Linaro Forge Licence Server

Release 23.1.2

Linaro Limited

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CHAPTER

ONE

INTRODUCTION TO LINARO FORGE LICENCE SERVER

This section describes when you need to use Linaro Forge Licence Server.

1.1 Linaro Forge Licence Server

Linaro Forge Licence Server provides licensing support for Linaro Forge.

There are three licensing models for Linaro Forge products:

- Evaluation (Trial) licenses
- Workstation (Node-locked) licenses
- Supercomputing (Floating) licenses

For evaluation and workstation licenses, copy the license file to the Linaro Forge installation directory, `{installation-directory}/licences`. Linaro Forge Licence Server is not required for these license types.

For supercomputing licenses, Linaro Forge Licence Server is required.

Note: If you use a remote client, the license is configured on the remote system. A local license is not required.

Installation of licenses is discussed further in *Add a new license*.

When you have determined that Linaro Forge Licence Server is a requirement for your site, you can proceed with *Install Linaro Forge Licence Server*.

1.1.1 Supported platforms

Linaro Forge Licence Server supports the same **Linux** platforms that Linaro Forge supports. Linaro Forge Licence Server is not supported on Mac or Windows. See Forge Supported Platforms for more details.

1.1.2 Obtaining help

Contact Forge Support.

CHAPTER

TWO

INSTALLATION

This chapter describes how to install Linaro Forge Licence Server.

2.1 Install Linaro Forge Licence Server

Install remotely using the `textinstall.sh` text-mode install script.

2.1.1 Before you begin

Linaro Forge Licence Server is only available for Linux systems.

2.1.2 Procedure

1. Download a release of Linaro Forge Licence Server from the Linaro Forge Licence Server Downloads.
2. Run the `textinstall.sh` install script provided by using these commands:

   ```
   tar xf linaro-licence-server-<version>-linux-<arch>.tar
   ```

   ```
   cd linaro-licence-server-<version>-linux-<arch>
   ```

   ```
   ./textinstall.sh
   ```

   - Replace `<version>` with the four digit version number of your installation package using the format `xx.x` for major product releases, and the format `xx.x.x` for support releases.
   - Replace `<arch>` with the required architecture (`aarch64`, `x86_64`, `ppc64le`).
3. When you are prompted, press **Return** to read the license, and enter the path of the installation directory.

   Note: Alternatively, run the text-mode install script `textinstall.sh`, accept the license, and point to an installation directory in one step. You can do this when you execute `textinstall.sh` using `--accept-licence` and `<installation-directory>`.

   For example:

   ```
   ./textinstall.sh --accept-licence <installation_directory>
   ```

   Replace `<installation_directory>` with your preferred directory.

2.1.3 Next steps

- See *Use Linaro Forge Licence Server* for details about using Linaro Forge Licence Server.
- See the `RELEASE-NOTES` file in the install package when the installation is complete.

CHAPTER

THREE

USE LINARO FORGE LICENCE SERVER

Linaro Forge Licence Server is required only for floating licenses on HPC clusters. Linaro Forge Licence Server is not required for single evaluation licenses, or workstation licenses (Linaro Forge).

3.1 Run Linaro Forge Licence Server

This section describes the process for setting up the Linaro Forge Licence Server and configuring it to start automatically during system boot.

3.1.1 Before you begin

- For security reasons, ensure that Linaro Forge Licence Server runs as an unprivileged user. For example, `nobody`, or preferably a dedicated user. Furthermore, Linaro recommends restricting the visibility of the host running the Linaro Forge Licence Server only to trusted users, and hidden externally.
- Linaro Forge Licence Server includes a systemd init configuration file for Linux systems.
- If Linaro Forge Licence Server runs without arguments, it uses licenses in the current directory (files matching `Licence*` or the variant spelling `License*`). You can include an optional argument to specify an alternative directory location instead of the current directory.
- Floating license server files are stored by default in the Linaro Forge Licence Server installation directory (`/opt/linaro/licenceserver/<version>/licences`). This is also the directory the systemd unit configuration uses by default.

3.1.2 Procedure

1. To create an unprivileged user and allocate a log directory, run these commands as root.

```
useradd --system --user-group --no-create-home \
     --home-dir /opt/linaro/licenceserver/<version> allinea
mkdir /var/log/linaro
chown allinea: /var/log/linaro
```

   This creates the user `allinea` and the log directory `/var/log/linaro`. The user is assigned ownership of the log directory. The `/opt/linaro/licenceserver/<version>` directory is the location of the Linaro Forge Licence Server installation. The license server log file is `/var/log/linaro/allinea.log`.

Note: If you install the Linaro Forge Licence Server in a custom installation path, set the `FORGE_LICENSE_DIR` environment variable to point to the custom license directory. `ALLINEA_LICENSE_DIR` is still supported and can be used instead of `FORGE_LICENSE_DIR`.

Caution: Ensure that the directory `/var/log` has appropriate access controls to limit access to the log files.

2. Edit `lib/systemd/system/allinea-licenceserver.service` in your Linaro Forge Licence Server installation. Make sure that the Environment, `ExecStart` and `User settings` in the `[Service]` section are correct for your system.
3. Create a symbolic link to the systemd directory:

```
ln -s lib/systemd/system/allinea-licenceserver.service \
     /etc/systemd/system/
```

4. Enable Linaro Forge Licence Server on future boots:

```
systemctl enable allinea-licenceserver
```

5. Start the Linaro Forge Licence Server:

```
systemctl start allinea-licenceserver
```

6. Check that the Linaro Forge Licence Server has started correctly:

```
systemctl status allinea-licenceserver
```

3.2 Enable logging

This section shows you how to enable logging. These steps must be done prior to starting the server.

3.2.1 Procedure

1. Set the environment variable `FORGE_LICENCE_LOGFILE` to the file that you wish to append log information to.
2. Set `FORGE_LICENCE_LOGLEVEL` to specify the amount of information required.

   The following list specifies the available log levels:

   - Level 0: no logging.
   - Level 1: client licenses issued are shown, served licenses are listed.
   - Level 2: stale licenses are shown when removed, licenses still being served are listed if there is no spare license.
   - Level 3: full request strings received are displayed.
   - Level 6: is the maximum.

Caution: In level 1 and above, the MAC address, user name, process ID, and IP address of the clients are logged. If you need to limit access to the log files, ensure that the directory of the file has appropriate access controls.

3.3 Add a new license

This section shows you how to set up a floating license on Linaro Forge Licence Server.

3.3.1 Before you begin

- A floating license consists of two files: Server license (`Licence.xxxx`), and Client license (`Licence`).
- Server license file names must begin with `License`, or the variant spelling `Licence`.
- License file names are not case-sensitive.
- You can append unique identifiers to license file names for storing them in the same directory.

  For example, add the server license serial number, `license.server.1234`, or include `client` in the client license name, `license.client.5678`.

3.3.2 Procedure

1. Copy the server license file to the `licences` subdirectory of the Linaro Forge Licence Server installation.

   For example:

   ```
   /opt/linaro/licenceserver/<version>/licences
   ```

2. Copy the client license file to the `licences` subdirectory of the licensed product installation, `<product-installation>/<version>/licences`.

   For example:

   ```
   /opt/linaro/<product>/<version>/licences/Licence
   ```

3. Edit the client license file to specify the hostname of the license server in use.
4. Restart Linaro Forge Licence Server for the new floating license to be picked up. Existing clients should not experience disruption if the restart completes promptly.

Multiple floating licenses can be served from the same licences directory. If you have multiple licenses for the same product, the license with the most tokens is preferred.

Note: Linaro Forge Licence Server is required only for floating licenses on HPC clusters. Linaro Forge Licence Server is not required for single evaluation licenses or workstation licenses (Linaro Forge). Copy these license files directly to the `licences` subdirectory in the product installation path, such as, `/home/user/linaro/forge/<version>/licences/Licence.client.5678`.

3.4 Licensing example

This section shows an example of how the Linaro Forge Licence Server is set up with details of the license file content.

For detailed instructions about how to set up the Linaro Forge Licence Server, see *Run Linaro Forge Licence Server*.

In this example, a dedicated Linux server machine is running the Linaro Forge Licence Server. It is installed in `/opt/linaro/licenceserver/<version>` and the server license files are stored in `/opt/linaro/licenceserver/<version>/licences`.

The Linaro Forge Licence Server program runs as the dedicated `allinea` user, and serves all licenses in `/opt/linaro/licenceserver/<version>/licences`. Linaro Forge Licence Server logs events to the `/var/log/linaro/allinea.log`.

These commands were run to set up the Linaro Forge Licence Server to:

- create the `allinea` user.
- specify the location of licenses and logs.
- link to the systemd init configuration.
- run the Linaro Forge Licence Server and check its status.

```
% useradd --system --user-group --no-create-home \
          --home-dir /opt/linaro/licenceserver/<version> allinea
% mkdir /var/log/linaro
% chown allinea: /var/log/linaro
% ln -s /opt/linaro/licenceserver/<version>/lib/systemd/system/allinea-licenceserver.service \
        /etc/systemd/system/
% systemctl enable allinea-licenceserver
% systemctl start allinea-licenceserver
% systemctl status allinea-licenceserver
```

The example server license file is `/opt/linaro/licenceserver/<version>/licences/Licence.server.physics` and is served by `server.physics.acme.edu` on port 4252.

It contains:

```
type=3
serial_number=1014
max_processes=48
expires=2004-04-01 00:00:00
support_expires=2004-04-01 00:00:00
mac=00:E0:81:03:6C:DB
interface=eth0
debuggers=gdb
serverport=4252
max_users=2
beat=60
retry_limit=4
hash2=c18101680ae9f8863266d4aa7544de58562ea858
```

The example client license is stored at `/opt/linaro/forge/<version>/licences/Licence.client.physics`.

It contains:

```
type=2
serial_number=1014
hostname=server.physics.acme.edu
serverport=4252
```

Note: The client file `hostname` parameter is manually edited to reference the Linaro Forge Licence Server.

3.5 Run product clients

This section describes how to configure the Linaro Forge license files.

3.5.1 Before you begin

- A floating license consists of two files: Server license (`Licence.xxxx`), and Client license (`Licence`).
- Server license file names must begin with `License`, or the variant spelling `Licence`.
- License file names are not case-sensitive.
- You can append unique identifiers to license file names for storing multiple licenses in the same directory.

  For example, add the server license serial number, `license.server.1234`, or include `client` in the client license name, `license.client.5678`.

3.5.2 Procedure

1. For each floating license, copy the corresponding client license file to the relevant licences subdirectory in the product installation directory, `<product_installation_directory>/licences`. For example, copy the Linaro Forge client license to `/opt/linaro/forge/<version>/licences`.
2. Edit `hostname` in the client license file to include the hostname or IP address of the machine on which the Linaro Forge Licence Server runs.
3. If your licenses directory is not in the product installation directory, you can specify the directory path to point to the location of the product licenses using the environment variable `FORGE_LICENSE_DIR`.

Notes:

- If you include a specific license file name in the `FORGE_LICENSE_DIR` path, the Linaro Forge Licence Server always attempts to serve that specific license.
- You can set the environment variable in a *module* file for the product. For example:

  ```
  export FORGE_LICENSE_DIR=${HOME}/SomeOtherLicenceDir
  forge
  ```

The fields in the client license file are:

Name	Required	Description
hostname	Yes	The hostname, or IP address of the license server
ports	No	A comma separated list of ports to be tried locally for GUI-backend communication. Defaults to 4242,4243,4244,4244,4245
serial_number	Yes	The serial number of the server license to be used
serverport	Yes	The port the server listens on
type	Yes	Must have value 2—this indicates that the license requires a server to run correctly

Note: The serial number of the server license is specified as this enables a user to be tied to a particular license.

3.6 Architecture licensing

Licenses issued after the release of Linaro Forge Licence Server 6.1 specify the compute node architectures that they may be used with. Licences issued prior to this release will enable the x86_64 architecture by default. Existing users for other architectures will be supplied with new licenses that will enable their architectures.

If there is any problem contact Forge Support.

3.6.1 Use multiple architecture licenses

If you are using multiple license files to specify multiple architectures, we recommend that you follow these steps.

Procedure

1. Ensure that the default licenses directory is empty.
2. Create a directory for each architecture.
3. To target a specific architecture, set `FORGE_LICENSE_DIR` to the relevant directory. Alternatively, set `FORGE_LICENSE_FILE` to specify the license file.

Multiple architectures example

On a site that targets two architectures, x86_64 and AArch64, create a directory for each architecture, and name them `licenses_x86_64` and `licenses_aarch64`. Then, to target the architectures, set the license directories as follows:

To target AArch64:

```
export FORGE_LICENSE_DIR=/path/to/licenses/licenses_aarch64
```

To target x86_64:

```
export FORGE_LICENSE_DIR=/path/to/licenses/licenses_x86_64
```

3.7 Access Linaro Forge Licence Server behind a firewall

In some scenarios, Linaro Forge Licence Server might be located behind a firewall. This is the case if you are accessing a license server hosted by Linaro. You might also be debugging a system that is not on the same network as the license server. In this case, you can use SSH forwarding to access the license server that is behind the firewall.

A local client license file is created or modified to specify `localhost` as the hostname parameter:

```
type=2
serial_number=1014
hostname=localhost
serverport=4252
```

Communication is then forwarded over the secure SSH connection to Linaro Forge Licence Server, which listens on port 4252.

This is an example of the command to use for setting up the SSH forwarding:

```
ssh -C -L 4252:server.physics.acme.edu:4242 login.physics.acme.edu
```

The `-C` switch is optional, and enables compression for communication over slow links.

3.8 Query status

Linaro Forge Licence Server provides a simple HTML interface to allow for querying of the current state of the licenses being served. This can be accessed in a web browser at the following URL:

```
http://<hostname>:<serverport>/status.html
```

For example, using the values described in *Licensing example*, the URL would be:

```
http://server.physics.acme.edu:4252/status.html
```

Initially, no licenses are being served, and the output in your browser window would be similar to the following:

```
[Licences start]
   [Licence Serial Number: 1014]
   [No licences allocated - 2 available]
[Licences end]
```

You can see that two licenses are available in this example.

As licenses are served and released, the information displayed will change. To update the status display, simply refresh your web browser window. For example, after one Linaro product is started, the output is updated:

```
[Licences start]
  [Licence Serial Number: 1014]
    [1 licences available]
      [Client 1]
        [mac=00:04:23:99:79:65; uname=gwh; pid=14007; licence=1014]
        [Latest heartbeat: 2004-04-13 11:59:15]
[Licences end]
```

Then, after another Linaro product is started and the web browser window is refreshed (notice the value for number of licences available), the output is updated:

```
[Licences start]
  [Licence Serial Number: 1014]
    [0 licences available]
      [Client 1]
        [mac=00:04:23:99:79:65; uname=gwh; pid=14007; licence=1014]
        [Latest heartbeat: 2004-04-13 12:04:15]
      [Client 2]
        [mac=00:40:F4:6C:4A:71; uname=graham; pid=3700; licence=1014]
        [Latest heartbeat: 2004-04-13 12:04:59]
[Licences end]
```

Finally, after the first Linaro product finishes:

```
[Licences start]
  [Licence Serial Number: 1014]
    [1 licences available]
      [Client 1]
        [mac=00:40:F4:6C:4A:71; uname=graham; pid=3700; licence=1014]
        [Latest heartbeat: 2004-04-13 12:07:59]
[Licences end]
```

Caution: If you do not want this page to be widely accessible, Linaro recommends authenticating it using a third-party proxy. You can also disable it, before starting the server, by setting the environment variable `FORGE_SILENT_LICENCESERVER=1`.

3.9 Handle lost clients

If Linaro Forge Licence Server loses communication with an instance of a client, the license allocated to that client is made unavailable for new clients until a timeout period has expired. The length of this timeout period can be calculated from the license server file values for `beat` and `retry_limit`:

```
lost_client_timeout_period = (beat seconds) * (retry_limit + 1)
```

For the example license files above, the timeout period would be:

```
60 * (4 + 1) = 300 seconds
```

During this timeout period, details of the 'lost' client continue to be output by the status display. As long as additional licenses are available, new clients can be started. However, once all of these additional licenses have been allocated, new clients are refused a license while this timeout period is active.

After this timeout period has expired, the status continues to display details of the 'lost' client until another client is started. Linaro Forge Licence Server grants a license to the new client and the status display then reflects the details of the new client.

3.10 Troubleshoot Licenses

Licenses are plain-text which enables you to see the parameters that are set. A checksum verifies the validity of the license.

If problems arise, the first step is to ensure that the parameters specified in the license file are consistent with the machine that is being used (MAC address and IP address), and that the number of users is as expected.

A port which is already used can not be used by Linaro Forge Licence Server. Ensure that you have specified an unused port.

Only privileged users can use ports below 1024, so you should use port 1024 or higher. You should not launch Linaro Forge Licence Server as root due to security issues.

CHAPTER

FOUR

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Product status

The information in this document is Final, that is for a developed product.

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https://www.linaro.org/
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