



**Arena-flow
Installation Guide**

Release 11.0.0

Arena-flow, LLC

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1 Installation

1.1 Overview

This chapter documents the procedures for installing *Arena-flow* and connecting it to its license server, the Reprise License Manager (RLM). The following steps lead you through the process of getting started with *Arena-flow*:

1. Create a CPFD Support site account in order to access downloads
2. Acquire hardware that meets recommended *System Requirements* for *Arena-flow*
3. *Plan the Client-Server Configuration*
4. *Download Arena-flow*
5. *Install Arena-flow*
6. *Point Client Machines to the RLM Server*

1.1.1 Licensing

In order to use *Arena-flow*, you must have a valid RLM software license. *Arena-flow* uses a client-server model for licensing, meaning that your license(s) can be placed on one machine, which acts as a license server, and other machines on the same network can point to and request licenses from that server. The server may also use the license(s) that it hosts. *Arena-flow* also supports RLMCloud, which is a cloud-based solution for serving RLM licenses.

The licensing policy for *Arena-flow* is as follows:

- Each solver license allows the user to run one instance of the *Arena-flow* solver.
- The number of *Arena-flow* solvers that can be run simultaneously is limited to the number of solver licenses that have been purchased.
- With any license, an unlimited number of *Arena-flow* Graphical User Interfaces (GUIs) can be open at the same time. This allows users to set up simulations, review previously set up models, and use all functions of the GUI.
- *Run calculation setup* does not count against the number of *Arena-flow* solver licenses in use. This allows users to review a project setup at any time.
- An unlimited number of *Tecplot for Arena-flow* post-processing instances can be open at the same time.
- The RLM license server must be run on a physical machine. A virtual machine (VM) cannot be used as the RLM license server host.
- The RLMCloud service is only available to customers with a current lease or maintenance contract for *Arena-flow*.

Metered Licenses

Arena-flow supports using metered licenses served via RLMCloud. Metered licensing provides virtually unlimited overflow licensing capacity up to the number of hours allocated on the meter.

Many *Arena-flow* users run a few simulations on an ongoing basis, but encounter times of peak demand when numerous simulations must be run as quickly as possible to meet schedule requirements. Metered licensing was developed to meet this need by enabling users to:

- Run multiple additional simulations concurrently, beyond the number of tokens available through their base licensing arrangement.
- Run broad parametric studies or link with optimization and machine learning tools.

Metered licensing is available for solver licenses. Each type of license is tracked by its own independent meter, and each meter is decremented at a rate corresponding to the number of license tokens checked out. The time resolution of meter decrements is one minute.

When *specifying licenses to be checked out*, the order in which they are listed will determine the order in which licenses are checked out. In most cases, users will probably wish to specify their base licenses (from their annual lease contract) first, and then specify metered licenses later in the list so that they are checked out last.

1.2 System Requirements

Arena-flow can be used on either Linux or Windows. The following table lists minimum and recommended system requirements.

	Minimum	Recommended
Operating System	64-bit CentOS 7 (RHEL 7) or other recent 64-bit Linux 64-bit Windows 10	64-bit CentOS 7 (RHEL 7) or higher Windows 10 Pro 64-bit
CPU	Any 64-bit Intel compatible from the last 5 years	Intel Core i7-9800X (4.4 GHz, 8 cores, 16.5 MB cache) or better. Higher clock speed and newer Intel architecture are better.
Memory (RAM)	8 GB	16 GB. Faster is better.
Hard drive space	500 GB free space	4 TB (2 X 2 TB). More is better

1.2.1 Additional Considerations

Though *Arena-flow* simulations can be run on laptops, or lower-performance desktop machines, doing so is generally not recommended. Investing in an up-to-date calculation machine, with the fastest hardware currently available, will provide much faster calculation speeds. Additionally, since computer hardware advances in capacity and speed at such a fast pace, it is recommended to purchase updated hardware every 2 to 3 years to obtain the fastest performance.

Arena-flow can be installed on compute nodes of a cluster. However, it will not take advantage of the multi-node parallel computing capabilities of the cluster. Each *Arena-flow* simulation utilizes the computing resources of a single machine. Since each individual node of a cluster is not usually optimized for the fastest possible single-machine CPU performance, it is often the case that running *Arena-flow* on a cluster node will not give the best possible calculation speed. Instead, it is generally better to purchase a very fast single-CPU standalone calculation machine on which to run *Arena-flow*. This standalone machine will outperform a cluster node in the majority of cases, for the purpose of running *Arena-flow*.

1.3 Plan the Client-Server Configuration

It is possible to configure RLM in several ways, depending on your needs and preferences. *Arena-flow* can use RLMCloud's hosted cloud server, an on-premise RLM server, or a combination of the two.

Arena-flow supports RLMCloud, an easy-to-use, cloud-based solution for serving RLM licenses. RLMCloud is hosted by [Reprise Software](#). There are many advantages of using RLMCloud which include:

1. Users and system administrators do not need to configure and maintain an on-premise RLM server. Instead, a user-level RLMCloud license file is specified in the *Arena-flow* GUI license server manager, and *Arena-flow* is ready to run.
2. RLMCloud is compatible with cloud-based computing platforms such as [Amazon EC2](#), [Microsoft Azure](#), and [Google Cloud](#).
3. With RLMCloud, increasing your *Arena-flow* license count or adding short-term licenses is a seamless and no-hassle process. CPFD, or your local in-country distributor, can quickly adjust licenses as needed, with no license administration burden for users.
4. RLMCloud enables use of *Metered Licenses*.
5. RLMCloud includes a customer portal so that *Arena-flow* users have visibility into their license servers. This portal allows you to view current license server status as well as users of licenses, view and download server log files, and edit license server options.

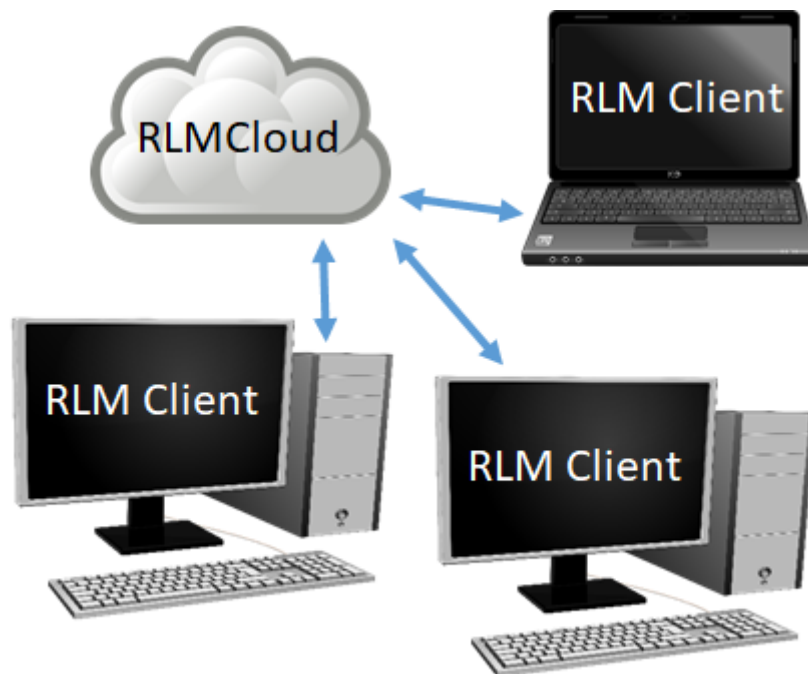


Figure 1.1. RLMCloud with multiple clients

Note The RLMCloud service is only available to customers with a current lease or maintenance contract for *Arena-flow*.

If you only have a single machine that will be running *Arena-flow* simulations, it may be most convenient to install the RLM server directly on that machine, so that it acts as both RLM server and RLM client:



Figure 1.2. Single machine acting as RLM server and client

It is also possible for such a machine to act as the RLM server for additional client machines. In the example shown below, two additional large calculation machines are clients, and one laptop is also a client. In general, laptops are not powerful enough to be useful for running large simulations, but it is often convenient to set up simulations on a laptop and then transfer them to a larger calculation machine.

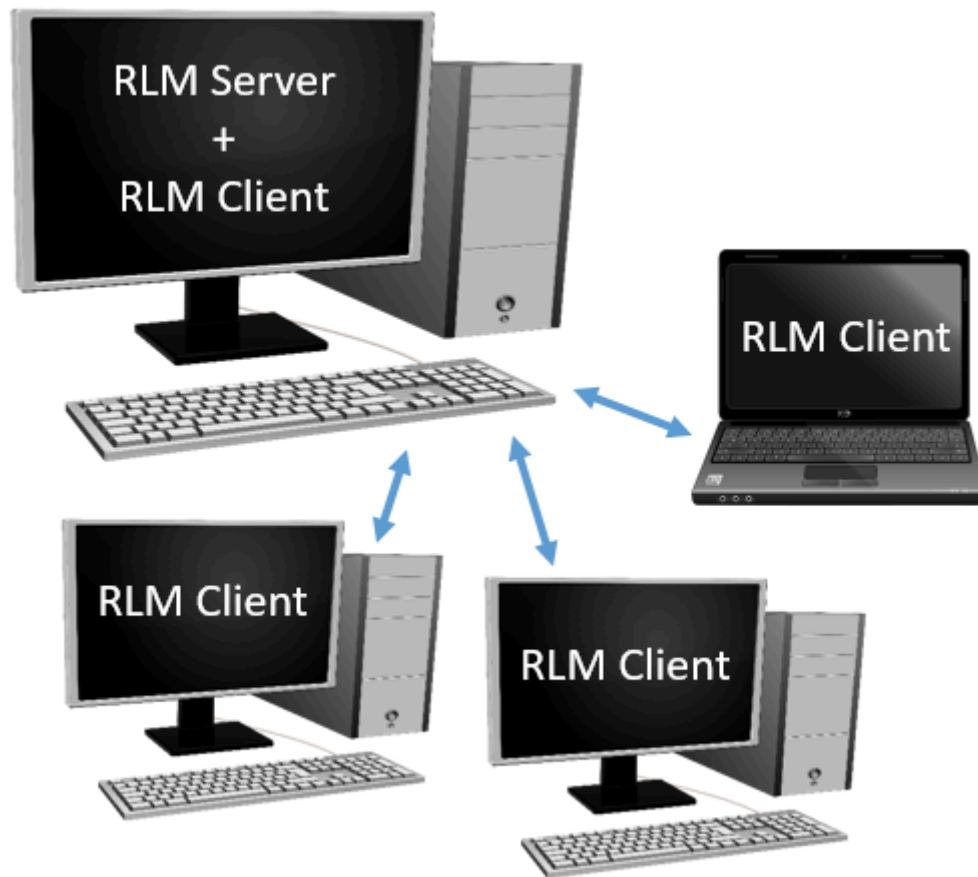


Figure 1.3. Single machine acting as RLM server and client, with multiple clients

Another option is to have a standalone RLM license server which is not intended to run simulations. This is common when a centralized license server already exists, or when an always-on file server is able to act as the RLM server as well.

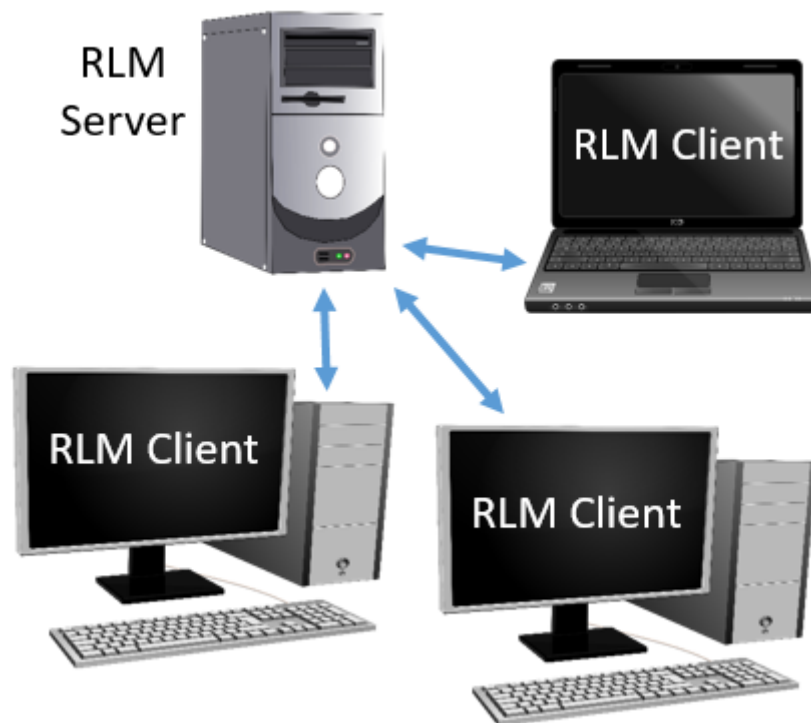


Figure 1.4. RLM server with multiple clients

For any of the above on-premise RLM server configurations, it is important to note that the RLM server machine must remain on and accessible to the RLM client machines during simulations. If the RLM server is powered off, or loses network connectivity to a client machine that is running a simulation, the *Arena-flow* solver will pause and wait for its license to become available again.

Note

1. When using an on-premise RLM server, the RLM server and all RLM client machines must be on the same network, or the network must be configured to allow all machines to see each other, in order for the *Arena-flow* licenses to work.
2. An on-premise RLM server must be a physical machine. A virtual machine (VM) cannot be used as the RLM license server host.

1.4 Download *Arena-flow*

The current version of *Arena-flow* is available for [download on the CPFD support site](#). When downloading, be sure to choose the appropriate distribution for your operating system (Linux or Windows).

The RLM license server installation program is a separate download from the *Arena-flow* distribu-

tion. If you will be running an on-premise RLM license server, be sure to [download the RLM installation package](#) for the appropriate operating system of the RLM license server (Linux or Windows).

Once downloaded, the installation files must be extracted from the compressed download files by using a decompression utility. This will generate the installation files in the same directory as the compressed file. You may now [Install Arena-flow](#) and point the machine to a [RLM server](#).

Physical installation media can be sent upon request via email to licensing@cpfd-software.com (please specify Windows or Linux and USB stick or CD).

1.5 Install *Arena-flow*

Arena-flow must be installed on every client machine. Multiple versions of *Arena-flow* can be installed on a single machine, and each version operates independently. It is not necessary to uninstall old versions of *Arena-flow* when installing a new version. [Download Arena-flow](#) and then follow the steps below to install the software:

1.5.1 GUI Install

1. Navigate to the *Arena-flow* installation folder that was [extracted](#).
2. Double-click on `arena-flow-11.0.0-Linux.run` (on **Linux**) or `arena-flow-11.0.0-Windows.exe` (on **Windows**) to start the *Arena-flow* Setup Wizard. Click *Next*.

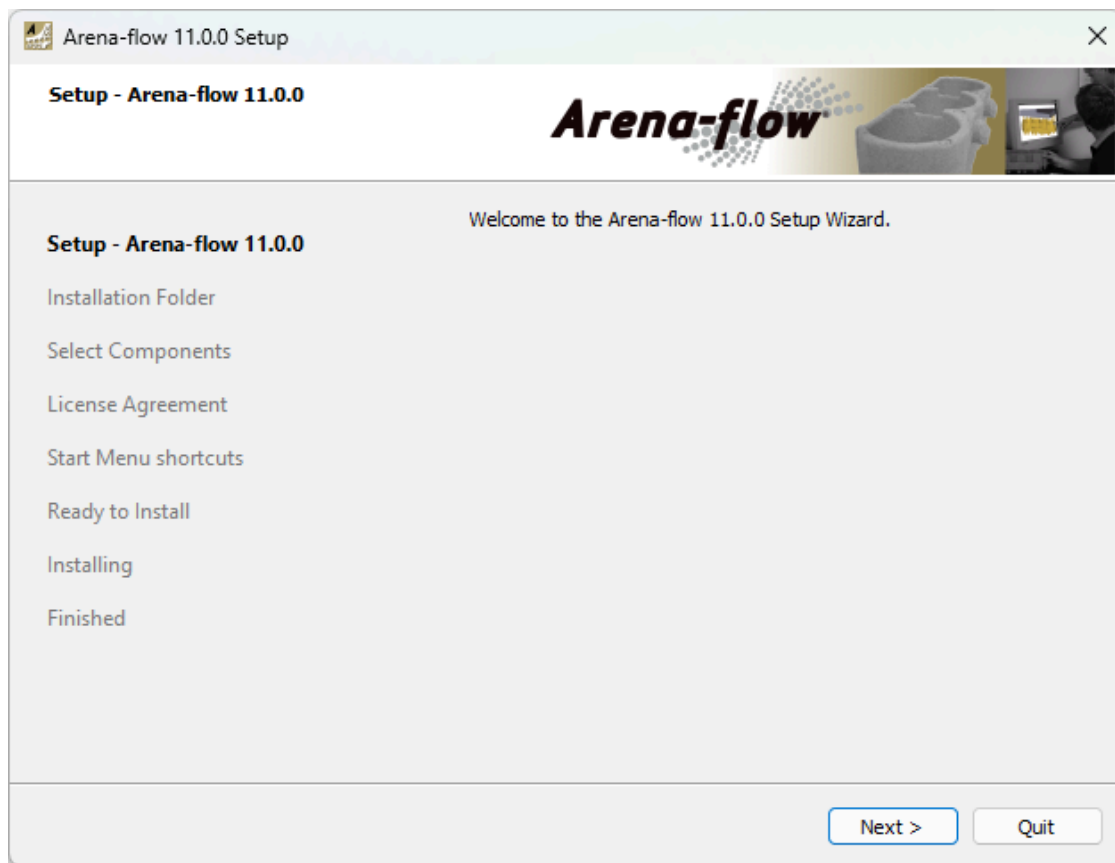


Figure 1.5. *Arena-flow* Setup Wizard

3. This window shows the default directory in which the *Arena-flow* version will be installed. It is recommended to use the default directory. Click *Next*.

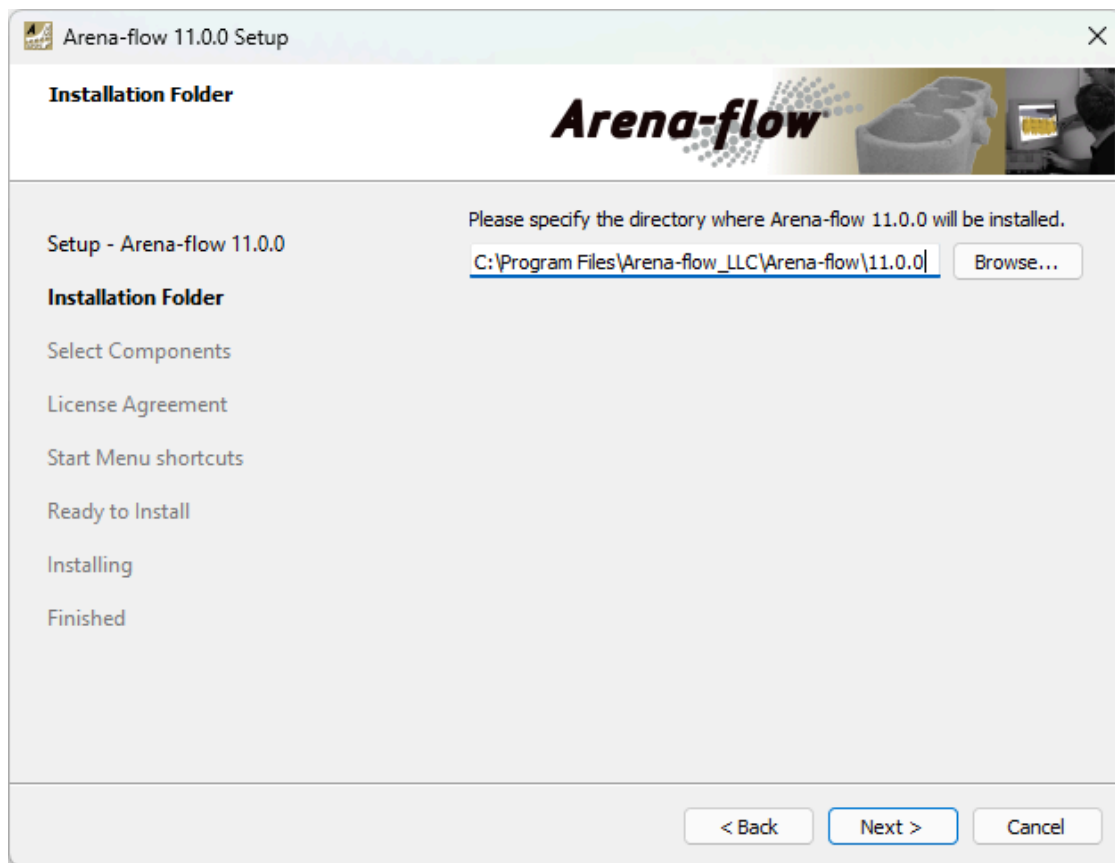


Figure 1.6. *Arena-flow* Installation Directory

4. This window allows you to choose the components to be installed. It is recommended that you leave all components checked and click *Next*.

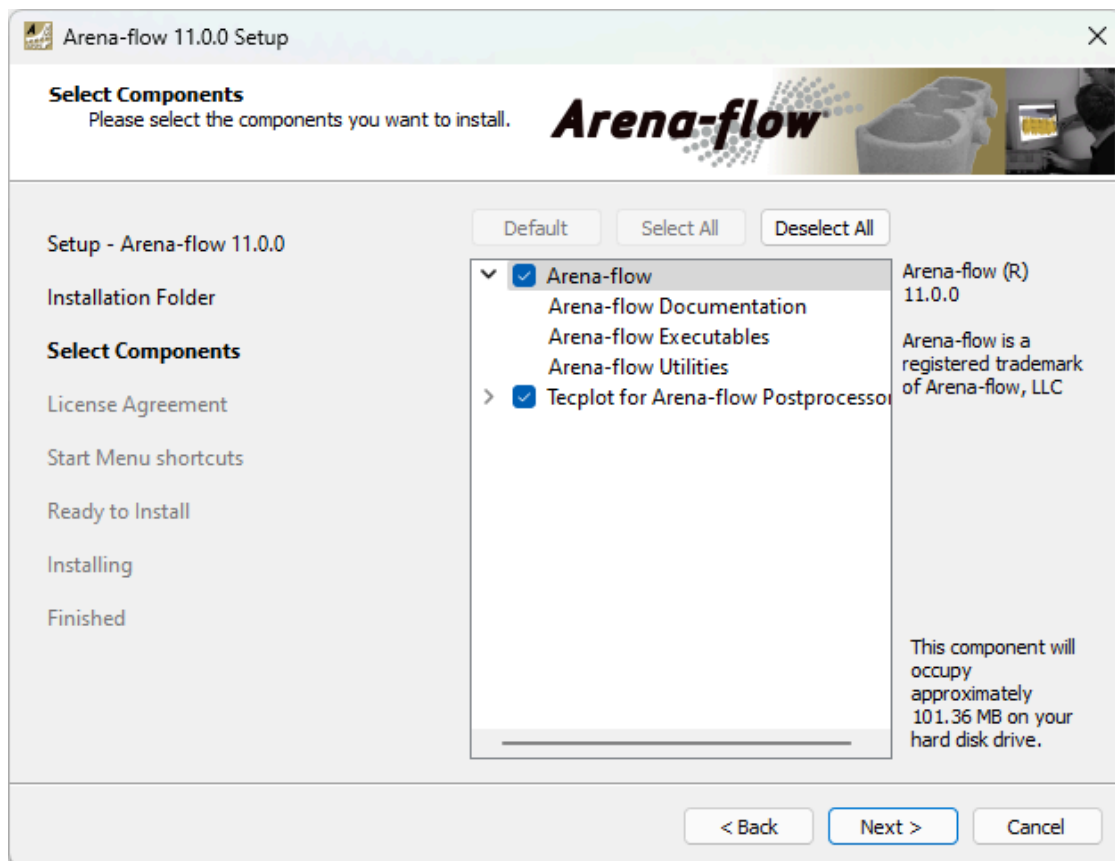


Figure 1.7. *Arena-flow* Setup Select Components

5. Read and accept the License Agreement and click *Next*.

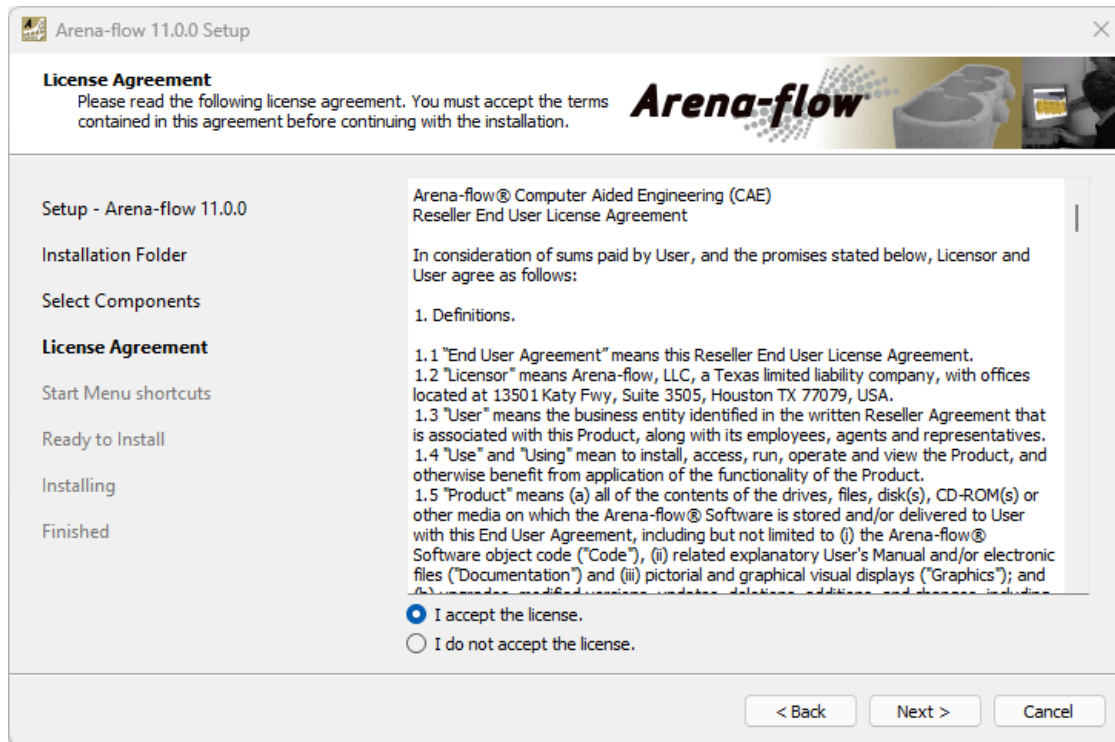
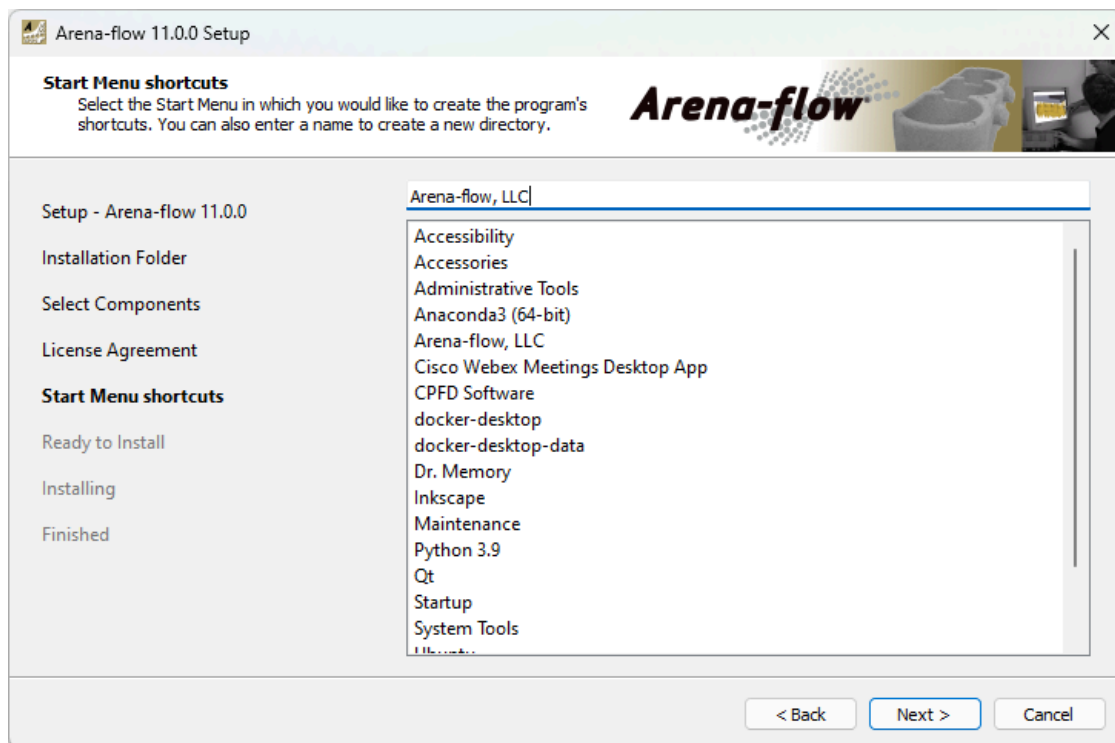


Figure 1.8. *Arena-flow* License Agreement

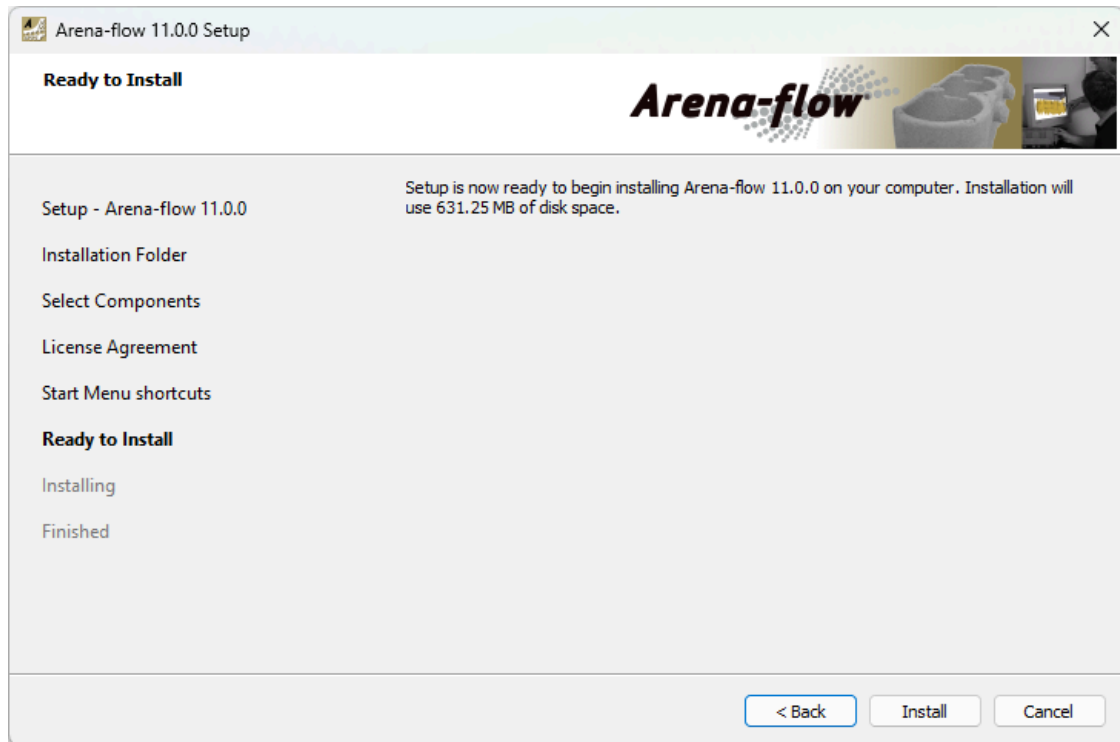
6. On Windows, create a Start Menu shortcut and click *Next*.

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7. Click *Next* in order to begin the installation.

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The installer will display a progress bar as it installs *Arena-flow*.

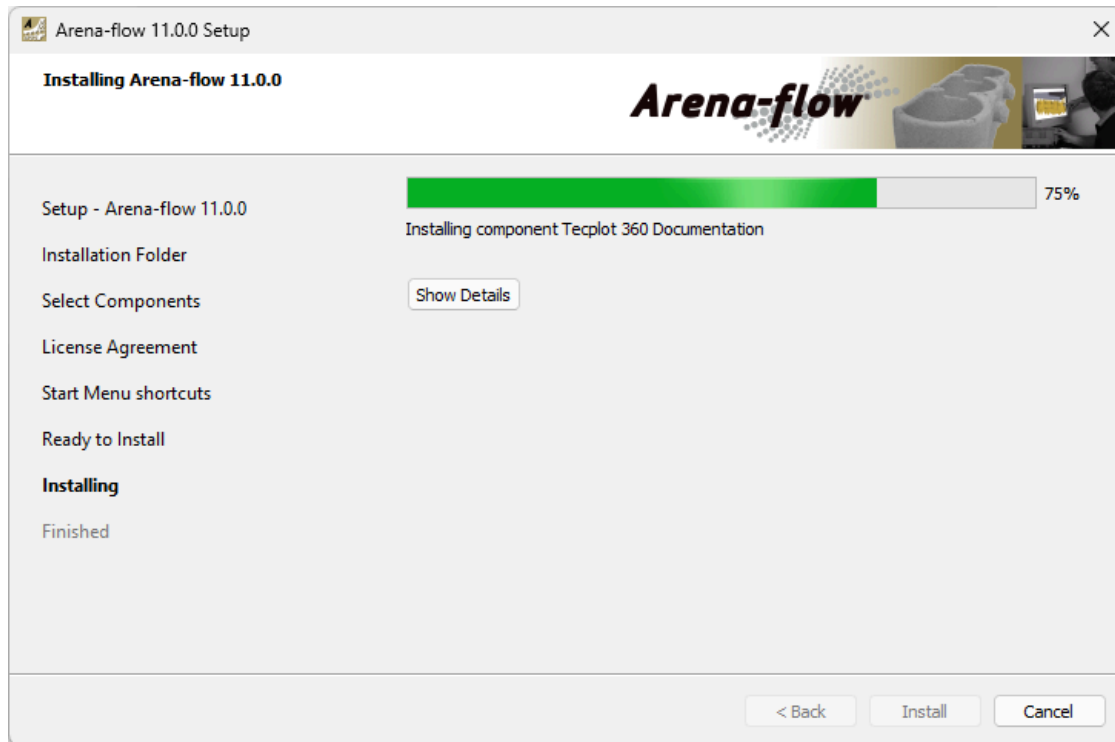


Figure 1.9. *Arena-flow* Setup Installing

8. Once the installation is complete, the final window of the *Arena-flow* Setup Wizard will be displayed.

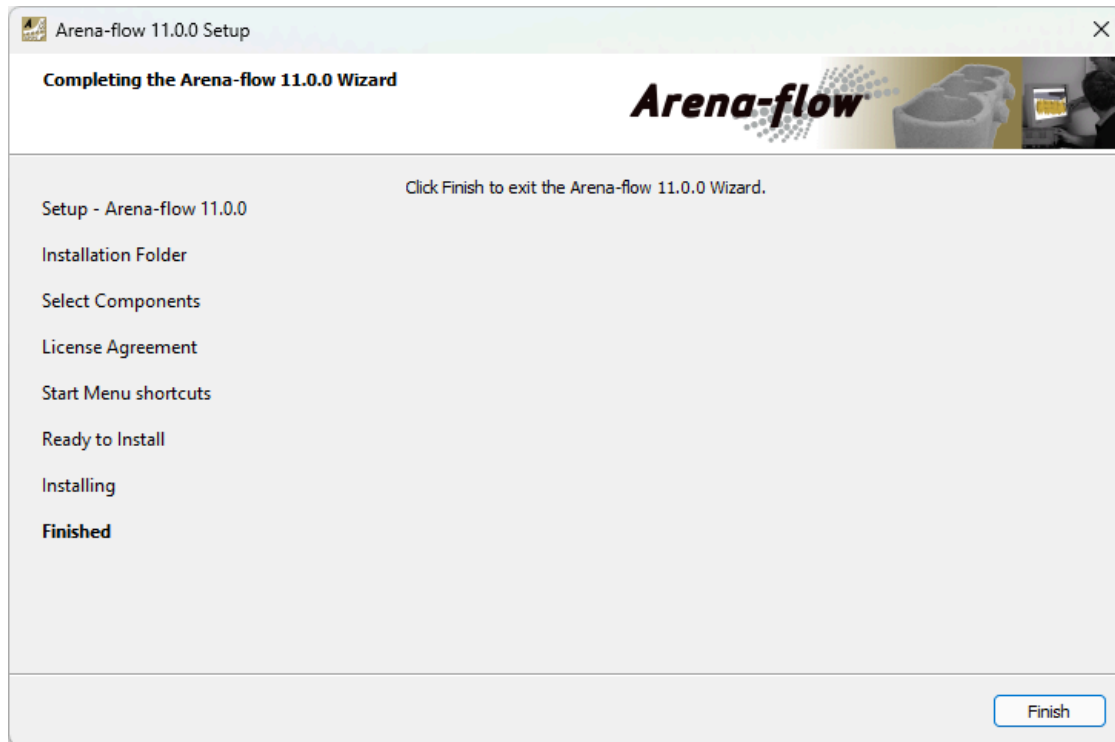


Figure 1.10. *Arena-flow* Setup Final Page

Note After installing *Arena-flow* on a Linux machine, it may be necessary to log out and log back in to ensure that *Arena-flow* is placed correctly in the system menu.

1.5.2 Headless Install

Arena-flow supports headless install and uninstall so the process can be scripted.

Linux

```
./arena-flow-11.0.0-Linux.run install --default-answer --accept-licenses  
--confirm-command --root /home/user/Arena-flow_LLC/Arena-flow/11.0.0
```

Windows

```
.\arena-flow-11.0.0-Windows.exe install --default-answer --accept-licenses  
--confirm-command --root "C:\Program  
Files\Arena-flow_LLC\Arena-flow\11.0.0"
```

1.5.3 Headless Uninstall

The uninstall tool can be found in the *Arena-flow* installation directory.

Linux

```
./Uninstall-Arena-flow purge --confirm-command
```

Windows

```
.\Uninstall-Arena-flow.exe purge --confirm-command
```

1.6 Point Client Machines to the RLM Server

Every RLM client machine must point to an RLM server in order to access the *Arena-flow* license(s). Clients can point to any combination of one or more RLMCloud license servers and one or more on-premise RLM license servers. The steps for pointing clients to the RLM license server(s) must be performed on the following occasions:

- The first time you set up the RLM server and its clients
- Any time the RLM server changes its IP address or hostname; in this case, all client machines need to be updated to point to the new IP address or hostname
- When a new client machine is being configured

The recommended method for pointing clients to the RLM license server(s) is by using the *Arena-flow License Manager* dialog, which is accessed by choosing *Manage License Servers* in the *Arena-flow GUI Help* menu.

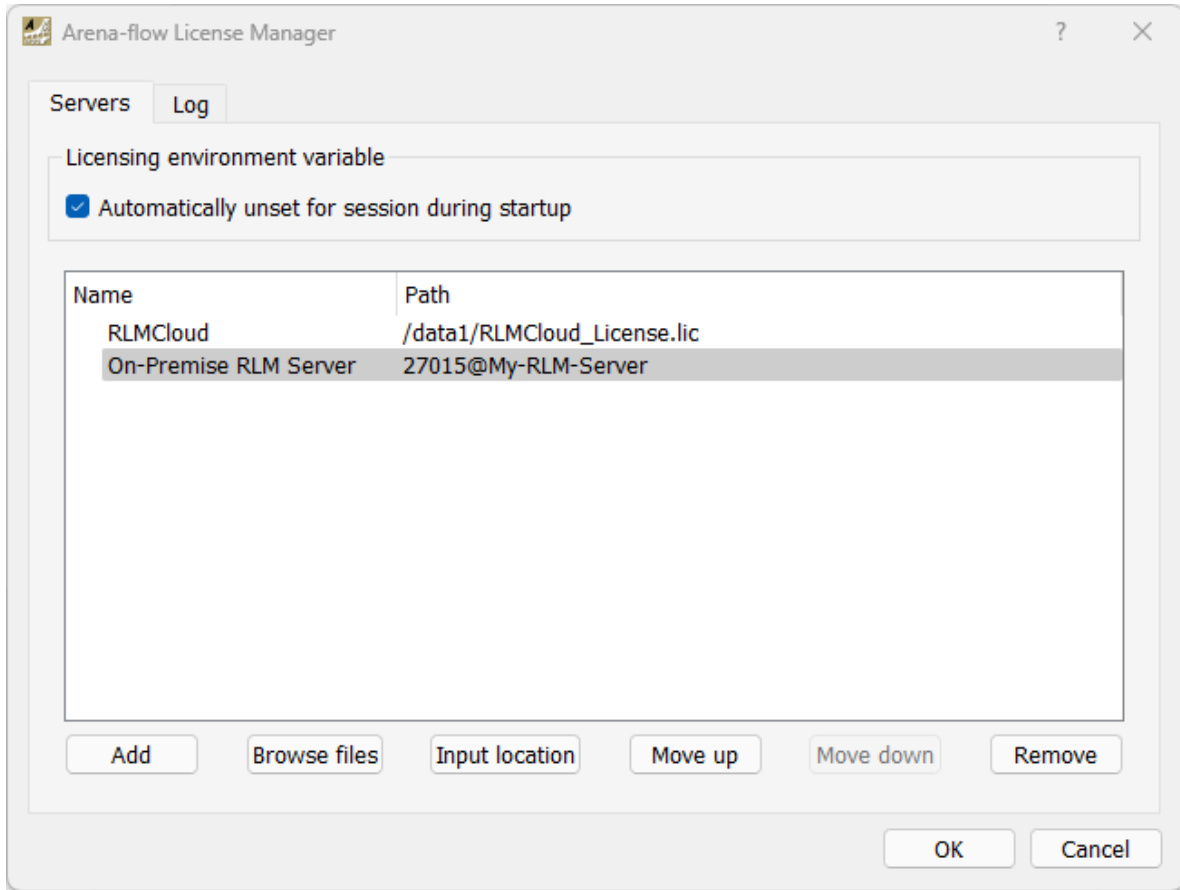


Figure 1.11. Servers tab of Arena-flow License Manager

The *Servers* tab, shown in [Figure 1.11](#), is used to define one or more RLM license servers to be used by the client. The order in which license servers are listed in this dialog is the order the client will use to request licenses. The first available license from the configured servers will be checked out.

The *Licensing environment variable* section will appear if a *legacy cpfd_LICENSE environment variable* has been set. This environment variable was used in pre-10.0.0 versions of *Arena-flow*, but is not the recommended method for pointing to the RLM license server in versions 10.0.0 and later. It is recommended that the option to *Automatically unset for session during startup* be checked so that *Tecplot for Arena-flow* is able to check out its license successfully.

In the *Servers* table, there are two columns:

Name This column is used to give each defined RLM license server a name for easy identification. There are no restrictions on the *Name* specified.

Path If an RLMCloud license server is being defined, this column holds the path to the RLMCloud license file (see [Using RLMCloud](#)). If an on-premise RLM license server is being defined, this column holds the port number and host name (or IP address) of the RLM server (see [Point Clients to the On-Premise RLM Server](#)).

The following buttons are present below the list of defined RLM license servers:

Add This button adds a new entry to the list of defined RLM license servers. After clicking *Add*, the

entry can be given a *Name*.

Browse files This button opens a file browser to select an RLMCloud license file. When a file is selected, the full path to the file will be shown in the *Path* column.

Input location This button allows text to be directly typed into the *Path* column for the currently selected entry. Double-clicking in the *Path* column for the current entry has the same effect. Direct text entry is most commonly used for specifying the port and host name (or IP address) of an on-premise RLM license server.

Move up This moves the currently selected entry up in the list of defined RLM license servers.

Move down This moves the currently selected entry down in the list of defined RLM license servers.

Remove This removes the currently selected item from the list of defined RLM license servers.

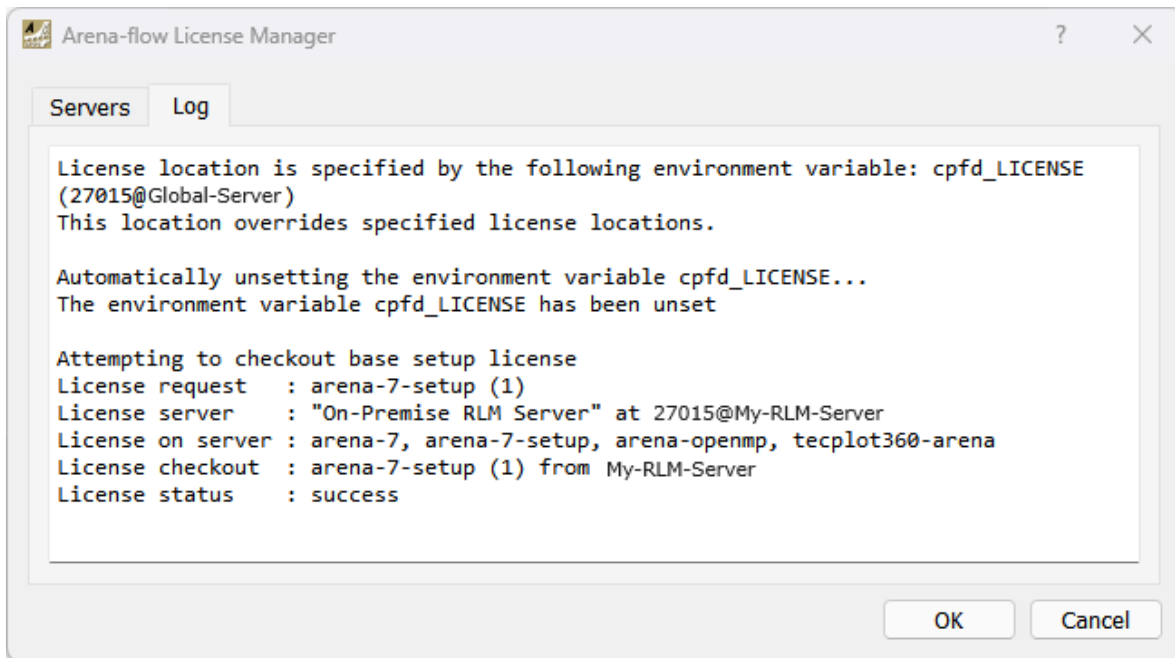


Figure 1.12. Log tab of *Arena-flow License Manager*

The *Log* tab, shown in [Figure 1.12](#), is used to view messages related to RLM license checkout. This is often useful for diagnosing and troubleshooting license issues.

1.6.1 Using RLMCloud

If an RLMCloud license server is being defined, the *Path* column holds the full absolute path to the RLMCloud license file. The RLMCloud license file can be located anywhere on the client's file system, as long as it is readable by the user(s) running *Arena-flow*. To open a file browser and select an RLMCloud license file, use the *Browse files* button as shown in [Figure 1.11](#).

1.6.2 Using an On-Premise RLM Server

Note

1. You do not need to install or update the RLM server for each new version of *Arena-flow*. Once

the RLM server is set up the first time, it will work with all versions of *Arena-flow*.

2. Administrator (on Windows) or `root` (on Linux) privileges are required in order to perform the RLM server installation.
3. An on-premise RLM server must be a physical machine. A virtual machine (VM) cannot be used as the RLM license server host.

Install the RLM Server The Reprise License Manager is installed by running **`reprise-installer.run`** (on Linux) or **`reprise-installer.exe`** (on Windows), *extracted* from the RLM server download. At the end of the Reprise License Manager installation, be sure to leave the box checked for *Show system information*.

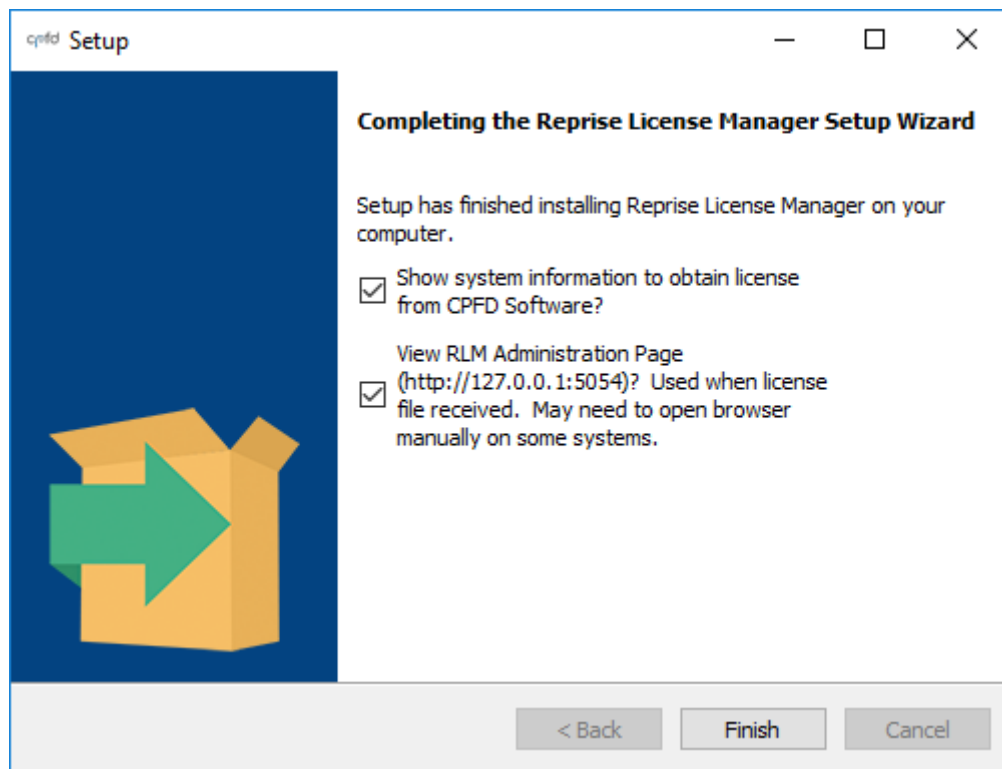


Figure 1.13. Final screen of RLM installer

A window will pop up showing your system information.

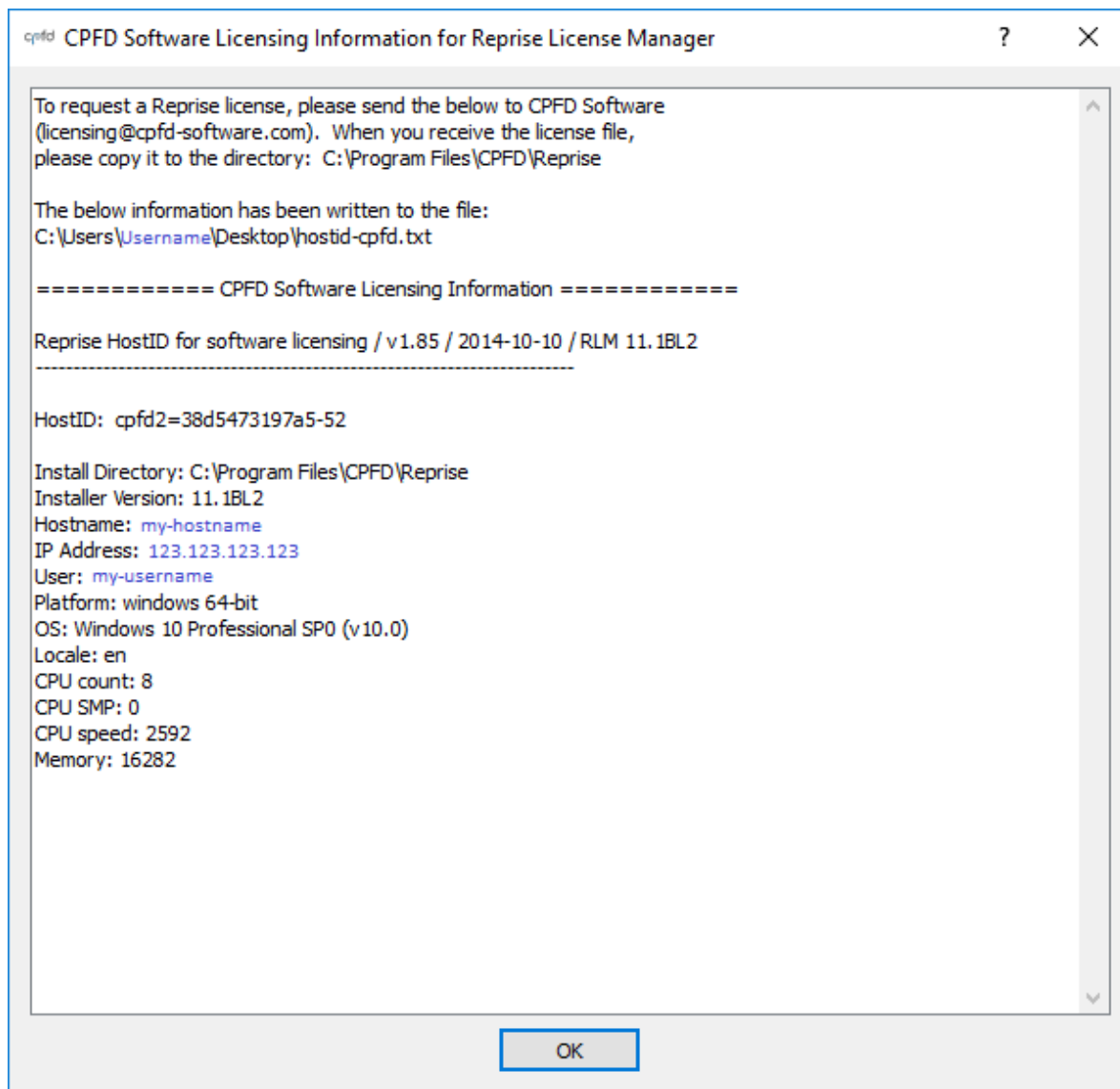


Figure 1.14. RLM installer host information

Additionally, a text file containing the same information will be saved to your Desktop with a file name of `hostid-cpfd.txt`. Email this file to licensing@cpfd-software.com, and CPFD Software will generate a license file and email it to you.

An alternative method of finding the license server's `hostid` is to run the command **getcpfdid** in a terminal or command prompt.

On Linux, the default installation location of this command is:

```
/usr/local/bin/reprise/getcpfdid
```

On Windows, the default installation location of this command is:

```
C:\Program Files\CPFD\Reprise\getcpfdid.exe
```

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Firewall Configuration

In order for RLM client machines to communicate with the RLM server, the server's firewall must have ports 5054, 27015, and 27016 open.

- If the OS of the RLM server is **CentOS 7 Linux**, the firewall ports can be opened by typing the following commands in a terminal as root:

```
firewall-cmd --permanent --zone=public --add-port=5054/tcp
```

```
firewall-cmd --permanent --zone=public --add-port=27015/tcp
```

```
firewall-cmd --permanent --zone=public --add-port=27016/tcp
```

```
firewall-cmd --reload
```

- If the OS of the RLM server is **Windows**, the firewall ports can be opened by using an **Administrator Command Prompt**. In the prompt, type the following commands:

```
netsh advfirewall firewall add rule name="RLM Web Server" dir=in  
action=allow protocol=TCP localport=5054
```

```
netsh advfirewall firewall add rule name="RLM License Server" dir=in  
action=allow protocol=TCP localport=27015
```

```
netsh advfirewall firewall add rule name="RLM ISV Server" dir=in  
action=allow protocol=TCP localport=27016
```

Install the RLM License

Note The license file only needs to be installed on the RLM server. It does not need to be installed on client machines.

Once you have requested and received your RLM license file from CPFD Software, it is necessary to install it on the RLM server. To install the RLM license file, follow these steps:

1. Save the RLM license file to your Desktop.
2. Copy the license file to the following location depending on the OS of your license server:

Linux

/usr/local/bin/reprise/

You will need root permission to do this. In a terminal opened to the same directory as the license file, type:

```
su  
<Enter root password>  
cp <license file> /usr/local/bin/reprise/
```

where <license file> is the RLM license file name.

Windows

C:\Program Files\CPFD\Reprise

Note that Windows Explorer will ask for administrator permission to copy a file into any directory inside C:\Program Files.

3. Open a web browser to: <http://127.0.0.1:5054>
4. Click *Reread/Restart Servers*, then *REREAD/RESTART*:

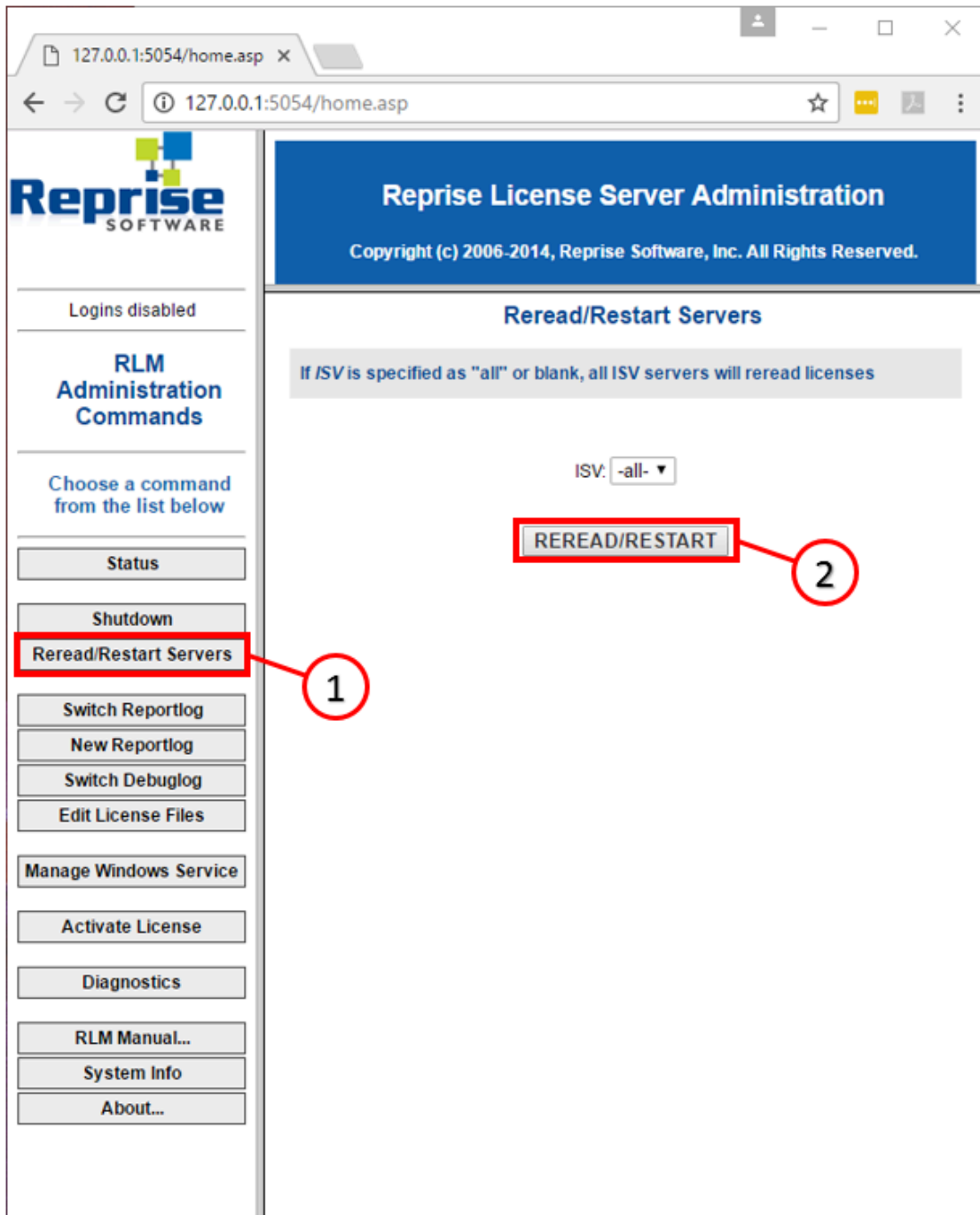


Figure 1.15. RLM Reread/Restart Servers

It is also possible to request that the RLM server reread its license file(s) via the command-line, in case you do not have access to the web interface of the RLM server. In the `reprise` folder,

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running the script named `rlmreread` will trigger a reread of the license file(s) for the RLM server. You must have administrator privileges to run this script.

5. Click *Status*, and then click the first *cpfd* button under the *Server Status* column. This lists the current status of your Reprise server licenses and shows licenses available.

The screenshot displays the 'Reprise License Server Administration' web interface. The left sidebar contains a 'Status' button, which is highlighted with a red box and labeled '1'. The main content area shows the 'Status for "rlm" on volta (port 5053)'. It includes a table for RLM software version (v11.1 (build 2)), RLM comm version (v1.2), debug log file (rlm.dlog), license files (cpfd-license-client.lic, cpfd-license_00002349.lic), and a table for rlm Statistics (Start time, Messages, Connections). Below this is a table for ISV Servers, which has columns for Name, port, Running, Restarts, Server Status, License Usage, Debug Log, REREAD, OPTIONS, TRANSFER, and SHUTDOWN. The 'Server Status' column for the 'cpfd' server is highlighted with a red box and labeled '2'.

ISV Servers	Name	port	Running	Restarts	Server Status	License Usage	Debug Log	REREAD	OPTIONS	TRANSFER	SHUTDOWN
cpfd	cpfd	27016	Yes	0	cpfd	cpfd	cpfd	cpfd	cpfd	cpfd	cpfd

Figure 1.16. Checking RLM license status

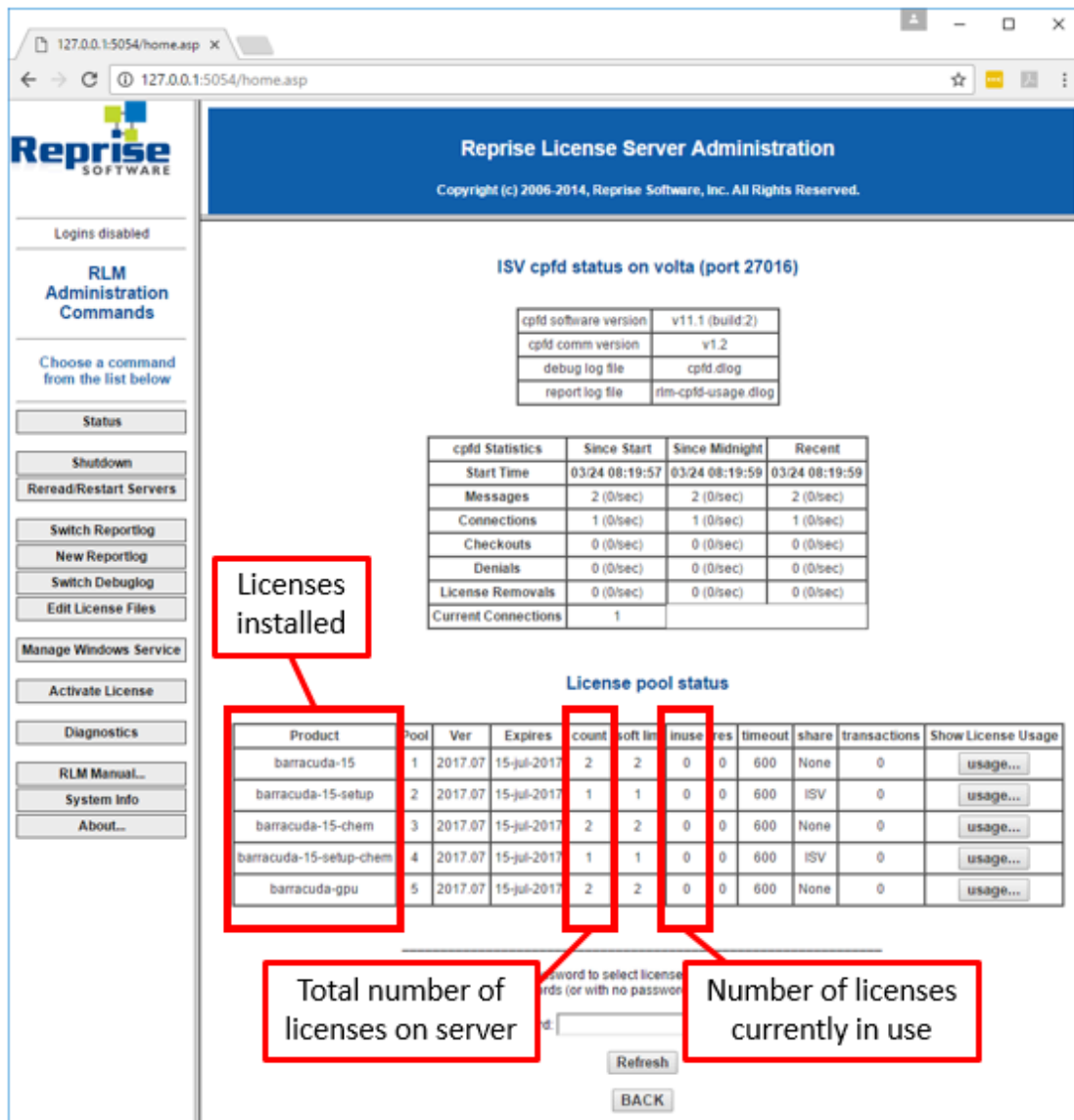


Figure 1.17. RLM license status table

Point Clients to the On-Premise RLM Server

Client machines are configured to point to an on-premise license server by specifying the port and host name (or IP address) of the RLM license server in the *Path* column of the *Servers* table in the *Arena-flow License Manager*. To enter the port and host name (or IP address) of an on-premise RLM license server, use the *Input location* button, as shown in Figure 1.11, or double-click in the *Path* column.

Port number The default port for the RLM license server is 27015. If you have intentionally changed it, use your custom port number instead.

Host name If the client machine can identify the RLM license server by its host name, then the *Path*

can be specified as 27015@<hostname>, where you need to replace <hostname> with the license server's host name.

IP address Instead of the host name, the IP address of the RLM license server may be used. The form of the *Path* entry in this case would be 27015@<IP address>, where you need to replace <IP address> with the license server's IP address.

- If the OS of the RLM server is **Linux**, you can find its IP address by opening a terminal on the server and typing:

```
ifconfig
```

The IP address is listed as `inet addr` in the printed output.

If you want to use the <hostname> of the RLM server, you can find it by opening a terminal on the server and typing:

```
hostname
```

This will print the <hostname> of the server machine.

- If the OS of the RLM server is **Windows**, you can find its IP address by opening a **command prompt** on the server and typing:

```
ipconfig
```

The IP address is listed as `IPv4 Address` in the printed output.

If you want to use the <hostname> of the RLM server, you can find it by opening a terminal on the server and typing:

```
hostname
```

This will print the <hostname> of the server machine.

Legacy Environment Variable Method

A legacy method of pointing clients to an on-premise RLM license server is by defining an environment variable named `cpfd_LICENSE`. Using the IP address or <hostname> of the RLM server, the `cpfd_LICENSE` environment variable can be defined for the client machine(s) as follows:

- If the OS of the RLM client is **Linux**, you can define the environment variable based on the RLM server's <IP address or hostname> by opening a terminal on the client and typing:

```
echo "export cpfd_LICENSE=27015@<IP address or hostname>">> ~/.bashrc
```

Logout and login in order for settings to update.

- If the OS of the RLM client is **Windows**, you can define the environment variable based on the RLM server's <IP address or hostname> by opening a **command prompt** on the client and typing:

```
setx cpfd_LICENSE 27015@<IP address or hostname>
```

1.7 Troubleshooting

We hope you never need to read this section, but in case things aren't working as expected after following the steps outlined above, please review the following troubleshooting tips.

1.7.1 License not found

If the *Arena-flow* GUI is unable to find a license file, it will not open. Instead, the License Manager will display an error in the log such as the one shown below:

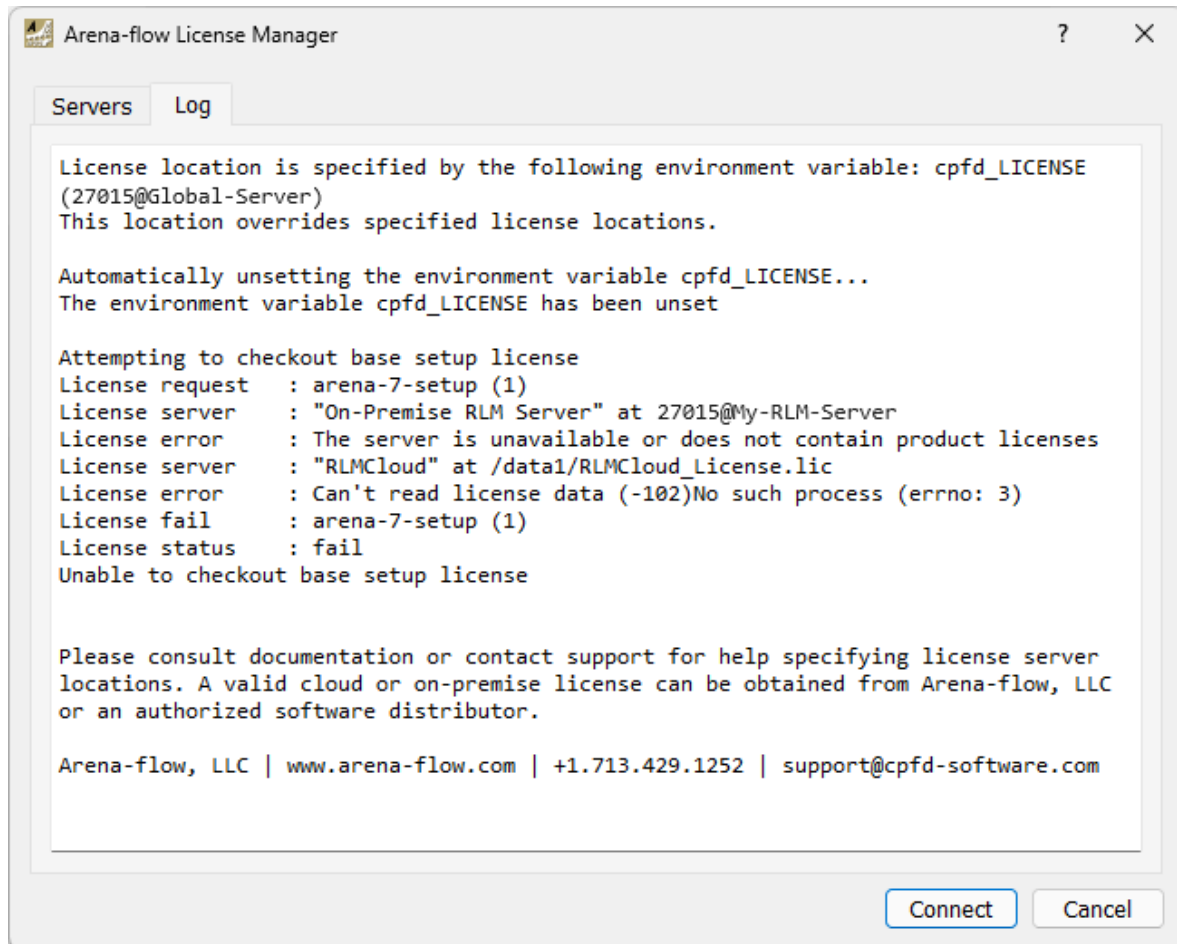


Figure 1.18. Error shown in License Manager Log when the *Arena-flow* GUI cannot find a license

If an error appears in the License Manager Log, check the following things:

1. Is the license expired? The license file (.lic) [emailed](#) to you will have the license expiration date as will the RLM license status table (see [Figure 1.17](#)).
2. Is the IP address or host name of the RLM server correct? [Here's how to check](#).
3. Is the port number of the license server correct? The default port is 27015, so double-check that the `cpfd_LICENSE` environment variable is using that port. Here's how to check:
On **Linux**, type in a terminal:

```
echo $cpfd_LICENSE
```

On **Windows**, type in a CMD command prompt:

```
echo %cpfd_LICENSE%
```

If the port number is not correct, *change* it to match.

4. Can the RLM web-page be opened successfully using the hyperlink in the error dialog? If not, then the RLM server is either not running on the server machine, or the client machine is not able to communicate with the RLM server. How to check:
 - Ensure that the RLM server is *installed*.
 - Can the client machine **ping** the RLM server? If not, then the client machine is not able to communicate with the server machine. The client and server machines must be able to communicate in order for RLM licenses to be used.

Note The **ping** service is not allowed to pass through the Windows firewall by default. It is necessary to *enable ping responses* in order to test communication to a Windows RLM server machine.

In order to **ping** a machine, open a terminal (on Linux) or a CMD command prompt (on Windows) and enter the command:

```
ping <hostname or IP address of RLM server>
```

5. Is there a firewall running on the server machine, preventing the client machine from obtaining an RLM license? See *Firewall Configuration* for details on how to open the necessary ports for the RLM server.
6. Is the computer's date and time set correctly? The license manager will not function properly if the date and time is not correct.

1.7.2 RLM Server Issues

Issues with the RLM server can most often be diagnosed by using two log files:

1. The *debug log file* is written to continuously by the RLM server as it is running. By default, the file name is `rlm.dlog`. The file name can be verified by using the *Status* page of the RLM web interface.

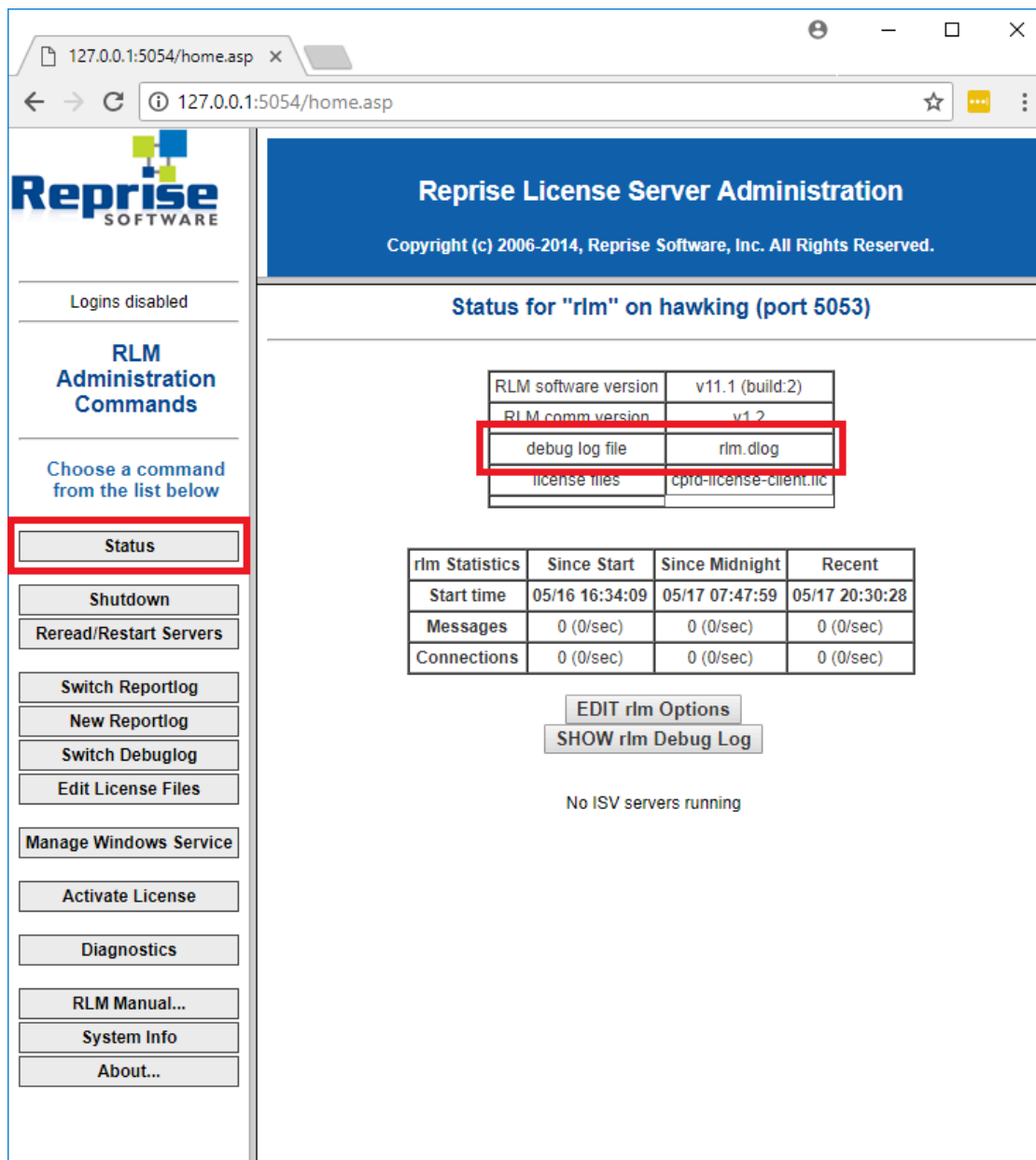


Figure 1.19. Checking RLM debug log file name

If the RLM server is running on Linux, the default location of this file is:

/usr/local/bin/reprise/rlm.dlog

If the RLM server is running on Windows, the default location of this file is:

C:\Program Files\CPFD\Reprise\rlm.dlog

- The *Diagnostics* file is written only upon request. To create this file, use the *Diagnostics* page of the RLM web interface. The *Output File* can be specified, which refers to a location on the RLM server's hard drive. Click the *Run Diagnostics* button to run the RLM diagnostics routine and create the *Output File*.

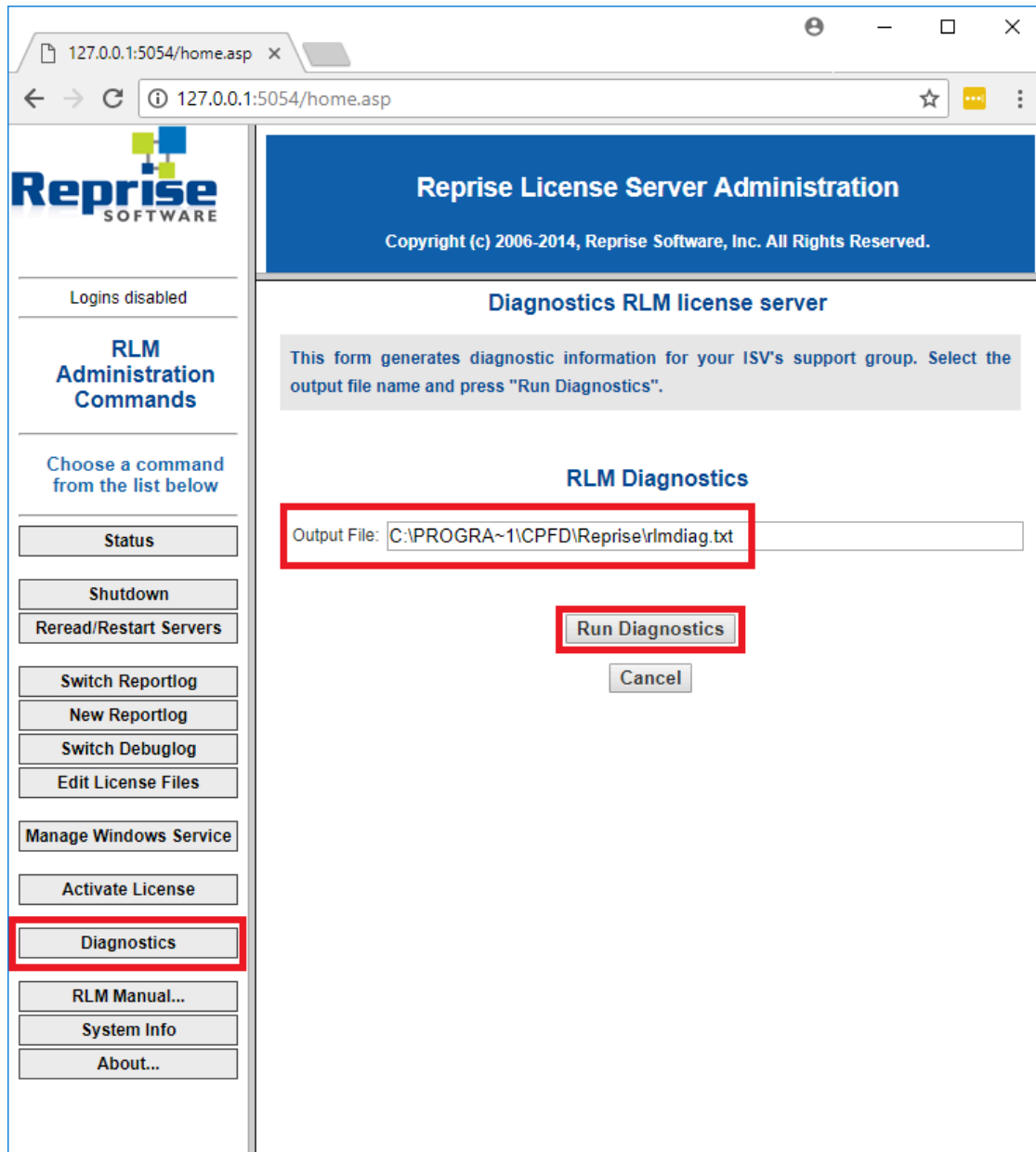


Figure 1.20. RLM Diagnostics file

1.7.3 Additional Packages Required on Some Linux Systems

In most cases, the default libraries included with your Linux installation will be sufficient for running the *Arena-flow* GUI and solver. However, we have encountered a few systems that needed libraries to be installed manually. In many cases, one or more of the following libraries have been important to install on such systems:

1. libxcb-icccm4
2. libxcb-image0
3. libxcb-keysyms1
4. libxcb-render-util0
5. libxkbcommon-x11
6. qt5-qtx11extras
7. xcb-util-image
8. xcb-util-renderutil
9. xcb-util-renderutil-devel

If you are experiencing issues where the *Arena-flow* GUI will not start due to library issues, we recommend working through installation of the packages listed above as a first step to troubleshooting the problem. Note that some packages may only be available on certain versions of Ubuntu or CentOS. If this is the case on your system, the package manager will warn you that a package is unavailable.