Best practices on deployment of IBM Rational License key server(RLKS) on Linux and Unix servers

Pankaj Sharma and Sombir Yadav

October 21, 2015

Introduction

IBM Rational License key server (RLKS) is a centralized application to serve and manage Floating and Token type of license keys. It is based on client/server architecture and uses TCP/IP protocol.

Rational License key server 8.1.4 is the latest released version that is more stable, secure and compatible with IBM Rational Administration and Reporting (ART) tool which provide new capabilities like different types of license usage reports.

This white paper provides insight on directory structure , scripts, license server as a service, best practices for enhancing the performance, frequently asked questions (FAQs) about License server and troubleshooting solution to common licensing issues on Unix and Linux platform.

The information covered in this white paper is helpful for Licensing administrators, system administrators, software asset managers who might be involved in the process of deployment of IBM Rational products licenses and License server in their organization.

TECHNICAL SUMMARY of Rational License Key server 8.1.4

From RLKS 8.1.x(8.1.1) onwards, two processes are used to manage licenses:

- lmgrd, the license manager process
- ibmratl, the Vendor process

lmgrd v11.10.0.3

ibmratl v11.10.0.3

IBM Rational License key server 8.1.4
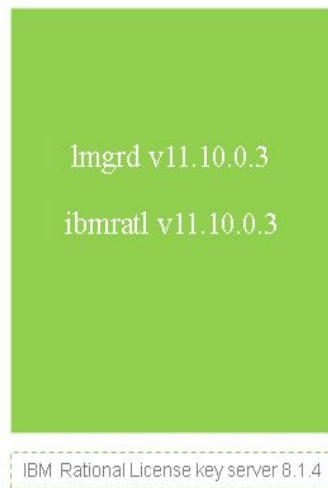
The lmgrd process handles the initial communication with IBM Rational products (clients) and it further passes the connection to appropriate Vendor daemon (ibmratl). The lmgrd daemon starts and restarts Vendor daemon process. The lmgrd daemon starts on port 27000 by default and listen all license request on this port when you start the server.

System requirements for RLKS 8.1.4

REDHAT

Operating system	Hardware	Bitness	Server	Operating system minimum	Product minimum	Notes?
Red Hat Enterprise Linux (RHEL) 5 Advanced Platform	x86-32	32	◒	Base	8.1.4	No
Red Hat Enterprise Linux (RHEL) 5 Advanced Platform	x86-64	64-Exploit, 64-Tolerate	●	Base	8.1.4	No
Red Hat Enterprise Linux (RHEL) 5 Server	POWER System - Big Endian	64-Exploit, 64-Tolerate	●	Base	8.1.4	No
Red Hat Enterprise Linux (RHEL) Server 6	POWER System - Big Endian	64-Exploit, 64-Tolerate	●	Base	8.1.4	No
Red Hat Enterprise Linux (RHEL) Server 6	x86-32	32	◒	Base	8.1.4	No
Red Hat Enterprise Linux (RHEL) Server 6	x86-64	64-Exploit, 64-Tolerate	●	Base	8.1.4	No
Red Hat Enterprise Linux (RHEL) Server 7	x86-64	64-Tolerate	◒	Base	8.1.4	No

AIX

Operating system	Hardware	Bitness	Server	Operating system minimum	Product minimum	Notes?
AIX 6.1	POWER System - Big Endian	64-Exploit, 64-Tolerate	●	Base	8.1.4	No
AIX 7.1	POWER System - Big Endian	64-Exploit, 64-Tolerate	●	Base	8.1.4	No

SOLARIS

Operating system	Hardware	Bitness	Server	Operating system minimum	Product minimum	Notes?
Solaris 10	SPARC	64-Exploit, 64-Tolerate	●	Base	8.1.4	No
Solaris 10	x86-32	32	◒	Base	8.1.4	No
Solaris 10	x86-64	64-Tolerate	◒	Base	8.1.4	No

HP-UX

"Rational Support Whitepaper"

Operating system	Hardware	Bitness	Server	Operating system minimum	Product minimum	Notes?
HP-UX 11i v2	IA64	64-Tolerate	◓	Base	8.1.4	No
HP-UX 11i v3	IA64	64-Tolerate	◓	Base	8.1.4	No
HP-UX 11i v2	PA-RISC	64-Tolerate	◓	Base	8.1.4	Yes
HP-UX 11i v3	PA-RISC	64-Tolerate	◓	Base	8.1.4	Yes

Installation of IBM Rational License key Server on Linux

1. Extract Rational License Key Server Version 8.1.4 zip file in an appropriate directory.

unzip RLKS_8.1.4_FOR_LINUX_X86_ML.zip

2. Go to the disk1 directory.

3. Run launchpad.sh. The IBM® Rational License Key Server window opens.

4. Click "IBM Rational License Key Server" *version* to open the Installation Manager interface if Installation Manager is not yet installed.

5. Select Installation Manager and Rational License Key Server and then click Next. The installation of Rational License Key Server requires Installation Manager to be installed.

6. After the prerequisites are validated, click Next.

7. Accept the license agreement and then click Next.

8. For both the Shared Resources directory and Installation Manager directory locations, either accept the default value or enter a different directory location and then click Next.

9. Accept the default installation directory for the license server or enter a different installation directory. The default installation directory is /opt/IBM/RationalRLKS

10. Select more languages to install, and then click Next.

11. Review the features to install; then click Next.

12. Click Install and then click Finish.

Configuration of license file on Linux License server

Licenses of all IBM Rational products reside on IBM Rational License key center website. Once you login to this website, you will find licenses of all the products purchased by your company under one or more accounts. Once you finish the license generation and download the license file, you will have to import this license file on License server system.

Importing license file on License server

o   Go to the directory where you have copied the license file that you have downloaded from "Rational License key center" website

o   Copy the content of license file in to **server_license.lic** file in RLKS_installation_Dir/config directory

For example:-

cp /root/lic.dat /opt/IBM/RationalRLKS/config/server_license.lic

o   Start the Rational License Key Server service

./lmgrd -c /opt/IBM/RationalRLKS/config/server_license.lic

Upgrading from Rational License server v8.1.2 or lower to RLKS 8.1.4

If you already have an existing instance of the license server v8.1.2 or lower and you want to upgrade to RLKS v8.1.4 , then follow below steps :

- o   Take a backup of the license file & log file
- o   Uninstall IBM Rational License key server 8.1.2 or lower
- o   Install Rational License Key Server 8.1.4 and import the license file.

IBM Rational License server directory structure on UNIX and Linux

In order to manage License server efficiently, you must understand its directory structure, important directories and files created after the installation of the application.

By default, installation happens in the /opt/IBM directory if you install as a root user.

The *RationalRLKS* directory has the following main subdirectories:

- o   bin – it stores license server binaries including lmgrd and ibmratl, and many other binaries.
- o   log – includes the license server debug log , named lmgrd.log by default
- o   config – stores license files with a .lic extension. Also stores ibmratl.opt Options file.
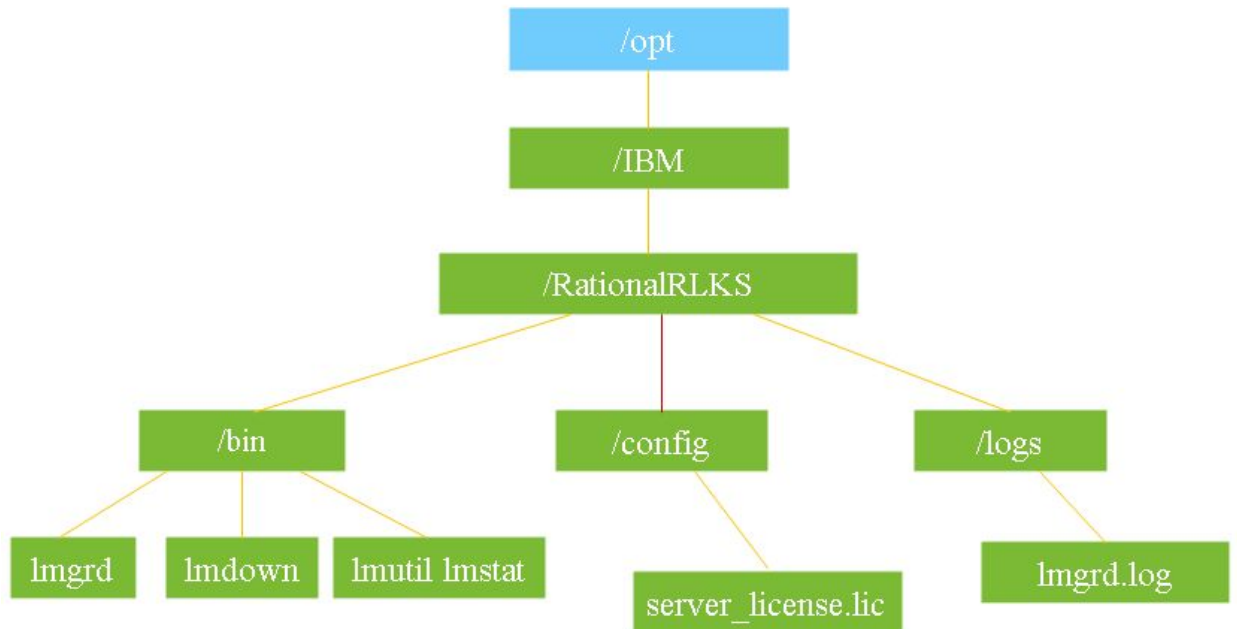
When you map the License server hierarchical directory structure more specifically the **/bin** directory, you will find many advanced scripts that you would have to use to manage License server application. Also directories like **/config** manifest and stores permanent and temporary licenses in different files to streamline and simplify the license usage.

Below tables explains the meaning and purpose of significant binaries and files in brief :

directory	binaries/File	Description
/bin	lmgrd	To start the License server
	lmdown	To shut down the License server
	lmutil lmstat	To check the license usage at any given point of time
/config	server_license.lic	license file
	ibmratl.opt	This file is being used for license access managment
/logs	lmgrd.log	License server log all license checkout/checkin info. in this log file

Tasks like starting or stopping the license server and checking the license usage at any point of time are most critical. It's likely that the license administrator will need to run these commands on a daily basis.

Below table list the command as we use practically on our unix and linux systems:-

Script/file	Description	Command
lmdown	**To start the License server**	**./lmutil lmdown -c port@hostname OR** **./lmutil lmdown -c <path of the license file>**
lmgrd	**To shut down the License server**	**./lmutil lmgrd -c port@hostname OR** **./lmutil lmgrd -c <path of the license file>**
lmutil lmstat	**To confirm that the license keys are served by the Rational License Key Server**	**./lmutil lmstat -a -c <path of the license file>**

Monitoring License server

License server(lmgrd) is a single threaded process. When a client sends a license request to License server, it first establishs the connection with lmgrd process which in turn call corresponding Vendor ibmratl to serve a license request. You can monitor the status of License server(lmgrd) process by running process command

ps –ef|grep lmgrd

```
[root@vEngine bin]# ps -ef|grep lmgrd
root      4734     1  0 13:33 pts/1    00:00:00 ./lmgrd -c /root/bharat.dat
root      4735  4734  0 13:33 ?        00:00:00 ibmratl -T vEngine.swg.usma.ibm.com 11.10 3 -c /root/bharat.dat
--lmgrd_start 5408a26d
root      6409  4660  0 14:09 pts/1    00:00:00 grep lmgrd
```

TCP/IP port 27000 is being used by default for the lmgrd process . You can run netstat command to verify the port number being used by license server.

netstat –anp | grep <port number>

```
[root@vEngine bin]# netstat -anp|grep 27004
tcp        0      0 127.0.0.1:55574              127.0.0.1:27004          ESTABLISHED 4735/ibmratl
tcp        0      0 :::27004                     :::*                     LISTEN      4734/lmgrd
tcp        0      0 ::ffff:127.0.0.1:27004       ::ffff:127.0.0.1:55574   ESTABLISHED 4734/lmgrd
```

Here lmgrd with the PID 4734 is using the port 27004.

Assigning static ports to RLKS

Port 27000 is used by default for the lmgrd daemon. You can change the lmgrd port if another application uses this port. If the port is not specified for the Vendor daemon, the default value is chosen by the operating system at run time. The Vendor daemon and lmgrd daemon must start on a specific port number each time a client makes a license request and checks out a floating license from the server. The specified ports remain open until the client returns the license to the server. You need to open two bidirectional (two-way communication) ports on the firewall

- one for the license manager daemon (lmgrd)
- one for the ibmratl daemon (ibmratl)
-

Once these ports have been opened on the firewall, they also need to be specified on the SERVER and VENDOR lines within the license file.

Locate the **server_license.dat** license file and use a text editor to modify the Vendor line to set static port as shown in below screenshot

```
[root@vEngine config]# vim server_license.lic
SERVER <hostname> <hostid>   27001
VENDOR ibmratl PORT=27005
```

Automate License server startup on Unix and Linux

After the license file is in place and the license server is started, configure the license server to automatically restart after a reboot.

For Red Hat Enterprise Linux (RHEL)
o   Create a **rlks_start** script under **/etc/rc.d/init.d** and include the following commands
     cd /opt/IBM/RationalRLKS/config
     ./start_lmgrd
o   Provide execute permissions to everyone on this rlks_start script
chmod 755 rlks_start

o   Create symbolic links to rlks_start script in all the run-levels

ln -s /etc/rc.d/init.d/rlks_start /etc/rc.d/rc2.d/S98Rlks

ln -s /etc/rc.d/init.d/rlks_start /etc/rc.d/rc3.d/S98Rlks

ln -s /etc/rc.d/init.d/rlks_start /etc/rc.d/rc4.d/S98Rlks

ln -s /etc/rc.d/init.d/rlks_start /etc/rc.d/rc5.d/S98Rlks

For SuSE Linux Enterprise Server (SLES)

o   Create a **rlks_start** script under **/etc/init.d** and include the following commands

cd /opt/IBM/RationalRLKS/config

./start_lmgrd

o   Provide execute permissions to everyone on this rlks_start script

chmod 755 rlks_start

o   Create symbolic links to rlks_start script in all the run-levels.

ln -s /etc/init.d/rlks_start /etc/init.d/rc2.d/S98Rlks

ln -s /etc/init.d/rlks_start /etc/init.d/rc3.d/S98Rlks

ln -s /etc/init.d/rlks_start /etc/init.d/rc4.d/S98Rlks

ln -s /etc/init.d/rlks_start /etc/init.d/rc5.d/S98Rlks

For AIX

    o   % su

    o   Edit **/etc/inittab**

Add this line :-

lmgrd:234:once:/bin/sh *rational_dir*/config/start_lmgrd_on_*server-name*

For Solaris

- o $ su
- o   # cp *rational_dir*/config/start_lmgrd_on_*server-name*\
     /etc/rc2.d/S98Rational

Performance tuning of RLKS 8.1.4 on Unix and Linux

Each Rational product client connected to a License server uses one or more sockets. Each license checkout opens up at least one TCP/IP Socket connection to the license server. If the number of sockets required by the License server on a single system becomes excessive, then you can implement any of below mentioned solution:-

- o   **Increase the number of file descriptors**

You can increase the limit of maximum simultaneous checkouts by increasing the file descriptors. The default limit for non-root users is 64 or 256 depending on the UNIX system you are using. You can increase this limit using one of the following ways:

A. If the **start_lmgrd** script is being used to start the license server, edit the start_lmgrd script.Search for following lines in the script:

if $lower_fd_limit

then

 # Lower the file descriptor limits.

ulimit -n 1024

ulimit -H -n 1024

fi

Change the lines in the script to set the file descriptors to 8192:

if $lower_fd_limit

then

 # Lower the file descriptor limits.

ulimit -n 8192

ulimit -H -n 8192

fi

B. If you start the license server using the command-line, use the command:

#!/bin/sh ulimit -n 8192 ulimit -H -n 8192 lmgrd [...]

where [...] are the lmgrd arguments.

o   **Run multiple Single license servers and split the licenses between them**

   You could install Multiple single license servers and each server can use a subset of the total licenses. In this topology, you can configure Rational products clients with license environment variables that contain detail of each license server. A Rational application tries each license server defined on the license search path until it succeeds or gets to the end of the list.

LM_LICENSE_FILE   27001@A;27002@B;27003@C;27004@D
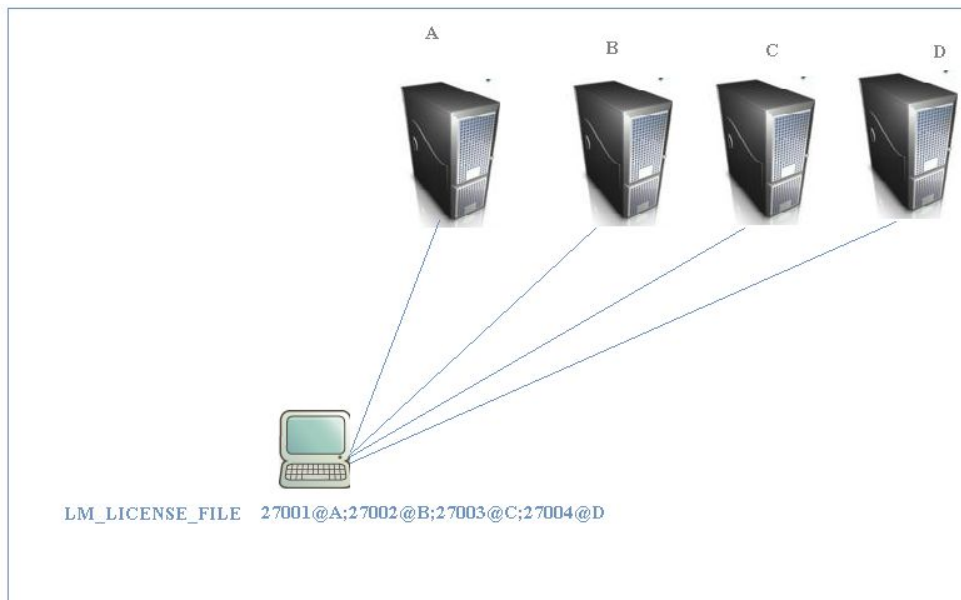
Frequently asked questions (FAQs) about RLKS

o **Is Rational License Key Server 8.1.x supported to install on VMware Linux image?**

The only supported Hostid for licensing on Linux is the Ethernet MAC address. So, if you want to use a License server on a VM, you will be essentially required to use and assign a MAC address to the VM. The MAC address of the VM may change. Check the VM platform documentation if you want to permanently assign a given MAC addresses to a VM.

o **Does Unix/Linux License server serve licenses to Windows clients?**

Yes, License server serves licenses to Windows and Linux/unix clients. Windows users(clients) can point to the License server by using any of the method

- Rational License Key Administrator(LKAD)

- IBM Installation Manager (only being used with SDP products)
- LM_LICENSE_FILE
- TELELOGIC_LICENSE_FILE

o **What are the High Availability alternatives available with License server?**

Triad(redundant) License servers

Triad servers are a set of 3 nodes designated to serve the same license file. The license file has 3 SERVER lines. License server is started on all 3 nodes. One of the servers starts out as the Master server and serves licenses. If the Master goes down, another server takes over as Master. Redundant servers require a quorum of 2 servers to be up, or no licenses are served.

Multiple Single License servers

You can distribute floating or token licenses among multiple single license servers in a large enterprise deployment to ensure 24*7 uptime.

o **How to point the Rational product clients to a Linux License Server (or Servers)?**

To point to single License server :

export LM_LICENSE_FILE=27000@hostname of the License server

To point to redundant License servers:

export LM_LICENSE_FILE=27000@server1,27000@server2,27000@server3

To point to multiple single License servers:

export LM_LICENSE_FILE=27000@server1:27000@server2

o   **How to configure License server to log information in append mode?**

You can append old log data as mentioned below

1. Create a new 'options' file (ibmratl.opt), or open an existing one.

2. Add the following line in ibmratl.opt file.

DEBUGLOG +logFile_location.

Example :-

DEBUGLOG +/opt/IBM/RationalRLKS/logs/lmgrd.log

Troubleshoot license issues

- o   **Problems with installation on Linux 6.x (64 bit)**

- o   **Wrong hostid on SERVER line for license file**

- o   **Problem with silent installation of RLKS 813**

- o   **Starting RLKS on SUSE results in error "Flexlm -13,66"**

- o   **Start Rational License Key Server as a non-root user**

- o   **Vulnerability affecting license server and daemon ibmratl**

Conclusion

It is important for the license server administrator to have a clear understanding
of license server deployment, administration, and system requirements to ensure
the efficient availability of license service. This whitepaper gives you insights on
deployment of licensing server infrastructure on Linux and Unix systems and also
aims to share best practices on performance tuning, RLKS directory structure,
system requirements, and answers to frequently asked questions.

References

https://www-01.ibm.com/support/knowledgecenter/SSSTWP_8.1.4/com.ibm.ratio nal.license.doc/topics/c_managing_lic.html?lang=en

http://www-01.ibm.com/support/docview.wss?uid=swg21117710

http://www-01.ibm.com/support/docview.wss?uid=swg21257370