

```
SERVER myserver 123456789ABC
```

In this case `myserver` is the license server used and the port number will be determined automatically. The name of the server can be changed at any time by manually editing the license file. The last number is the MAC address which can not be changed by the user. The location of the license file to read the license server name from is determined by the environment variable:

```
MOSEKLM_LICENSE_FILE = PATH_TO_LICENSE
```

where `PATH_TO_LICENSE` is the location of your permanent license file. When using the automatic installer `MOSEKLM_LICENSE_FILE` is automatically set to

```
MOSEKLM_LICENSE_FILE = <INSTALL_DIR>\mosek\6\licenses\mosek.lic
```

Alternatively you may use the syntax

```
MOSEKLM_LICENSE_FILE = port@host
```

or

```
MOSEKLM_LICENSE_FILE = @host
```

where `port` is the port that `lmgrd` is running on and `hostname` is the hostname or IP-address of the license server. If only `host` is given the `port` will be determined automatically (there is an overhead associated with this). As an example consider setting

```
MOSEKLM_LICENSE_FILE = 27000@server01
```

where the default port 27000 used by `lmgrd` is used on the server named `server01`. Please note that if port 27000 is not free another port number may be used by `lmgrd`. See Section 8.1.2.3 for instructions on how to manually set the port number used by `lmgrd`.

The most efficient way to specify the license server is

```
MOSEKLM_LICENSE_FILE = port@ip
```

where `IP` is the IP-address of the license server. This way the client machine will not need to search for the correct port number or do a DNS lookup to locate the IP-address.

For instructions on setting the operation system environment variables see Appendix B.

8.2 LINUX / UNIX / MAC OSX

To use a floating MOSEK license you must:

1. Install LSB 3.0 or later on the server if not already installed. This package is called `lsb` in most linux distributions.
2. Install the license server (Section 8.2.1).
3. Set the `MOSEKLM_LICENSE_FILE` environment variable on any machine on which you want to run MOSEK. (Section 8.2.2).

8.2.1 License server installation

This section discusses how to install the license server on LINUX / UNIX / MAC OS X. Two files are required to run the license server:

- **lmgrd**: The license server daemon executed by the user.
- **MOSEKLM**: A daemon started by **lmgrd**.

These files can be found in:

```
<INSTALL_DIR>/mosek/6/tools/platform/<PLATFORM>/bin/
```

To start the license server run the following commands:

```
cd <INSTALL_DIR>/mosek/6/tools/platform/<PLATFORM>/bin/
./lmgrd -c PATH_TO_LICENSE -l lmgrd.log
```

Where **PATH_TO_LICENSE** is the path to your license file. The license server will save a log file in the location given by the **-l** command line parameter. If the license server was started successfully the **lmgrd.log** file will look similar to this:

```
cat lmgrd.log
15:03:09 (lmgrd) -----
15:03:09 (lmgrd)   Please Note:
15:03:09 (lmgrd)
15:03:09 (lmgrd)   This log is intended for debug purposes only.
15:03:09 (lmgrd)   In order to capture accurate license
15:03:09 (lmgrd)   usage data into an organized repository,
15:03:09 (lmgrd)   please enable report logging. Use Macrovision's
15:03:09 (lmgrd)   software license administration solution,
15:03:09 (lmgrd)   FLEXnet Manager, to readily gain visibility
15:03:09 (lmgrd)   into license usage data and to create
15:03:09 (lmgrd)   insightful reports on critical information like
15:03:09 (lmgrd)   license availability and usage. FLEXnet Manager
15:03:09 (lmgrd)   can be fully automated to run these reports on
15:03:09 (lmgrd)   schedule and can be used to track license
15:03:09 (lmgrd)   servers and usage across a heterogeneous
15:03:09 (lmgrd)   network of servers including Windows NT, Linux
15:03:09 (lmgrd)   and UNIX. Contact Macrovision at
15:03:09 (lmgrd)   www.macrovision.com for more details on how to
15:03:09 (lmgrd)   obtain an evaluation copy of FLEXnet Manager
15:03:09 (lmgrd)   for your enterprise.
15:03:09 (lmgrd)
```

```

15:03:09 (lmgrd) -----
15:03:09 (lmgrd)
15:03:09 (lmgrd)
15:03:09 (lmgrd) FLEXnet Licensing (v11.4.0.0 build 31341) started on kolding (linux) (5/14/2007)
15:03:09 (lmgrd) Copyright (c) 1988-2006 Macrovision Europe Ltd. and/or Macrovision Corporation. All
15:03:09 (lmgrd) US Patents 5,390,297 and 5,671,412.
15:03:09 (lmgrd) World Wide Web: http://www.macrovision.com
15:03:09 (lmgrd) License file(s): /home/sandvik/kolding.lic
15:03:09 (lmgrd) lmgrd tcp-port 27000
15:03:09 (lmgrd) Starting vendor daemons ...
15:03:09 (lmgrd) Started MOSEKLM (internet tcp_port 44950 pid 23251)
15:03:09 (MOSEKLM) FLEXnet Licensing version v11.4.0.0 build 31341
15:03:09 (MOSEKLM) Server started on kolding for: PTS
15:03:09 (MOSEKLM) PTOC PTON PTOM
15:03:09 (lmgrd) MOSEKLM using TCP-port 44950

```

In this case `lmgrd` is running on port 27000 and `MOSEKLM` is running on port 44950.

8.2.2 Checking out a license from the server

To run `MOSEK` (from the license server or a remote machine) you must set the environment variable

```
MOSEKLM_LICENSE_FILE = PATH_TO_LICENSE
```

where `PATH_TO_LICENSE` is the location of your permanent license file, e.g.

```
/home/me/mosek/6/licenses/mosek.lic
```

On the client machine the only function of the license file is to identify the host name of the license server. The first line of the license file should be similar to:

```
SERVER myserver 123456789ABC
```

In this case `MOSEK` will try to use `myserver` as a license server. The name of the server can be changed at any time by manually editing the license file. Alternatively you may use the syntax

```
MOSEKLM_LICENSE_FILE = port@host
```

or

```
MOSEKLM_LICENSE_FILE = @host
```

where `port` is the port that `lmgrd` is running on and `hostname` is the hostname or IP address of the license server. If only `host` is given the `port` will be determined automatically. As an example consider setting

```
MOSEKLM_LICENSE_FILE = 27000@server01
```

where the default port 27000 used by `lmgrd` is used on the server named `server01`. Please note that if port 27000 is not free another port number may be used by `lmgrd`. See Section 8.2.6 for instructions on how to manually set the port number used by `lmgrd`.

8.2.3 Verifying that the license system works

Run the commands

```
cd <INSTALL_DIR>/mosek/6/tools/platform/<PLATFORM>/bin/
./msktestlic
```

The message

```
*****
A license was checked out correctly.
*****
```

appears on successful license checkout.

8.2.4 Starting lmgrd on boot.

For security reasons `lmgrd` should not run as root. To start `lmgrd` at boot time we recommend that you add the following command to your startup script:

```
su username -c "umask 022; lmgrd -c path_to_license_file -l lmgrd.log"
```

```
# Where:
#   username:  is a normal, non-root, non-privileged user
#
#   lmgrd:    is the complete path and file name to the lmgrd binary
#
#   path_to_license_file:  is the complete path and file name to
```

```
#                               the license file
#
#   log:           is the complete path and file name to the debug log file
```

8.2.5 Speeding up license checkout

The most efficient way to specify the license server is

```
MOSEKLM_LICENSE_FILE = port@ip
```

where IP is the IP-address of the license server. This way the client machine will not need to search for the correct port number or to do a DNS lookup to locate the IP-address.

8.2.6 Accessing the license server through a firewall

The license server consists of two daemons

- **lmgrd**: The license server daemons,
- **MOSEKLM**: A demon started by **lmgrd**

Both needs an open port in the firewall. To specify which port number each daemon should use you must change the license file. The first two lines in a standard MOSEK license file look like:

```
SERVER my_server 123456789ABC
VENDOR MOSEKLM
```

To instruct **lmgrd** to use port 27000 and **MOSEKLM** to use port 3084 change the first two lines of the license file to:

```
SERVER my_server 123456789ABC 27000
VENDOR MOSEKLM port=3084
```

Restart the license server and configure your firewall to allow access to the chosen port numbers which in this case are 27000 and 3084.

Finally, it is a good idea to check if the port is open by using the telnet command as follows

```
telnet my_server 27000
```

on the client computer(s). You will get an error message similar to

```
Connecting To birkende...Could not open connection to the host,  
on port 27000: Connect failed
```

if the port is *not* open. If open `telnet` will connect with no error message.

See also the [Flexlm end user manual](#) for more information.

Chapter 9

Installing a trial license

9.1 Windows

To install a trial license, replace the

```
<INSTALL_DIR>\mosek\6\licenses\mosek.lic
```

file with your trial license file sent to you by email. In the above please replace <INSTALL_DIR> with the location of your MOSEK installation.

9.1.0.1 License file search path

The location MOSEK will search for your license file is controlled by the environment variable

```
MOSEKLM_LICENSE_FILE
```

The default value for a Windows installation performed with the automatic install tool is

```
<INSTALL_DIR>\mosek\6\licenses\mosek.lic
```

For information on changing this variable see Section [8.1.2.4](#).

9.2 LINUX / UNIX / MAC OSX

To install a trial license set the environment variable

```
MOSEKLM_LICENSE_FILE = PATH_TO_LICENSE
```

where `PATH_TO_LICENSE` is the location of your trial license file sent to you by e-mail (e.g. `/home/me/mosek/6/licenses/mosek.lic`).

Appendix A

Manual installation instructions

A.1 Windows

INSTALLATION OF THE MOSEK OPTIMIZATION
TOOLS FOR WINDOWS

CONTENTS:

1. INSTALLATION.
 - 1.1 MANUAL METHOD
 - 1.2 AUTOMATIC METHOD
 - 1.3 CREATED DIRECTORIES
2. TESTING THE INSTALLATION
3. COMPILER.
4. ONLINE DOCUMENTATION.
5. SUPPORT.

1. INSTALLATION

1.1 MANUAL METHOD

The following table shows which file you need for each platform to install MOSEK manually.

Platform description	: Platform	: Binary download

Windows	: win	: mosektoolswin.zip
Windows x64	: win64x86	: mosektoolswin64x86.zip

After obtaining the correct file then unzip it.

Assuming you install MOSEK in the directory

c:\

you must add the path

c:\mosek\5\tools\platform\<platform>\bin

to the operating system environment variable

PATH

Observe that <platform> should be replaced by the right value from the above table i.e for instance win or win64x86.

Also you must set the operating system environment variable

MOSEKLM_LICENSE_FILE

to

c:\mosek\5\licenses\mosek.lic

1.2 AUTOMATIC METHOD

The following table shows which binary download you need.

Platform description	: Platform	: Binary download

Windows	: win	: moseksetupwin.msi
Windows x64	: win64x86	: moseksetupwin64x86.msi

After downloading the appropriate file from the MOSEK website then run it i.e. for instance by double clicking on it.

1.3 CREATED DIRECTORIES

Unpacking the distribution file will create a directory named

mosek\5

that has the subdirectories

help/ : The MOSEK help desk.

doc/	: Manuals in HTML and PDF format.
doc/license	: License conditions.
licenses/	: License files.
tools/platform/	: Binaries and libraries.
tools/platform/<platform>/h/	: Include files.
tools/examples/	: Example files.
tools/scripts/	: Useful shell scripts.
tools/test/	: Test scripts for MOSEK installation.

2. TESTING THE INSTALLATION (For experts only.)

This is an option for EXPERTS only. Note some operations may fail during test because you do not have all the appropriate tools installed.

The installation can be tested as follows. First open a DOS box and then execute the command.

```
cd \mosek\5\tools
```

next if are using Windows 32 bit, do

```
test\testwin
```

else if using Windows x64, do

```
test\testwin 64x86
```

3. COMPILER

The lib, dll, and exe files in this distribution is known to be compatible with

Microsoft C V6.
Microsoft .NET
Intel C v8 and v9.

4. ONLINE DOCUMENTATION

Load the file

```
mosek\5\help\help.html
```

into your browser for online help.

5. SUPPORT

In case of problems consult the frequently asked question chapter in the user's manual and then contact the MOSEK support.

MOSEK support / support@mosek.com

A.2 LINUX / UNIX / MAC OSX

INSTALLATION OF THE MOSEK OPTIMIZATION TOOLS FOR UNIX

CONTENTS:

1. WHAT YOU SHOULD DO.
2. UNPACKING.
3. OPERATING SYSTEM ENVIRONMENT VARIABLES.
 - 3.1 LD_LIBRARY_PATH (HPUX/LINUX/SOLARIS)
 - 3.1.1 SH AND BASH SHELLS
 - 3.1.2 CSH SHELL
 - 3.2 DYLD_LIBRARY_PATH (MAC OSX)
 - 3.3 PATH
 - 3.4 MOSEKLM_LICENSE_FILE
4. ONLINE DOCUMENTATION.
5. EVALUATION LICENSE INSTALLATION.
6. SUPPORT.

1. WHAT YOU SHOULD DO

Please complete the following steps to install MOSEK.

- a. Download and unpack the appropriate file, see Section 2 for details.
- b. Setup the appropriate environment variable.
The following table shows variables should be defined on each operating system.

Variable name	: Operating system	: See Section

LD_LIBRARY_PATH	: LINUX/SOLARIS	: 3.1
DYLD_LIBRARY_PATH	: MAC OSX	: 3.2
MOSEKLM_LICENSE_FILE	: All operating systems	: 3.4

c. Optionally setup the PATH variable. See Section 3.3 for details.

2. UNPACKING.

Obtain the appropriate distribution file from the MOSEK web site and unpack it. Names of the distribution file for each supported platform are listed below:

mosektoolslinux32x86.tar.gz	Linux Intel X86 32bit version.
mosektoolslinux64x86.tar.gz	Linux 64 bit X86 (AMD and Intel CPUs).
mosektoolsosx32ppc.tar.gz	MAC OSX 32 bit PowerPC.
mosektoolsosx32x86.tar.gz	MAC OSX 32 bit Intel X86.
mosektoolssolarissparc.tar.gz	Solaris 32 bit Sparc.
mosektoolssolarissparc64.tar.gz	Solaris 64 bit Sparc.
mosektoolssolaris32x86.tar.gz	Solaris 32 bit Intel X86.
mosektoolssolaris64x86.tar.gz	Solaris 64 bit Intel X86 (AMD and Intel CPUs).

Unpacking the distribution file will create a directory named

mosek/5

which have the subdirectories

help/	: The MOSEK help desk.
doc/	: Manuals in HTML and PDF format.
doc/license	: License conditions.
licenses/	: License files.
tools/platform/	: Binaries and libraries.
tools/platform/<platform>/h/	: Include files.
tools/examples/	: Example files.
tools/scripts/	: Useful shell scripts.
tools/test/	: Test scripts for MOSEK installation.

where <platform> is the platform key i.e. for instance linux32x86.

3. OPERATING SYSTEM ENVIRONMENT VARIABLES

MOSEK requires some shared libraries i.e. all the shared libraries in

mosek/<version>/tools/platform/<platform>/bin

in order to make them accessible appropriate environment variables must be set.

3.1 LD_LIBRARY_PATH (LINUX/SOLARIS)

In order to make them accesible, then the OS environment variable

LD_LIBRARY_PATH

should point to

```
mosek/<version>/tools/platform/<platform>/bin
```

how to accomplish this is dependent on the shell you are using.

3.1.1 SH AND BASH SHELLS.

If you are using the sh or bash shells you set LD_LIBRARY_PATH using the commands

```
LD_LIBRARY_PATH=$HOME/mosek/<version>/tools/platform/<platform>/bin:$LD_LIBRARY_PATH
export LD_LIBRARY_PATH
```

3.1.2 CSH SHELL.

If you are using a CSH shell you can set it as follows

```
setenv LD_LIBRARY_PATH $HOME/mosek/<version>/tools/platform/<platform>/bin:$LD_LIBRARY_PATH
```

3.2 DYLD_LIBRARY_PATH (MAC OSX)

On the MAC OSX platform you need to set the DYLD_LIBRARY_PATH variable i.e.

```
DYLD_LIBRARY_PATH=$HOME/mosek/<version>/tools/platform/osx32ppc/bin:$DYLD_LIBRARY_PATH
export DYLD_LIBRARY_PATH
```

You may have to add the DYLD_LIBRARY_PATH spefication to your

```
$HOME/.MacOSX/environment.plist
```

file.

3.3 PATH

You may consider adding the path

```
mosek/5/tools/platform/<platform>/bin
```

to environment variable \$PATH. <platform> represent the

platform id e.g. solaris/sparc.

3.4 MOSEKLM_LICENSE_FILE

You should set operating system environment variable

MOSEKLM_LICENSE_FILE

to

\$HOME/mosek/5/licenses

where \$HOME/ represent the directory where you installed MOSEK.

3.7 Startup file

You may want to add the commands executed in the previous section to your startup file. The startup file for a bash shell is ~/.bashrc

4. ONLINE DOCUMENTATION

Load the file

mosek/5/help/index.html

into your browser for online help.

5. EVALUATION LICENSE INSTALLATION

If you are using MOSEK with an evaluation license, then do NOT try to install the license server (lmgrd).

Setting the MOSEKLM_LICENSE_FILE environment variable is all that is required. Normally setting it as

MOSEKLM_LICENSE_FILE=\$HOME/mosek/5/licenses/mosek.lic

6. SUPPORT

In case of problems consult the frequently asked question chapter in the user's manual or contact the MOSEK support at the email address

support@mosek.com

Appendix B

Operating system environment variables

This appendix discusses how to add and modify operating system environment variables for different operating systems.

B.1 Windows NT/2000

On Windows NT/2000 choose the system icon from

`\start\Settings\Control Panel\`

Next choose the environment tab. This tab allows you to add new environment variables and to modify existing environment variables.

B.2 Windows XP

1. Right-click on the *My computer* icon in the start menu.
2. Choose *Properties*.
3. Choose *Advanced* tab.
4. Choose *Environment variables*.
5. You can now add new variables or modify an existing variable.

B.3 MAC OSX

Usually you can setup operating system variables on MAC OSX as you would do under UNIX as explained in Section B.4.

Sometimes it necessary to create a file named

```
$HOME/.MacOSX/environment.plist
```

or if the file exists you should add some lines to the above file. An example `enviroment.plist` file is shown below

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE plist PUBLIC
  "-//Apple Computer//DTD PLIST 1.0//EN"
  "http://www.apple.com/DTDs/PropertyList-1.0.dtd">
<plist version="1.0">
<dict>
  <key>MOSEKLM_LICENSE_FILE</key>
  <string>/home/user/mosek/4/licenses/mosek.lic</string>
  <key>PYTHONPATH</key>
  <string>/home/user/mosek/4/tools/platform/osx32x86/bin</string>
</dict>
</plist>
```

Please note that in more recent version os OS X, the library search path `DYLD_LIBRARY_PATH` cannot be set in `environment.plist`.

For further explanation see <http://developer.apple.com/qa/qa2001/qa1067.html>.

B.4 UNIX

How to set and modify operating system environment variables in a UNIX environment is dependent on shell. For `cs`h and `tc`sh environment variables are defined using the command

```
setenv MYVAR some_value
```

whereas in `bash` and `sh` shells environment variables are defined using the commands

```
export MYVAR=some_value
```

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