

Upgrade Load Generator on Linux

If you have a previous version of the Linux Load Generator installed and you want to upgrade to version 12.01, run the Load Generator Setup Wizard. The setup wizard will first uninstall the previous version of the Load Generator, and will then install version 12.01. For details on how to run the setup wizard, see ["Install Load Generator on Linux" below](#).

Install Load Generator on Linux

This section describes how to use the Load Generator Setup Wizard to install the HP Load Generator on a Linux platform.

For details on how to perform a silent installation, see ["Install Silently" on the next page](#).

Note: During installation, you can optionally install CA and SSL certificates for the Load Generator. These certificates are used for authentication and secure communication respectively. Both certificates should be in *.cer (X.509) format.

- For a CA certificate: You can enter the path to an existing certificate, or leave the path blank to skip the step. If you want to install the CA certificate, it should be generated in advance.
- For an SSL certificate: You can select it from an existing certificate file. Alternatively, it can be generated automatically if you provide the CA certificate containing the private key.

For details on generating a CA certificate, see "How to Create and Use Digital Certificates" in the *HP LoadRunner User Guide*.

For more information on working with certificates in LoadRunner, see the "Authentication Settings" documentation in the *HP LoadRunner User Guide*.

To run the Load Generator Setup Wizard:

1. Change directory to `<installation root directory>/InstData/Linux/VM`.

Note: There are two versions of the Load Generator Setup Wizard, a 32-bit version and a 64-bit version.

- The 64-bit version checks that the required pre-requisite software is installed on the computer. If any pre-requisite software is missing, a message is displayed, and the setup wizard will abort. Install the required package and then re-run the setup wizard.
- The 32-bit version of the setup wizard does not check that the pre-requisite software is installed.

Make sure that you select the correct `<installation root directory>` version for your Linux installation.

2. [sh and bash shells] Launch the setup wizard by typing: `source ./installer.sh`.

[csh and tcsh shells] Launch the setup wizard by typing: `source ./installer.csh`.

Note: It is recommended that you use the **source** command to run the setup wizard, as shown above. If you run the setup wizard without using the **source** command, you must set the environment variables for the current shell session. For details, see ["Set the Environment Variables" on the next page](#).

Follow the online instructions to install the HP Load Generator.

Note: If you encounter an error during the installation, see ["Troubleshoot the Load Generator Linux Installation" on page 28](#) for a possible solution.

3. Configure your environment.

After you install the Load Generator, configure your environment as described in ["Configure the Linux Environment" on the next page](#).

Install Silently

To perform a silent installation of the HP Load Generator, follow the procedure below:

1. Change the current directory to the installer directory:

```
cd <path_to_installer_cd>/InstData/Linux/VM
```

2. Run the following command to silent-install the Load Generator:

```
source ./installer.sh -i silent
```

Note: It is recommended that you use the **source** command to perform the silent installation, as shown above. If you perform the installation without using the **source** command, you must set up the environmental variables after installing the Load Generator. For details, see ["Set the Environment Variables" on the next page](#).

If you encounter an error during the installation, see ["Troubleshoot the Load Generator Linux Installation" on page 28](#) for a possible solution.

By default, the Load Generator will be launched at the end of the installation. If you do not want to automatically launch the Load Generator, run the **source** command using the following command-line option:

```
source ./installer.sh -i silent -DSTART_PRODUCT_AFTER_INSTALL=No
```

Configure the Linux Environment

This section describes the configuration steps you need to complete after installing the Load Generator, before you can begin working with the Load Generator.

To complete the setup process after installing the Load Generator:

1. Set the appropriate environment variables.

See ["Set the Environment Variables" below](#).

Note: If you used the **source** command to install the Load Generator, the setup wizard automatically sets the appropriate environment variables - and there is therefore no need to perform this step.

2. Verify the Load Generator installation.

See ["Verify the Linux Installation" on the next page](#).

3. Check that the Controller can access the Load Generator.

See ["Check the Controller Connection" on page 24](#).

Set the Environment Variables

Note: This topic is applicable only if you ran the Load Generator Setup Wizard without using the **source** command. If you used the **source** command, there is no need to perform any of the procedures described below.

To enable the Load Generator to run, the following environment variables must be defined:

- **M_LROOT.** The location of the Linux Load Generator installation directory.
- **PATH.** The location of the Linux Load Generator **bin** directory.
- **PRODUCT_DIR.** The location of the Linux Load Generator installation directory.

The Load Generator Setup Wizard performs the following tasks relating to the environment variables:

- Adds the environment variable definitions to the system-wide startup scripts.

If the variable definitions were not correctly set during the setup, see ["Troubleshoot the Load Generator Linux Installation" on page 28](#) for possible solutions.

- Sets environment variables for the current shell session if the **source** command was used to run the setup wizard.

This topic describes how to set the environment variables for the current shell session if the **source** command was not used to run the setup wizard.

To determine if environment variables are set, run **verify_generator** (see ["Run verify_generator" on the next page](#)) or use the following command:

```
echo $M_LROOT
```

If the name of the Load Generator installation folder is returned, then the environment variables are correctly set for current shell. If the name of the Load Generator installation folder is not returned, then manually set the variables as described below.

To manually set the environment variables for the current shell session (if the **source** command was not used to run the setup wizard) , execute one of the following commands:

- Bash users:

```
source <Load Generator installation directory>/env.sh
```

- C Shell users:

```
source <Load Generator installation directory>/env.csh
```

Verify the Linux Installation

The Load Generator installation includes a setup verification utility, **verify_generator**, that checks the Load Generator setup on your Linux machine. The verification utility checks environment variables and your startup scripts (`/etc/csh.cshrc`, `${HOME}/.cshrc` or `/etc/profile`, `${HOME}/.profile`) to verify that they are set up correctly.

It is strongly recommended that you run the **verify_generator** utility after installing the HP Load Generator, before attempting to invoke the Load Generator. For details on how to run the **verify_generator** utility, see ["Run verify_generator" on the next page](#).

The **verify_generator** utility checks the following:

- All the prerequisite software is installed. (This check is performed for 64-bit installations only.)
- There are at least 128 file descriptors
- The `.rhosts` permissions have been defined properly: `-rw-r--r--`
- The host can be contacted by using `rsh` to the host. If not, it checks for the host name in `.rhosts`
- **M_LROOT** is defined
- `.cshrc` or `.profile` defines the correct **M_LROOT**
- `/etc/csh.cshrc`, `${HOME}/.cshrc` or `/etc/profile`, `${HOME}/.profile` defines the correct **M_LROOT**
- `.cshrc` or `.profile` exists in the home directory
- The current user is the owner of the `.cshrc` or `.profile`
- A Linux Load Generator installation exists in **\$M_LROOT**
- The executables have executable permissions
- `PATH` contains **\$M_LROOT/bin** and `/usr/bin`
- The `rstatd` daemon exists and is running

Run `verify_generator`

It is recommended that you run the `verify_generator` utility after installing the HP Load Generator, before attempting to invoke the Load Generator. For details on what is checked by the `verify_generator` utility, see ["Verify the Linux Installation" on the previous page](#).

Note: To run this command, you must be a "normal" user and not root user.

Before you run the `verify_generator` utility, make sure that you have set the `DISPLAY` environment variable on your machine.

To run `verify_generator`:

1. From the **<Load Generator installation directory>/bin** folder, run the following command:

```
./verify_generator
```

For example:

```
/opt/HP/HP_LoadGenerator/bin/verify_generator
```

If you want to receive detailed information about the checks, you can use the `-v` option, as follows:

```
./verify_generator -v
```

2. View the results.
 - If the settings are correct, **verify_generator** returns **OK**.
 - If any of the settings are incorrect, **verify_generator** returns **Failed**, and suggestions on how to correct the setup.

Check the Controller Connection

If the LoadRunner Controller will connect remotely to the Load Generator using **rsh** (remote shell), you need to make sure that the Load Generator can be remotely accessed by the Controller.

1. On the Load Generator machine, locate the **.rhosts** file which is located in the user home directory.
2. In the **.rhosts** file, verify that the Controller is included in the list of machines. If it is not listed, add it to the list.

If the Controller still cannot connect to the Load Generator, contact your system administrator.

Connecting to a Linux Load Generator Without Using rsh

You can configure the Controller to connect to the Load Generator without using **rsh**. In this case, you need to activate the agent daemon on the Load Generator, as described below.

This section describes how to connect to a Linux Load Generator without using **rsh**.

1. On the Linux Load Generator, run the agent daemon by entering the following command from **<Load Generator installation directory>/bin**:

```
./m_daemon_setup -install
```

This runs a daemon called **m_agent_daemon**, and if successful, you receive a message: **m_agent_daemon <process ID>**.

The agent now keeps running, even if the user is logged off. You can stop the agent by using the command explained in step 9 below, or by rebooting the machine.

Note: If you look at the **m_agent_daemon[xxx].log** log file in the temp directory, you may

see communication errors, even if the installation succeeded.

2. In the Controller, select **Scenario > Load Generators**. The Load Generators dialog box opens.
3. Click **Add**. The Load Generators dialog box opens.
4. In the **Name** box, enter the name of the computer on which the Load Generator is running.
5. From the **Platform** list, select **Linux**.
6. Click **More**.
7. Click the **Linux Environment** tab, and make sure that the **Don't use RSH** check box is selected.
8. Connect as usual.
9. To stop the agent daemon, run the following command from the **<LR_root>/bin** directory:

```
./m_daemon_setup -remove
```

This stops the **m_agent_daemon** daemon, and if successful, you receive the message: **m_agent_daemon is down**.

Improve Load Generator Performance

This section includes recommendations for improving Load Generator performance. You can increase the number of file descriptors, process entries, and amount of swap space by configuring the kernel.

Note: Most operating systems using the Linux Load Generator have sufficient default file descriptors, process entries, and swap space, and rarely require reconfiguration.

This section includes:

Increase File Descriptors	25
Increase Process Entries	27
Increase Swap Space	27

Increase File Descriptors

A Load Generator uses the following File Descriptor resources:

- 14 file descriptors for the launch service
- 20 file descriptors for the agent
- 30 file descriptors for each Vuser driver. By default, there is a driver for every 50 Vusers.
- File descriptors for the running Vusers. Each Vuser requires two descriptors.

For example, to compute the number of file descriptors used in running 100 threaded Vusers, the Load Generator requires:

Descriptors	Purpose of the descriptors
14	For the launcher
20	For the agent
60	For 2 drivers (30 x 2, each one drives 50 Vusers)
200	For 100 Vusers (each Vuser requires 2)

Total: 294 File Descriptors

If Vusers are run as processes instead of threads, one driver is run per Vuser. Therefore, each Vuser requires 30 file descriptors.

The procedure to increase the number of file descriptors differs between shells.

In the examples below, the number of descriptors is increased to the maximum of 1024.

- For sh and ksh users, type:

```
ulimit -n 1024
```

- For csh users, type:

```
limit descriptors 1024
```

Below is an alternate procedure to increase file descriptors. In this example, the number of descriptors is increased to the maximum of 8192.

1. Add the following line to the **/etc/security/limits.conf** file:

```
hard nfile 8192
```

2. Add the following line to the **/etc/sysctl.conf** file:

```
fs.file-max = 8192
```

3. Reboot the machine.

Increase Process Entries

Each Vuser requires several free process entries. To increase the number of process entries on your system, you must reconfigure the kernel.

This section describes how to reconfigure the kernel for Linux platforms.

1. Locate the `/etc/security/limits.conf` file.
2. Set the maximum number of processes in the limits file. Type:

```
hard nproc 8192
```

3. Reboot the machine.

Increase Swap Space

Each Vuser requires swap space ranging in size from 200 KB to 4 MB. Before adding space to your system configuration, you should determine your paging requirements. For environments running programs with very large memory requirements, it is recommended to have paging space of four times the physical memory. If you do not have enough paging space, certain processes may be killed, and others will be unable to start.

Uninstall the HP Load Generator

You can use the Load Generator Setup Wizard to uninstall the HP Load Generator, as described below. Note that the last step in the procedure enables you to perform either a regular uninstall or a silent uninstall.

To uninstall the HP Load Generator:

1. Make sure that you are logged in as the same user who installed the HP Load Generator.
2. Change the current directory to the installation directory:

```
cd <path_to_installation_folder>/_HP_LoadGenerator_Installation
```

3. Run the following command, and then follow the instructions in the wizard to uninstall the HP Load Generator:

```
sh ./Change_HP_LoadGenerator_Installation
```

To perform a silent uninstall, run the following command:

```
sh ./Change_HP_LoadGenerator_Installation -i silent
```

Troubleshoot the Load Generator Linux Installation

This section describes troubleshooting tasks relating to the setup of the Linux Load Generator.

This section includes:

- ["Environment variables were not set correctly in the system-wide startup scripts" below](#)
- ["Error when installing the Load Generator on a Linux platform" on page 31](#)
- ["Environment variables are not unset after uninstalling the Load Generator" on page 31](#)
- ["Unable to run Vusers on the Load Generator" on page 32](#)

Environment variables were not set correctly in the system-wide startup scripts

To enable the Load Generator to run, the system-wide startup scripts must be modified to set specific environment variables. The required modifications to the startup scripts are made by the Load Generator Setup Wizard. If the startup scripts were not correctly modified during the setup of the Load Generator, you can manually make the required changes to the startup scripts as described below. The required changes differ slightly between C shell users, and Bourne and Korn shell users.

- **Manually modifying the startup scripts for C shell users**

During the Load Generator installation process, the setup wizard creates the **env.csh** script. This script includes the commands to set the required environment variables for C shell users. A sample **env.csh** script is shown below.

```
setenv PRODUCT_DIR <Load Generator installation directory>
setenv M_LROOT ${PRODUCT_DIR}
if ( ! $?PATH ) then
    setenv PATH ""
```

```
endif  
setenv PATH ${M_LROOT}/bin:${PATH}"
```

Add the following line to the **/etc/csh.cshrc** or **~/.cshrc** startup script to execute the **env.csh** script during the shell startup:

```
source <Load Generator installation directory>/env.csh
```

For example:

```
source /opt/HP/HP_LoadGenerator/env.csh
```

The effect of making the above modification to the startup script is similar to the modifications that are made by the setup wizard. A sample of the modifications that the setup wizard makes to the **/etc/csh.cshrc** startup script is shown below:

```
# New environment setting added by HP_LoadGenerator on Wed Jan 30 16:20:10  
IST 2013 2.  
  
# The unmodified version of this file is saved in /etc/.login1557000131.  
# Do NOT modify these lines; they are used to uninstall.  
setenv PRODUCT_DIR "/opt/HP/HP_LoadGenerator"  
  
# End comments by InstallAnywhere on Wed Jan 30 16:20:10 IST 2013 2.  
  
# New environment setting added by HP_LoadGenerator on Wed Jan 30 16:20:10  
IST 2013 5.  
  
# The unmodified version of this file is saved in /etc/.login1557000131.  
# Do NOT modify these lines; they are used to uninstall.  
setenv M_LROOT "/opt/HP/HP_LoadGenerator"  
  
# End comments by InstallAnywhere on Wed Jan 30 16:20:10 IST 2013 5.  
  
# New environment setting added by HP_LoadGenerator on Wed Jan 30 16:20:10  
IST 2013 8.  
  
# The unmodified version of this file is saved in /etc/.login1557000131.  
# Do NOT modify these lines; they are used to uninstall.  
if ( ! $?PATH ) then  
setenv PATH ""  
endif
```

```
setenv PATH "/opt/HP/HP_LoadGenerator/bin:${PATH}"  
# End comments by InstallAnywhere on Wed Jan 30 16:20:10 IST 2013 8.
```

- **Manually modifying the startup scripts for Bourne and Korn shell users**

During the Load Generator installation, the setup wizard creates the **env.sh** script. This script includes commands to set the required environment variables for Bourne shell and Korn shell users.

Add the following line to the **/etc/profile** or **~/.profile** startup script to execute the **env.sh** script during the shell startup:

```
source <Load Generator installation directory>/env.sh
```

For example:

```
source /opt/HP/HP_LoadGenerator/env.sh
```

The effect of making the above modification to the startup script is similar to the modifications that are made by the setup wizard. A sample of the modifications that the setup wizard makes to the **/etc/profile** startup script is shown below:

```
# New environment setting added by HP_LoadGenerator on Fri Jan 18 11:14:24  
IST 2013 1.  
# The unmodified version of this file is saved in /etc/profile1806316421.  
# Do NOT modify these lines; they are used to uninstall.  
PRODUCT_DIR=/opt/HP/HP_LoadGenerator  
export PRODUCT_DIR  
# End comments by InstallAnywhere on Fri Jan 18 11:14:24 IST 2013 1.  
# New environment setting added by HP_LoadGenerator on Fri Jan 18 11:14:24  
IST 2013 4.  
# The unmodified version of this file is saved in /etc/profile1806316421.  
# Do NOT modify these lines; they are used to uninstall.  
M_LROOT=/opt/HP/HP_LoadGenerator  
export M_LROOT  
# End comments by InstallAnywhere on Fri Jan 18 11:14:24 IST 2013 4.
```

```
# New environment setting added by HP_LoadGenerator on Fri Jan 18 11:14:24
IST 2013 7.

# The unmodified version of this file is saved in /etc/profile1806316421.

# Do NOT modify these lines; they are used to uninstall.

PATH="/opt/HP/HP_LoadGenerator/bin:${PATH}"

export PATH

# End comments by InstallAnywhere on Fri Jan 18 11:14:24 IST 2013 7.
LoadRunner settings #PATH=${M_LROOT}/bin:$PATH; export PATH
```

Error when installing the Load Generator on a Linux platform

When you use the **source installer.sh** command to install the Load Generator version 12.02 on a Linux machine on which the Load Generator version 12.02 was previously installed, you may receive the following error message:

"An error occurred while trying to manage the selected instance."

Solution:

1. Open the registry file `/var/.com.zerog.registry.xml` and locate the element **"product"** with attribute **"name"="HP_LoadGenerator"**.

For example: `<product name="HP_LoadGenerator" id="77f695c1-1f0c-11b2-883d-c486a85f6555" version="11.52.0.0" copyright="2012" info_url="http://www.hp.com" support_url="http://www.hp.com" location="/opt/HP/HP_LoadGenerator" last_modified="2013-01-21 13:12:14">`

2. Record the value of the **"location"** attribute.
3. Remove the entire directory that is referred to by the **"location"** attribute.
4. Delete the registry file `/var/.com.zerog.registry.xml`.
5. Rerun the **source installer.sh** command.

Environment variables are not unset after uninstalling the Load Generator

When you uninstalled the Linux Load Generator, the setup wizard might not have unset the Load Generator environment variables (`M_LROOT`, `PRODUCT_DIR`, and `PATH`) for the current shell. To unset the environment variables, close the current shell session and invoke a new one, or manually unset the variables as described below:

- To unset the M_LROOT and PRODUCT_DIR variables:
 - [bash shells] Use the **unset** command.
 - [csh shells] Use the **unsetenv** command.
- To update the PATH variable to exclude the Load Generator binary directory, type:
 - [bash shells] PATH=<required list of paths>; export PATH
 - [csh shells] setenv PATH <required list of paths>

Unable to run Vusers on the Load Generator

If you are unable to run Vusers on the Load Generator, no specific error is reported, and the Vuser protocol requires a third-party application or client to be present on Load Generator side, check the dynamic libraries used by the application. This will enable you to establish if any shared objects cannot be found. A shared object that cannot be found may indicate either a missing prerequisite package or an environment variable issue.

To check the dynamic libraries used by an application, type:

```
ldd application_name
```

For example, type `ldd mdrv` to determine if all the dependencies of the **mdrv** executable can be found. If any dependencies are not found, run **verify_generator** as described in ["Run verify_generator" on page 23](#).

Note: If you are running Vusers for a protocol that requires a client installation (for example, Oracle), make sure that the path for the client libraries is included in the dynamic library path environment variable (LD_LIBRARY_PATH or SHLIB_PATH).

Chapter 4: Manage Licenses

LoadRunner is delivered with a Community Bundle license (this replaces the Instant-on license). The Community Bundle provides the following features:

- A permanent bundle with that lets you run 50 Vusers.
- All protocols are included except for GUI (UFT), COM/DCOM and protocols in the template bundle such as C and Java Vusers.

To run additional Vusers from the LoadRunner Controller, you need the appropriate LoadRunner licenses. These licenses must be available on the computer on which the LoadRunner Controller is installed.

You use the LoadRunner License Utility to manage your LoadRunner licenses. The LoadRunner License Utility enables you to:

- View the details of licenses that are currently installed
- Install additional licenses

This chapter includes:

Install New Licenses	33
View License Information	34
Troubleshoot Licenses	37

Install New Licenses

After you receive your license information from your HP representative, you can use the HP LoadRunner License Utility to enter the license information.

You install a new license using either the license key or the license file provided by HP.

- **License key.** A license key enables you to install just a single license at a time. You may receive the license key directly from HP, or the license key may be included in a license file that you receive from HP.
- **License file.** A license file contains the license keys for one or more licenses. When you use a license file to install the new licenses, the LoadRunner License Utility reads the license file and extracts all the license keys that are included in the license file. You can then select which of the available licenses to install. You may choose to use a license file to install LoadRunner licenses because the license file enables you to install multiple licenses simultaneously.

To install a new LoadRunner license:

1. **Open the LoadRunner License Utility.**
 - a. In legacy Windows operating systems, click **Start > All Programs > HP Software > HP LoadRunner > License > LoadRunner License Utility**.

or

In icon-based desktops such as Windows 8, search for **License** and select the **LoadRunner License Utility** item.
The HP LoadRunner License Utility opens.
 - b. In the LoadRunner License Utility, click **Install New Licenses**. The LoadRunner License Utility - New License dialog box opens.
2. **To install using a license file:**
 - a. Click the **Browse** button to the right of **License file**, and locate the license file that was sent to you by HP.
 - b. Click **View License File Content** to display details of the licenses that are included in the license file.
 - c. In the list of licenses included in the license file, select the licenses to install.
3. **To install using a license key:**
 - a. Click **Install a license using a license key**.
 - b. Enter the license key that you received from HP.
4. **Complete the installation.**
 - a. Click **Install**. The selected licenses are installed.
 - b. Click **Close**. In the License Summary table, make sure that the new licenses appear in the list of installed licenses.

View License Information

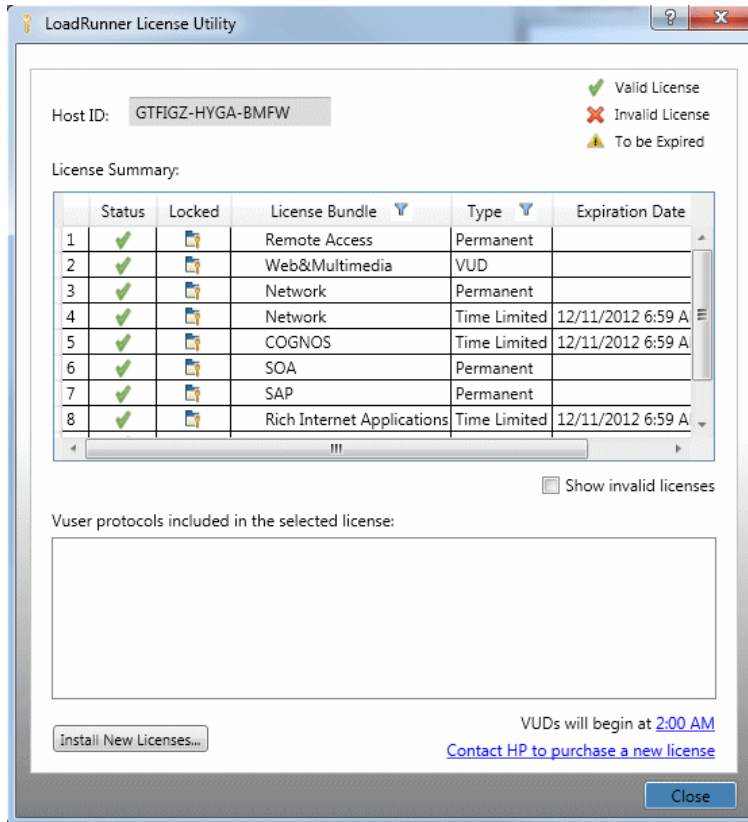
You can use the HP LoadRunner License Utility to view your license information.

The **Community** license provides 50 permanent Vusers at no cost. These Vusers are valid for all protocols except for GUI (UFT), COM/DCOM, and template protocols.

To view your license information:

In legacy Windows operating systems, click **Start > All Programs > HP Software > HP LoadRunner > License > LoadRunner License Utility**.

In icon-based desktops such as Windows 8, search for **License** and select the **LoadRunner License Utility** item. The HP LoadRunner License Utility opens.



The HP LoadRunner License Utility displays the following information:

- **Host ID.** Identifies the computer on which the Controller is installed. You may need to provide the Host ID when purchasing new LoadRunner licenses. To obtain new LoadRunner licenses, click the [Contact HP to purchase a new license](#) link at the bottom of the LoadRunner License Utility.
- **License Summary.** Displays a list of the LoadRunner licenses that are installed on the Controller computer. Click on any license in the table to display additional details about the license. The User protocols included in the selected license box displays a list of the User protocols that are included in the selected license.
- **Status.** Indicates the status of the license.
 - **Valid.** Indicates that the license is current and functional.
 - **Invalid.** Indicates that the license is no longer valid. An Evaluation license becomes invalid if a Time limited, Permanent, or VUD license is installed for the same Vuser bundle. A VUD license becomes invalid when the remaining capacity is zero. By default, the License Summary table does not show invalid licenses. Select the **Include invalid licenses** check box to show invalid licenses. Note that a license may become temporarily invalid if the LoadRunner License Utility detects that the system clock has been tampered with. To restore

the affected licenses, reset the system clock to the current time.

- **To be Expired.** Indicates that the license will expire within 30 days.
- **Locked.**
 - **Locked.** Indicates that the license can be installed only on the computer on which it is currently installed – not on any other computer.
 - **Unlocked.** Indicates that the license can be installed on any computer.
- **License Bundle.** Indicates the name of the Vuser protocol bundle to which the license applies. The license enables the Controller to run Vusers of any protocol that is included in the protocol bundle. To display a list of the Vuser protocols that are included in a bundle, click the license in the License Summary table. A list of the associated Vuser protocols is displayed at the bottom of the LoadRunner License Utility.

Note that a Partner License icon that appears to the left of a license bundle indicates that the license is for a LoadRunner partner, and not for standard LoadRunner Vuser protocols. Partner licenses enable third-party applications to be controlled by the LoadRunner Controller. Partner licenses operate the same as standard LoadRunner licenses.

- **Type.** Indicates the type of license:
 - **Freemium** licenses are installed when LoadRunner is first installed.
 - **Evaluation** licenses are supplied to enable potential customers to evaluate LoadRunner functionality.
 - **Time limited** licenses are valid for a limited period only. Time limited licenses are typically issued for 60 or 365 days.
 - **Permanent** licenses do not expire - there is no time limit to the validity of these licenses.
 - **VUD** licenses are issued with a limited capacity. The capacity is defined by the measurement Vuser-days or VUDs. For example, the capacity of a VUD license may be 1000 VUDs. Each day that the Controller is used to run Vusers, the maximum number of Vusers that ran simultaneously on that day is deducted from the remaining license capacity. If a maximum of 200 Vusers ran on day 1, then 800 VUDs remain in the license.

For example, assume that you purchase a license for 100 VUDs, and then run 3 different scenarios within the same 24 hour period, with 20 Vusers in each scenario. At the end of that period, only 20 VUDs (and not 60) are deducted from your total number of available VUDs, leaving you with 80 remaining VUDs which can be used at any time in the future.

- **Expiration Date.** Indicates the date and time when **Time limited**, and **Evaluation** licenses expire.
- **Capacity.** Indicates the capacity of the selected license:

- For **Evaluation, Time Limited, and Permanent licenses**, **Capacity** indicates the maximum number of Vusers [of the type specified by the license bundle] that can be run simultaneously from the LoadRunner Controller.
- For VUD licenses, **Capacity** indicates the number of VUDs that remain in the license.
- **Show invalid licenses.** Select this check box to show invalid licenses in the list of LoadRunner licenses that are installed.
- **Vuser protocols included in the selected license.** Displays the Vuser protocols that are included in the selected license.
- **Install New Licenses.** Opens the New License dialog box which enables you to install new LoadRunner licenses.

Troubleshoot Licenses

If you have a temporary license, contact HP Customer Support to obtain a permanent license.

If LoadRunner does not accept your license key, perform the following checks:

- Make sure you typed in the license key exactly as it was given to you. The license key must include the required spaces. The license key is case sensitive.
- If you receive a permission denied error message during Controller startup, you must grant Full Control permission for the Registry's HKEY_LOCAL_MACHINE key as described below.

To add registry permissions:

1. Run **regedit** to modify the registry.
2. Select the HKEY_LOCAL_MACHINE key.
3. Select **Security > Permissions**.
4. Add **Full Control** permission to the user that is running the Controller.
5. Click **OK**.