



ArcGIS Licensing Concepts and Strategies

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ESRI Licensing Concepts and Strategies

An ESRI Technical Paper

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ESRI Licensing Concepts and Strategies

Introduction The purpose of this document is to explain ESRI® product licensing in detail and, in so doing, provide you with some strategic options for implementation. The primary focus will be on the licensing schemes used in ArcGIS® 9, with a discussion of 8.x and update procedures. Products covered will be concurrent use ArcGIS Desktop (ArcInfo®, ArcEditor™, and ArcView®), ArcInfo Workstation, ArcView and ArcEditor single use, ArcIMS®, ArcSDE®, ArcGIS Server, ArcGIS Engine Developer Kit, and ArcGIS Engine Runtime.

What Is Licensing? In its simplest form, licensing can be defined as the ability or right to use a specific product for a specific period of time, but the issue is slightly more complex and requires further clarification. Before the document can progress, a basic understanding of certain terminology that will recur frequently throughout must be established. For a more comprehensive list of terms, see the Glossary at the end of the document.

License The right to use a software application as defined in the license file or authorization file.

License File A license file contains your concurrent use license manager licensing data. Each license file contains information such as the SERVER name, hardware key number (Windows) or hostid (UNIX), product version, and the number of seats available for use. It is used with concurrent use products.

Authorization File An authorization file contains single use, server, or developer products authorization data. Each file contains information regarding the feature name, version number, time-out date, registration number, and authorization code. It is used with software-authorized products.

Existing License Schemes With the release of ArcGIS 9 there are two primary license schemes for the previously mentioned ESRI products:

- Software authorization (product registration)
- License management

Software Authorization The terms *software authorization* and *product registration* are used interchangeably throughout ESRI documentation and possess the same meaning; the process in which you as the user obtain a registration number or numbers that you provide to ESRI for the creation of an authorization file. That authorization file will in turn be installed on your computer to unlock your software for use. With the release of ArcGIS 9 the software authorization licensing model is used by the following products and their extensions.

Single Use Single Use products are those that require registration. These products can be installed and registered on one machine only. At 9.0 the single use product category includes ArcView single use, ArcEditor single use, and all extensions to these products.

Server Products Server products require registration on every machine on which a component of the core product is installed. For example, all ArcIMS machines on which the ArcIMS Spatial Server will be installed require registration. At 9.0 the server product category includes ArcIMS, ArcSDE, ArcGIS Server, Tracking Server, and all extensions or options.

Developer Products Developer products require registration on each machine on which they will be used. At 9.0 the developer products category includes ArcGIS Engine Developer Kit and ArcGIS Engine Runtime.

The Authorization Process Upon completion of the installation of a software-authorized product, you will be required to register that product and any extensions that may have been obtained with it. That registration process begins with the registration number, which is a three letter, nine number code (e.g., ABC123456789). Each application and extension should have a separate and unique registration number. For example, ArcView single use uses UNK111111111 and the ArcPress™ extension to ArcView single use uses UNK999999999. One registration number will not register multiple products.

The registration number will be used to acquire an authorization file from ESRI. The acquisition of this file can be done using a number of methods, such as visiting <http://service.esri.com>, using the product's registration wizard, or contacting ESRI Customer Service directly. Each of these methods allows you to input your registration number, and in return ESRI will provide an authorization file that will allow you to unlock your software. Authorization files may be directly installed on your computer (e.g., the automatic method in the wizard) or e-mailed, mailed, or faxed to you for you to install.

Should you choose to not use the automatic method, upon receipt of your authorization file you will need to reenter the appropriate wizard and input the file information, either by browsing to it or manually entering the information into a form. Once that process is complete, your software will be authorized for use.

Checking Authorized Software To check what products have been registered on a machine, when those products time-out, and more, ESRI has provided some useful tools. For single use products there is the Desktop Administrator, which can be launched by going to Start > Programs > ArcGIS > Desktop Administrator. For Server and Developer products, locate the AuthorizationSummary.exe utility in the <install_home>:\ArcGIS\Bin directory.

License Management The term *license management* is used in reference to concurrent use ESRI products that are controlled with the use of the FLEXlm® License Manager. The FLEXlm License Manager, provided by Macrovision®, is further developed and repackaged to work with specific ESRI products, and with version 9, the license manager is called ArcGIS License Manager. The products that are managed by that license manager are concurrent use ArcInfo, ArcEditor, ArcView, ArcInfo Workstation, and all extensions to these products.

The ArcGIS 9 License Manager requires four components to function.

- A unique identifier
- A supported operating system
- The ArcGIS vendor daemon
- The lmgrd daemon

To unlock and use your ArcGIS 9 concurrent use software, you will be need to install the ArcGIS License Manager on either a Windows or UNIX machine that you designate as your license manager server.

Note: The ArcGIS License Manager is not supported on Linux.

To install the license manager you must first determine the number that will be used as the unique identifier. On Windows, that number will come from an external piece of hardware called the hardware key, also referred to as a "Dongle" or "Sentinel Key". There are parallel port and USB port versions of the key available.

Figure 1
Windows Hardware Keys



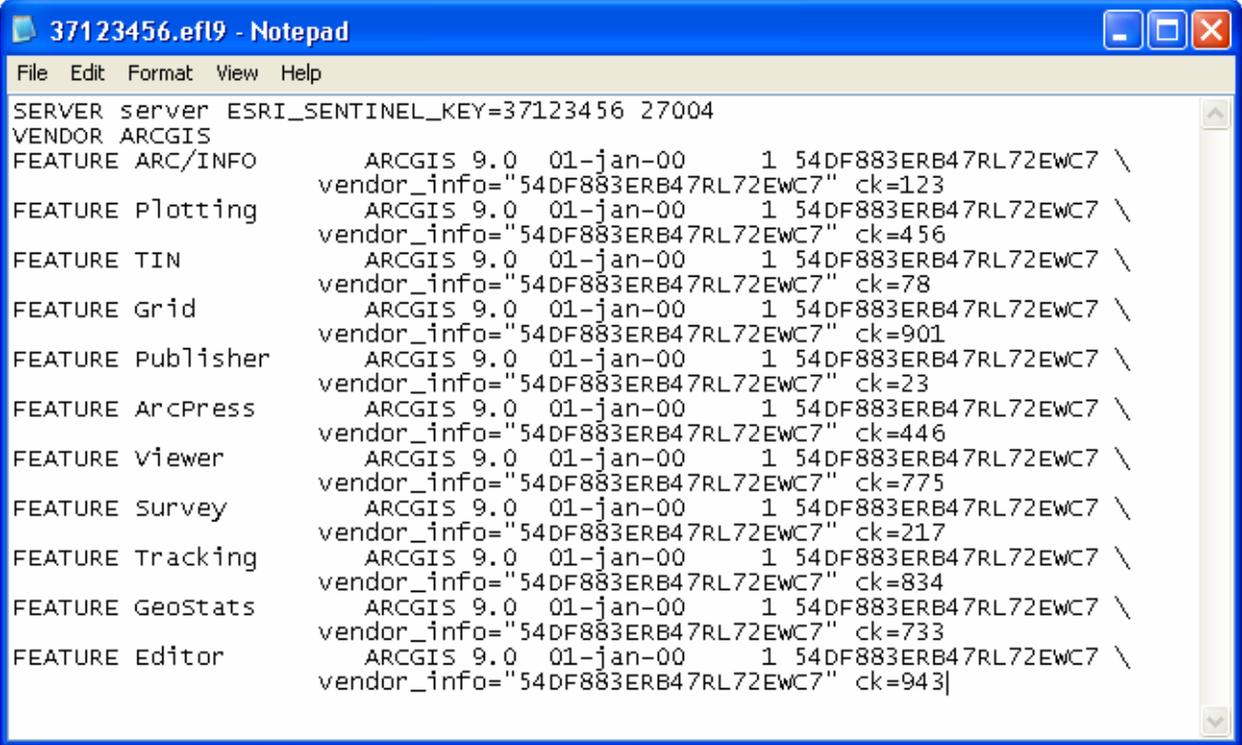
Printed on your hardware key is an eight digit number beginning with "371". This number is referred to as either the hardware key number or the ESRI Sentinel Key number. Plugging the hardware key into your computer provides the machine with a unique identifier. On UNIX, the unique identifier comes from the machine itself. To obtain it, you can run the following command from the \$ARCHOME/sysgen directory:

```
% ./lmutl | lhostid
```

An example of the expected return would be "876a5b4c".

These unique identifiers are the numbers that ESRI Customer Service will use to generate a license file that is unique to that specific computer. The license file is a text file that contains the actual license information to be used on the license server. In it is the information necessary to allow use of the software, such as the hostname of your license server, the hardware key number or hostid, the version of license, and the number of seats of each product you are licensed to use.

Figure 2
Example of Windows License File



```

37123456.efl9 - Notepad
File Edit Format View Help
SERVER server ESRI_SENTINEL_KEY=37123456 27004
VENDOR ARCGIS
FEATURE ARC/INFO          ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=123
FEATURE Plotting          ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=456
FEATURE TIN                ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=78
FEATURE Grid              ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=901
FEATURE Publisher         ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=23
FEATURE ArcPress          ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=446
FEATURE viewer            ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=775
FEATURE survey            ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=217
FEATURE Tracking          ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=834
FEATURE GeoStats          ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=733
FEATURE Editor            ARCGIS 9.0 01-jan-00 1 54DF883ERB47RL72EWC7 \
                           vendor_info="54DF883ERB47RL72EWC7" ck=943|

```

Once you have established your unique identifier and have obtained your license file, you can continue with the installation of the ArcGIS License Manager (Windows only, the UNIX license manager is installed with the software).

Windows License Manager Installation

To install the ArcGIS 9 License Manager on a Windows machine, first make sure your hardware key is plugged into a functioning parallel or USB port. Insert either the ArcGIS Desktop or ArcInfo Workstation CD into the appropriate drive and browse to the License directory. Within that folder is either an LMSetup.exe (Desktop) or licensemanager.exe (Workstation). Launch the executable to initiate the ArcGIS 9 License Manager installation. Follow the procedures as provided. A reboot will be required.

The tools and files necessary to run the license manager will be written to the following location on your system drive, <System_Drive>\Program Files\ERI\License\arcgis9x. The license manager installation is also hard coded to create a flexlm directory on your C: drive.

Neither of these locations can be changed, and the C: drive is a requirement for the flexlm directory.

After you have installed the license manager and rebooted, inside the flexlm directory will be at least two files: an ArcGIS file that is 0 KB and one or more lmgrd.xxx (xxx being an alphanumeric code) files that are each 1 KB. These files are the license manager daemons, or the files that allow the license manager to communicate with both itself and the client software. The license manager daemons require the TCP/IP protocol be installed and functioning on both the license manager server and any client on which concurrent use software will be installed. The software must also be capable of resolving the hostnames and IP addresses of the server and client machines. The lmgrd daemon is static, meaning that it always uses the same port number. The ArcGIS 9 daemon is dynamic, meaning that each time the license manager is started, the ArcGIS daemon scans to find any open port and uses the first it can locate.

Note: No directories will need to be shared or made accessible on the network; all connections are made using the TCP/IP ports.

UNIX License Manager Installation

The license manager installation on UNIX is a simple process as it is bundled into the installation of ArcInfo Workstation. Once your software installation is complete, use the following command to obtain your machine's hostid:

```
% ./lmutil | lhostid
```

With that hostid you can obtain your license file and save it into the 9.0 \$ARCHOME/sysgen directory and rename it license.dat. Do not merge 8.x and 9.0 copies of your license files; they must remain separate. Once the 9.0 license.dat is in place, issue the following command to start your ArcGIS 9 License Manager:

```
% lmgrd -c license.dat > license.log &
```

Directing the Software Clients

Once the installation and reboot are complete, you should have a fully functional ArcGIS 9 License Manager, ready to serve the licenses you have available. At this point you will need to direct your ArcGIS 9 Concurrent Use client applications to the new license server. This can be done using one of three methods.

Installation (Windows only)

During the installation of your concurrent use software, you will be asked if you want to browse to an existing license manager server. If you have already installed your ArcGIS 9 License Manager, then you can simply enter the hostname of that server into the appropriate section of the software installation. It will then set a pointer to that machine for licensing.

Desktop Administrator (Windows only)

When you install any ArcGIS Desktop product (Workstation not included) you will be provided with a Desktop Administrator, which allows you to change license manager servers, monitor license availability, and check software installations. To change the license manager server you are pointing to

- Browse to Start > Programs > ArcGIS > Desktop Administrator.
- Click the License Manager folder.
- Click Change.
- Enter the hostname of the new license manager server.
- Click Ok.

License File Variable

The license file variable is a system-level environment variable that can be set to direct your machine to a network license manager server. This variable takes precedence over all other license manager pointers on a machine. To set the variable:

- Browse to Start > Settings > Control Panel > System.
- Click the Advanced tab.
- Click Environment Variables.
- Under System Variables, click New.
 - Variable Name: ARCGIS_LICENSE_FILE
 - Variable Value: @server_hostname

UNIX clients can be redirected to a network license manager server by adding or editing the following variable in the user's .cshrc, .kshrc, or .profiles file.

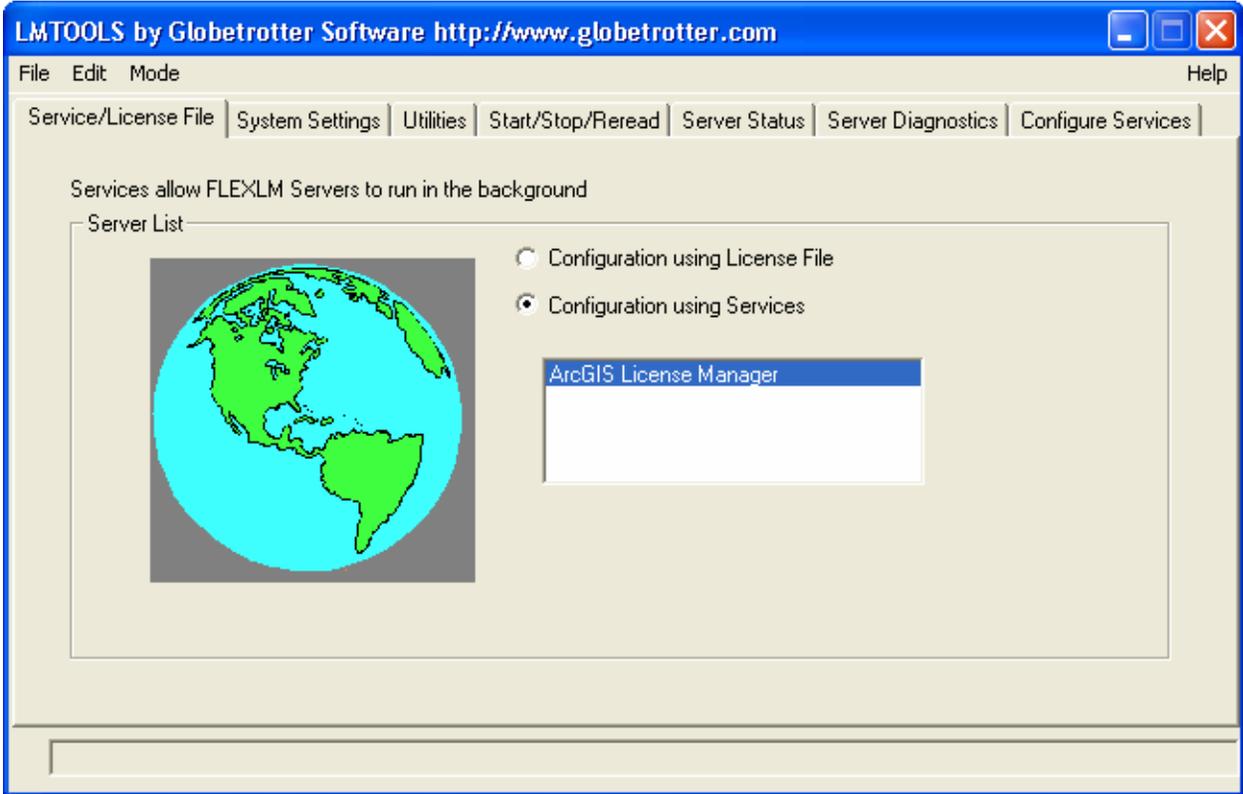
```
setenv ARCGIS_LICENSE_FILE @server_hostname
```

Remember to save and source the .cshrc, .kshrc, or .profiles file once the entry is made.

Using the License Manager Tools (Windows Only)

On all Windows License Manager servers is a utility called License Manager Tools (LMTOOLS). The LMTOOLS provide a number of resources to make the administration of your license manager server easier. To access the tools go to Start > Programs > ArcGIS > License Manager (9.x) > License Manager Tools. Because the ArcGIS License Manager operates as a service on the machine, you will need to click the Configuration using Services radio button and ensure ArcGIS License Manager is highlighted before you can use the tools.

Figure 3
License Manager Tools



System Settings Provided in the System Settings section are details of the machine that may be relevant to the license manager such as the hostname of the machine, the username currently logged in, and the systems IP address. None of the fields can be edited in this section, it is a display window only.

Utilities In this section there are two tools available for use. The first is the Perform Check Sum option, which will perform a checksum of the first license in your license file directory. The purpose of this checksum is to test the validity and usability of a license file. If errors occur, troubleshooting may be required.

The second utility is the Find Version tool, which can be used to check the version of an executable related to the license manager. For instance, you could use the Browse button to locate ARCGIS.exe in C:\Program Files\ESRI\License\arcgis9x and click find version to see that it is using version 7.0d of the FLEXlm License Manager.

Start/Stop/Reread In the Start/Stop/Reread section are buttons to start and stop the license manager service as well as one that forces the license manager service to reread the license file or files. Reasons for stopping and restarting the license manager service may include recovering from a recent crash of the license manager or redirecting a log file. A reread of the license file is most often done when a new feature has been added.

Server Status In the Server Status section of the tools, the Perform Status Inquiry option gives you the ability to check the status of your license manager at that moment. Choosing the default of Display Everything will display the status of every license you have for a particular version of the software on that machine. The List All Active Licenses option allows you to check only licenses that are being used. In the Options section, you can use the text boxes to check the status of either a specific license daemon, a specific feature, for instance ArcPress, or a different license server.

Server Diagnostics The Perform Diagnostics button in the Server Diagnostics section allows you to check the validity of a license and whether or not it can be checked out. This can be done on all licenses or on individual features.

Configure Services The Configure Services section is where the properties from the ArcGIS License Manager are stored. In it is the service name, the path to the lmgrd daemon, the path to the directory in which the license files are stored, as well as a path to a debug log file.

The debug log file allows you view the historical status of your license manager in the form of a log file. It is typically placed in a TEMP directory, but the location can be changed. It is recommended that you delete the log file periodically for more understandable results as, over time, it can grow quite large.

UNIX License Manager Utilities The ArcGIS License Manager on UNIX also has a number of tools available to manage your site's licenses. As was suggested in the UNIX installation section, use the following command to start your UNIX license manager:

```
% lmgrd -c license.dat > license.log &
```

This command will start the license manager as well as create a log file called license.log in your \$ARCHOME/sysgen directory. Similar to Windows, this debug log file allows you view the historical status of your license manager in the form of a log file. It is recommended that you delete the log file periodically for more understandable results as, over time, it can grow quite large.

./lmutil lmstat Use the ./lmutil lmstat command to check the current status of your license manager server. The most typical usage, which checks the entire server's status, would be:

```
./lmutil lmstat -a -c license.dat
```

```
Usage: lmstat
  [-a]                (display everything)
  [-A]                (list all active licenses)
  [-c license_file]  (use "license_file" as license file)
  [-f [license name]] (list users of license(s))
  [-i [feature_name]] (list info about specified feature)
  [-S [DAEMON]]      (list all users of DAEMONS licenses)
  [-s [server_name]] (display status of server node(s))
```

./lmutil lmreread Use the `./lmutil lmreread` command to reread your `license.dat` file. This is useful when changes have been made to a `license.dat` file such as the addition of new feature lines. The most common usage of this feature would be:

```
./lmutil lmreread -c license.dat
```

./lmutil lmdown The `./lmutil lmdown` command is used to stop the license manager. The most common usage is:

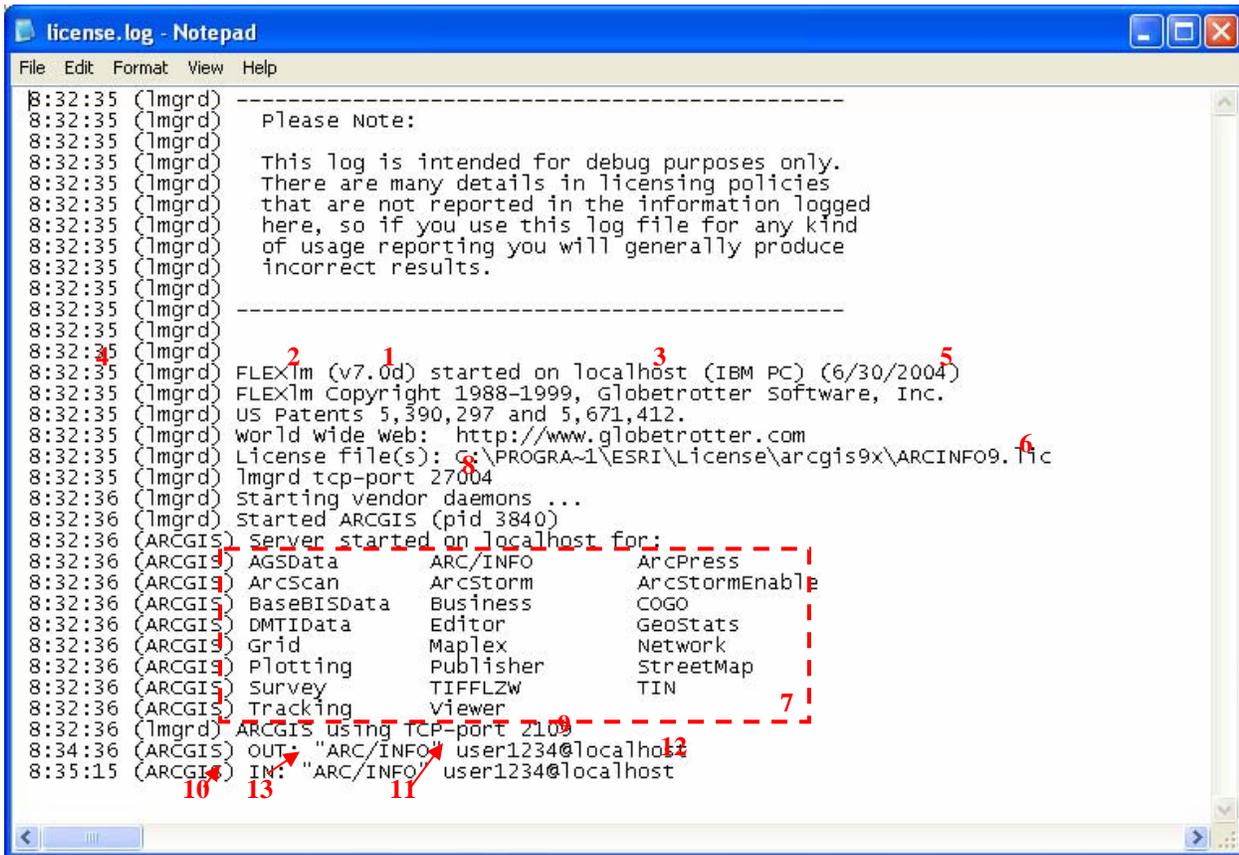
```
./lmutil lmdown -c license.dat
```

For full usage of the `lmutil` command, simply enter `./lmutil ??` at the command prompt. A quick reference of the most common UNIX license manager commands is provided at the end of this document.

Understanding the Debug Log File

The debug log file is a valuable tool that can be used by a license administrator for a number of different things, from monitoring license usage to troubleshooting errors. This section will discuss common entries seen in the debug log file. Troubleshooting those messages has been thoroughly documented in the License Manager Reference Guide as well as the ESRI Knowledge Base, <http://support.esri.com/index.cfm?fa=knowledgeBase.gateway>. For more information on the log file, also see <http://support.esri.com/index.cfm?fa=knowledgebase.techArticles.articleShow&d=21944> (*login required*).

Figure 4
Example of Debug Log File



In the above example of the debug log file, version 7.0d¹ of the FLEXlm² license manager was started on the host "localhost"³ at 8:32:35⁴ on June 30, 2004⁵. The license files are stored in C:\Program Files\ESRI\License\arcgis9x\ARCINFO9.lic⁶.

The available licenses in the license file are listed⁷. The port being used by the lmgrd daemon is 27004⁸, and the port being used by the ARCGIS daemon is 2109⁹. One ArcInfo license was checked out¹⁰ by someone with username user1234¹¹ and that user was working on workstation "localhost"¹². The license was subsequently checked back in¹³, or released.

Error messages in the log file can include the following:

```
<time> (ESRI) Logfile switched from stdout
<time> (ESRI) The SuperPro Driver is not installed on this system
<time> (ESRI) daemon shutdown requested - shutting down
```

Driver Not Installed

```
<time> (ESRI) The SuperPro hardware key is not installed on this system
<time> (ESRI) daemon shut down requested - shutting down
```

Hardware Key Not Installed

```
<time> (lmgrd) "HOSTNAME" not a valid server hostname, exiting
<time> (lmgrd) Valid server hosts are: "HOSTS"
<time> (lmgrd) Using license file
C:\Program Files\ESRI\License\*.lic
```

Invalid Hostname

```
<time> (ESRI) Vendor daemon can't talk to lmgrd (Cannot connect to license
server (-15,11:10060) WinSock error code)
<time> (lmgrd) Vendor daemon died with status 241
<time> (lmgrd) Since this is an unknown status, lmgrd will
<time> (lmgrd) attempt to re-start the vendor daemon.
<time> (lmgrd) Restarted ESRI <internet tcp_port 0 pid <number>
```

Vendor Daemon Died

```
<time> (ESRI) Wrong hostid, exiting (expected ESRI_SENTINEL_KEY=37101174, got ESRI_SENTINEL_KEY=37100548).
```

Incorrect Hostid

```
<time> (ESRI) cannot open lock file (C:\flexlm\ESRI): Permission denied
<time> (lmgrd) MULTIPLE "ESRI" servers running.
<time> (lmgrd) Please kill, and run lmread
<time> (lmgrd)
<time> (lmgrd) This error probably results from either:
<time> (lmgrd) 1. Another copy of lmgrd running
<time> (lmgrd) 2. A prior lmgrd was killed with "kill -9"
<time> (lmgrd) (which would leave the vendor daemon running)
<time> (lmgrd) To correct this, do a "ps -ax | grep ESRI"
<time> (lmgrd) (or equivalent "ps" command)
<time> (lmgrd) and kill the "ESRI" process
```

Multiple Lock Files

Note: In this example "ESRI" is the vendor daemon. If you are using version 9, the vendor daemon is "ARCGIS".

The License File Variable

The license file variable is a system-level environment variable that is used to direct, or point, a client machine to a specific license manager server. It is most often used to direct client machines to a network license manager server. When set this variable takes precedence over all other license manager pointers.

```
ARCGIS_LICENSE_FILE=@<host>  
Ex. ARCGIS_LICENSE_FILE=@localhost
```

```
ARCGIS_LICENSE_FILE=<port>@<host>  
Ex. ARCGIS_LICENSE_FILE=27004@localhost
```

Of the two, the first option is the recommended choice because the client machine is able to scan the ports and find the license manager. The second method should only be used in the case where the client and license manager server are on different sides of a firewall or you are absolutely certain the port will not change.

Working With a Firewall

Many of today's networks are using some sort of firewall for enhanced security from outside threats. Because the license manager uses the TCP/IP protocols, implementing such a firewall can pose problems between the license manager server and the clients connecting to it.

The problem is caused by the firewall often closing or blocking access to the ports the license manager uses to communicate. As is evidenced in Figure 2, on the first line of the file, the lmgrd daemon is "locked" to port 27004n as it has been specified in the license file. The ARCGIS daemon, on the second line of the file, is not "locked" to a particular port; it is dynamic, meaning that it can listen on any available port.

To secure the license management environment and allow you to implement a firewall, you can lock the ARCGIS daemon to a specific port. You can also change the lmgrd daemon from the default 27004 to another location, though the range 27001–27009 was prespecified for license manager use because of the low traffic in that range. To lock the ARCGIS daemon simply add the following entry to the "VENDOR ARCGIS" line in all of your license files:

```
PORT=####*  
*#### being the desired port number
```

No configuration is necessary on the individual client machines. For more information, see <http://support.esri.com/index.cfm?fa=knowledgebase.techArticles.articleShow&d=26135>.

Failover

Often in environments that require greater amounts of uptime, the need to set up a backup license manager exists. Doing so is possible using the license file variable. Simply add a second entry to the value to indicate the second license manager server

Note: The license managers at both sites will need to be the same version.

The client side license file variable would look similar to the following:

```
ARCGIS_LICENSE_FILE=@<host1>;@<host2>
```

```
Ex. ARCGIS_LICENSE_FILE=@lmsrver;@diffserver
```

```
ARCGIS_LICENSE_FILE=<port>@<host1>;<port>@<host2>
```

```
Ex. ARCGIS_LICENSE_FILE=27004@lmsrver;27004@diffserver
```

Once a client application binds itself to a particular license server, then it cannot failover to a second license server for extension licenses.

Licensing Across a WAN

Using the license manager on a wide area network is not much different from any given LAN configuration. The same rules hold true such as TCP/IP will need to be installed and functioning on all machines and those machines must be capable of successfully pinging each other. Given that the license manager and client machines are sending and receiving numerous transmissions throughout a particular connection session, it is important that the connection to the license manager server be extremely stable. Instructions on setting up a WAN licensing environment cannot be documented given the innumerable potential middleware issues and configuration possibilities.

Licensing on Citrix/WTS

In the past, only one type of ArcGIS application (ArcInfo, ArcEditor, or ArcView) could be executed on a single Windows Terminal Server (WTS)/Citrix® server at any one time (i.e., all clients had to adopt the same desktop license mode). If you used the Desktop Administrator to switch between different license types (for example, from ArcInfo floating to ArcView floating) in a Citrix environment, all users were affected and had to use the same desktop license mode to continue being operational. It was not possible to switch between different license types for only one user in Citrix and not have this switch affect all Citrix users. Now an environment variable is available that allows individual users to launch ArcGIS with the license type of their choice.

```
ArcInfoESRI_SOFTWARE_CLASS=Professional
```

```
ArcEditorESRI_SOFTWARE_CLASS=Editor
```

```
ArcViewESRI_SOFTWARE_CLASS=Viewer
```

This overrides the registry setting for the user that sets it as an environment variable before launching ArcMap. When ArcMap.exe is launched, it will become ArcView, ArcEditor, or ArcInfo (and will check out the appropriate license). The use of this variable overrides the currently configured license type configured in the Desktop Administrator, thereby allowing any user of a WTS/Citrix configuration with a single installation of ArcGIS Desktop to switch to any desktop license mode for which he/she has an available license. This variable can be set either in the user's profile or in a batch file that first sets the variable then launches ArcMap. The batch file can then be published as an application.

If a different license mode is used than the one originally installed for the ArcGIS application, a valid license manager will also have to be provided using the license file variable:

```
ARCGIS_LICENSE_FILE=@<hostname>
```

For more information, see the *ArcGIS 9 License Manager Reference Guide*.

Failover License Managers Across a WAN

It is possible to have two license manager servers in different physical locations and still create a failover environment. For example, your company has a license server in Dallas with two seats of ArcInfo and a second license server in Redlands with five seats of ArcInfo and one seat of ArcPress. You want people at both sites to be able to failover to licenses at the other site.

To start, the license managers at both sites will need to be the same version; in other words you cannot have an 8.x license manager at one site and a 9.0 at the other. The license files at the two sites will look similar to these:

License file for "dallas"

```
SERVER dallas ESRI_SENTINEL_KEY=37123456 27004
VENDOR ARCGIS PORT=1234
FEATURE ARC/INFO ARCGIS 9.0 01-jan-00 2
EC50A0571EMC2MD2B49D \
                        vendor_info="Y62RKZH1EF84H27M0224" ck=32
```

License file for "redlands"

```
SERVER redlands ESRI_SENTINEL_KEY=37165432 27004
VENDOR ESRI PORT=4321
FEATURE ARC/INFO ARCGIS 9.0 01-jan-00 5
84H27MD284H27MD2B49D \
                        vendor_info="ZSH27MD2EF84H27M0224" ck=18
FEATURE Arcpress ARCGIS 9.0 01-jan-00 1
CVDE7MD284H27MD2B49D \
                        vendor_info="ZSH657WU7F84H27M0224" ck=206
```

The first step on each license manager server is to ensure that the necessary ports in the firewall are open and available. See the Firewall section above for more information. Once the license managers are set, you can use the license file variable on each of the client machines to redirect when necessary.

The users in Dallas will set ARCGIS_LICENSE_FILE to:

```
@dallas; @redlands
```

The users in Redlands will set ARCGIS_LICENSE_FILE to:

```
@redlands; @dallas
```

Once the client application binds itself to a particular license server, you cannot failover to a second license server for extension licenses. So in the above scenario, if you have accessed

the "dallas" server for an ArcInfo license, you cannot then use the ArcPress extension on the "redlands" server. To use that ArcPress license you will need to access the license server in Redlands for ArcInfo as well.

Options File The vendor options file is a simple text file that can be utilized to manage your license server environment in a number of different ways. Because ArcGIS uses version 7.0d of the FLEXlm license manager, there is a limitation to the commands that can be used. For more information on the commands, visit the advanced section of the License Manager Reference Guide or the FLEXlm End User Guide, <http://www.macrovision.com/services/support/enduser/TOC.htm>.

The options file allows the license administrator to control various operating parameters of FLEXlm. Users are identified by their user name, hostname, display, or IP address. Specifically, the license administrator can

- Allow the use of features.
- Deny the use of features.
- Reserve licenses.
- Restrict the number of licenses available.

Options files allow the license administrator to be as secure or open with licenses as you like. Lines in the options file are limited to 2,048 characters. The "\" character is a continuation character in options file lines. You can include comments in your options file by starting each comment line with a pound sign "#". Everything in an options file is case sensitive. Be sure that user names and feature names, for example, are entered correctly.

Once created, the options file should be stored in the following location, depending on your operating system.

Windows:
 <SystemDrive>\Program Files\ESRI\License\arcgis9x\arcgis.opt

UNIX:
 \$ARCHOME/sysgen/arcgis.opt

ESRI supports the following functions in the options file:

EXCLUDE	Deny a user access to a feature.
EXCLUDEALL	Deny a user access to all features served by this vendor daemon.
GROUP	Define a group of users for use with any options.
HOST_GROUP	Define a group of hosts for use with any options.
INCLUDE	Allow a user to use a feature.
INCLUDEALL	Allow a user to use all features served by this vendor daemon.

LINGER	Cause licenses to be held by the vendor daemon for a period after the application checks them in or exits.
MAX	Limit usage for a particular feature/group. Prioritizes usage among users. <i>Note: ArcGIS Desktop may attempt to check out an additional license when implementing the MAX option. To work around this, increment the use count in the MAX option by one (n+1).</i>
MAX_OVERDRAFT	Limit overdraft usage to less than the amount specified in the license.
NOLOG	Turn off logging of certain items.
REPORTLOG	Specify that a log file be written suitable for use by the FLEXadmin End User Administration Tool.
RESERVE	Reserve licenses for a user.

Note: ESRI does not implement the TIMEOUT or TIMEOUTALL options or other options added after the 7.0d release of FLEXlm.

Upgrading to Version 9

There have been a number of changes to the license manager as well as the licensing schema used by many of the ArcGIS 9 products. ArcGIS Desktop and ArcInfo Workstation 9 users will be required to upgrade existing versions of the license managers and their license files. The license manager and license files installed with 8.x or previous versions will not work with version 9.0 software. Conversely, the ArcGIS 9 License Manager and license files will not work with any 8.x or previous versions.

With the release of ArcGIS 9, ArcGIS Desktop and ArcInfo Workstation are now the only products that continue to use the FLEXlm License Manager. The rest of ESRI's products in the ArcGIS 9 suite now require registration and authorization prior to use. These products include ArcSDE, ArcIMS, ArcGIS Server, ArcGIS Engine Developer Kit and Runtime, ArcView single use, and ArcEditor single use.

The best resource for understanding these changes is the ArcGIS 9 Product Licensing Guide, <http://support.esri.com/index.cfm?fa=knowledgebase.documentation.viewDoc&PID=43&MetaID=693>.

Licensing ArcGIS Engine Developer Kit Applications

The ArcGIS Engine products, Developer Kit and Runtime, use a product registration process for their copy protection mechanism. Users who purchase these products are provided with a registration number and must register their product and install an authorization file prior to using the products. Developers who develop ArcGIS Engine applications also have the ability to control the deployment licensing of their applications. Applications developed with the ArcGIS Engine Developer Kit will be locked, and users of these applications will need to authorize and unlock them before they can be used. For an in-depth discussion of ArcGIS Engine licensing, see the white paper *Delivering Custom GIS Applications With ArcGIS Engine*, <http://support.esri.com/index.cfm?fa=knowledgebase.whitepapers.viewPaper&PID=79&MetaID=755>.

Concurrent Use Versus Single Use

Throughout this document, a number of topics have been covered, so now it is time to bring them together to find the solution that works best for you. In its simplest form, ArcGIS is a family of products.

- ArcGIS Desktop: ArcInfo, ArcEditor, ArcView and all extensions, ArcReader™
- ArcGIS Server: ArcSDE and ArcIMS (ArcMap™ Server)

It is the job of license management to control how these products are deployed within your organization. To do this there are two different types of seats.

- Software authorization (fixed)
- Concurrent use (floating)

The software authorized products, such as ArcView single use or ArcIMS, are registered to a specific seat or machine and are only allowed to be run on that one machine. To facilitate this you are required to obtain an authorization file from ESRI and with that file you can unlock your software. The advantage to software authorization, at least in the ArcGIS Desktop field where you have a choice, is primarily that it is cheaper than its concurrent use counterpart. It also allows some flexibility in the fact that you are not required to be attached to a networked license manager, so it is usable for fieldwork on laptops or tablet PCs.

Concurrent use products require that you install a license manager to unlock the product. In essence the licenses float on the network. There are many benefits to this strategy, the primary being the centralized administration of your entire ESRI license management. With the concurrent use setup you can install just one license manager and serve those licenses out to a number of users on your network. This is advantageous for users who do not require dedicated use of the software or can share software extensions. In the software authorization environment, if you have three fixed users that each need the ArcPress extension, then you would need to purchase three ArcPress registration numbers. In the floating environment you can purchase one ArcPress registration, and users can use it on demand then release it to others once finished. Concurrent use licensing also allows you to restrict or control software usage through the previously discussed options file.

Deciding what best suits your individual organization can be a difficult decision, but one that should be thought through carefully. It is possible to mix configurations on a network so there are a number of options available to you.

Additional Information

For more information, including assistance with troubleshooting licensing errors, refer to the License Manager Reference Guide found in the Documentation directory of your ArcGIS 9 Desktop or ArcInfo 9 Workstation CDs. Information is also available online in the ESRI Knowledge Base at <http://support.esri.com>.

Glossary

Authorization

The completion of the registration process. At this point your single use or server product and/or extensions have been installed and registered with ESRI, and an authorization file has been sent to you that was generated through the appropriate registration wizard.

- Authorization File*** An authorization file contains your single use or server product authorization data. Each file contains information regarding the feature name, version number, time-out date, registration number, and authorization code.
- Concurrent Use*** Floating software products that are administered by a license manager. A central license manager (installed anywhere on your network) allows you to install the floating products on as many machines as you like. The number of seats or licenses purchased determines the number of users who can run the applications simultaneously.
- Developer Product*** Products that can be used on one machine, similar to single use products. Each developer product requires a unique registration number used to generate the authorization file. The Software Authorization wizard is then used to enter the authorization file and unlock the software for use.
- Fixed*** See *Single Use*
- Floating*** See *Concurrent Use*
- Hardware Key*** The Sentinel SuperPro hardware key is a parallel or USB port hardware dongle that provides the unique number used in the generation of your license file. The key is plugged into either the parallel or USB port on the license manager server and was shipped inside your ArcGIS product packaging. UNIX users do not need a hardware key.
- Keycode*** A keycode is a unique number in the feature line of your license or authorization file that controls access to your software. The keycodes are based on a unique identifier. In ArcEditor concurrent use on Windows, for example, the hardware key number provides this unique identifier. The license manager compares the keycodes in the license file and the unique identifier for a computer to allow access to the software. If the keycode and the unique identifier agree, then software access is granted.
- License*** The right to use a software package or component as defined in the license or authorization file.
- License File*** A license file contains your license manager license data. Each license file contains information such as the server, ESRI_SENTINEL_KEY number (Windows only), version, the number of seats, and so on.
- Permanent*** A time-out date listed as permanent indicates that the license for the particular product does not expire.
- Registration*** The step in the install process where you are required to contact ESRI Customer Service and notify them of your single use, server, or developer product registration number.
- Registration Number*** A three letter, nine digit number (ABC123456789) that authenticates your software with ESRI. Every single use and server product, including their extensions or options, has a unique registration number.

Seat The number used to specify the amount of simultaneous instances of the software that can be used at one time. Most often, seats represent users at individual computers. However, seats may also represent the simultaneous number of servers or connections in use.

Server Product Products that can be used on one enterprise server machine. Each server product requires a unique registration number used to generate the authorization file. The Software Authorization wizard is then used to enter the authorization file and unlock the software for use.

Single Use Products that can be used on one machine. Each single use product requires a unique registration number used to generate the authorization file. The single use registration wizard is then used to enter the authorization file and unlock the software for use.

Common UNIX License Manager Commands

<code>./mutil lmver lmgrd</code>	... show version of lmgrd daemon
<code>./lmutil lmver ARCGIS</code>	... show version of vendor daemon
<code>./lmutil lmhostid</code>	... show hostid of current machine
<code>./lmgrd -c license.dat > /dev/console &</code>	... startup goes to console
<code>./lmgrd -c license.dat > /dev/null &</code>	... startup goes to null
<code>./lmgrd -c license.dat > license.log &</code>	... startup goes to log file
<code>./lmgrd -c license.dat &</code>	... starts up in current window
<code>./lmutil lmstat -a -c license.dat</code>	... show license status
<code>./lmutil lmread -c license.dat</code>	... initialize changes in license file
<code>./lmutil lmdown -c license.dat</code>	... shut down license manager
<code>ps -ef grep ARCGIS</code>	... show if vendor daemon is running
<code>ps -ef grep lmgrd</code>	... show if lmgrd daemon is running
<code>kill -9 <PID of ESRI or lmgrd></code>	... end the designated process
<code>Arc: productinfo</code>	... show licenses in use for Arc
<code>Arc: show product</code>	... show available licenses