

High availability options for IBM Rational License Key Server

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October 15, 2012

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Introduction

Optimal usage of licenses is a primary requirement for any organization. You as a system administrator or license administrator must ensure that the right kind of license is in use by clients. IBM Rational product licensing can be either node based or floating. An Rational Authorized User license allows a single, specific individual to use an IBM Rational product.

A Rational floating license is a license for a single software product shared among users. To use floating licenses with Rational products, you must obtain floating license keys and install IBM Rational License Key Server. It is the license server that responds to clients for access to the license keys. Once the client closes the Rational product, the license goes back to the pool for reuse.

Rational License Key Server is a centralized application that serves license keys to Rational products running on client machines. You can install products on the same machine where you have configured the Rational License key server.

Organizations recognize the significance of a business continuity plan. Downtime of critical applications is a costly occurrence and extended downtime can negatively affect the business. Environments are constantly changing, so if you are not keeping your backup plans in place, you could suffer huge losses and might get into major license server failure.

Backup license server options can keep your critical business applications up and running to reduce downtime from unplanned outages. Backup measures minimize unplanned downtime from disasters that might affect your business considerably.

This white paper provides the details of backup plans available for Rational License Key Server. The paper introduces you to the backup and disaster recovery plans you can implement, explaining advantages and benefits.

High availability of licenses for Rational applications

In a highly volatile and technology driven business climate, downtime or unplanned outage is costly. High availability license server backup alternatives can help you improve critical, continuous availability. To sustain high availability of Rational License Key Server in your environment, there are several solutions available:

- Using three-server redundancy with Rational License Key Server
- Having multiple Rational License Key Servers using license search path

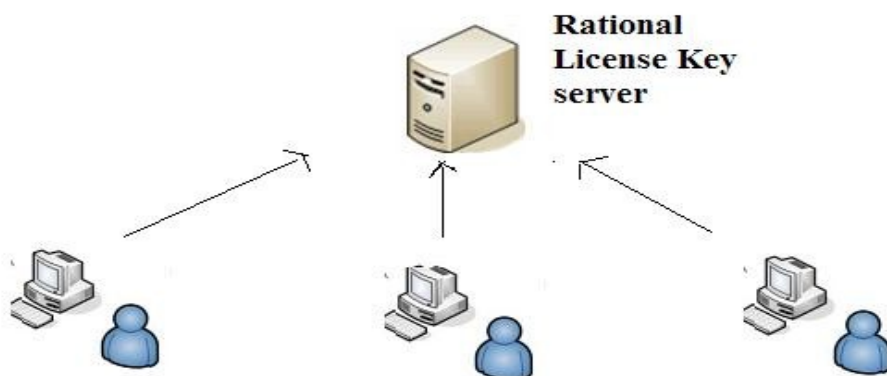


Figure 1 : Rational License Key Server Overview

Three-server redundancy

Three-server redundancy in Rational License Key Server provides backup fail-over protection. In this redundant license server setup, all three license servers function to form a triad. The license server sends periodic heartbeats to each other to ensure that at least two servers are communicating and running. A quorum forms when at least two of the three license servers are running and communicating with each other.

In this setup, each license server is either primary, secondary, or tertiary. Out of three license servers, one server is the designated master responsible for serving the licenses.

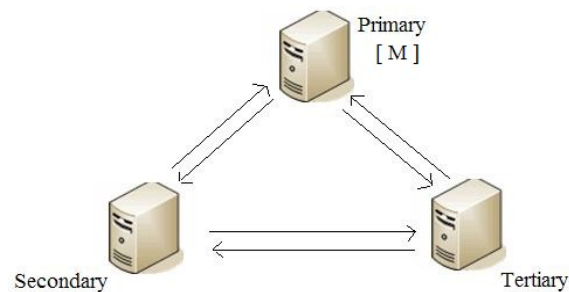


Figure 3 : Three-server Redundancy Overview

If the master license server fails, another license server becomes the master and serves the licenses to Rational applications. If the primary and secondary server goes down, Rational applications will not have access to licensing. The tertiary license server can never become the master.

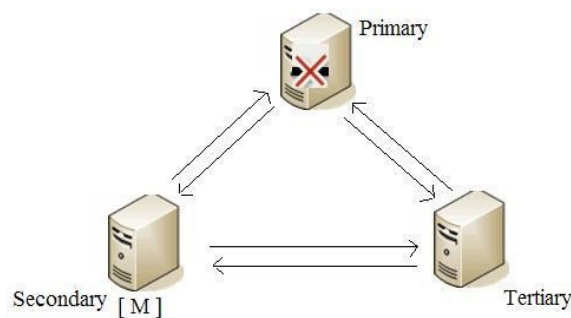


Figure 4: Three-server redundancy backup failover

Configure licensing for three-server redundancy

License administrators perform these steps:

1. Choose and identify three server systems to use in setting up redundant license server configuration. Identify the host name and host ID values for these systems.
2. Log into Rational License Key Center website. Generate the license keys and download the license file.
3. Copy the Rational License Key Server installation files to each of three license server systems. Follow these steps:
4. Install IBM Rational License key server on all three license systems.
5. Import a license file on each license key server system.

Sample redundant license file

These lines are an example of a license file configured for three-server redundancy:

```
SERVER Apple 111dead 27000
SERVER Orange 2222dead 27000
SERVER Banana 3333dead 27000
VENDOR ibmratl
```

There are three SERVER lines define each of the systems involved. The host name values are Apple, Orange, and Banana. The host ID values are "1111dead", "2222dead", and "3333dead".

All servers use the same port of 27000 to listen for communication. The line "VENDOR ibmratl" is a reference the Rational License Key Server vendor daemon.

Managing a license server with three-server redundancy

Start and stop the redundant license servers

It is better to start the primary license server before the secondary or tertiary license servers. This sets the primary license server to become the master before the others start. If you start the secondary and tertiary license server before the primary, then the secondary will establish itself as master. You can refer output generated by **lmutil** script to know which license server is the master.

In this example, **lmstat** output shows the primary license server is the master:

```
-----
lmutil -Copyright (c) 1989-2009 Flexera Software, Inc. All Rights
Reserved.
Flexible License Manager status on Wed 2/28/2012 21:23

License server status: 27000@A-Primary,27000@B-Secondary,27000@C-
Tertiary
  License file(s) on A-Primary: /opt/license.dat:

A-Primary: license server UP (MASTER) v11.8
B-Secondary: license server UP v11.8
C-Tertiary: license server UP v11.8

Vendor daemon status(on A-Primary):

      ibmrat1:UP v11.8
-----
```

The **lmdown** script shutdowns all three license servers in a single command. You do not have to shutdown each license server manually.

Identifying quorum in redundant license servers

A quorum forms when at least two of three license servers are running and communicating to each other. You can check the debug log of the license servers to confirm whether the quorum establishes successfully or not.

In this example, **lmgrd logs** shows that the quorum is successfully established:

```

-----
(lmgrd) lmgrd tcp-port 27000
(lmgrd) Redundant server configuration enabled. Attempting to
establish quorum...
(lmgrd) Trying to establish connections to other redundant
servers...
(lmgrd) Attempting connection to secondary redundant server Dummy
(lmgrd) Attempting connection to tertiary redundant server Rummy
(lmgrd) Established connection to tertiary redundant server Dummy
(lmgrd) Redundant server quorum established. Master is Summy
(lmgrd) Starting vendor daemons ...
(lmgrd) Started telelogic (pid 2256) (telelogic) FLEXnet Licensing
version v11.8.0.0 build xxxxx
-----

```

Debug log in license servers

It is the master license server that captures all the logging. The remaining two license servers are on standby, and start logging information only when the mater license server is down.

Configure clients for redundant license servers

On Microsoft Windows, use Rational License Key Administrator to configure Windows clients to use redundant license servers.

1. On the Windows client, open the Rational License Key Administrator.
2. Select the menu option **Settings > Client/Server Configuration**.
3. Check the box labeled **Use License server**.
4. Click **Add Server** and choose Server Type as **Redundant**.
5. Enter the Primary, Secondary and Tertiary host name information along with the port numbers for each.
6. Verify that you are able to connect and view the licenses served.

On UNIX platforms, to point the client to redundant Windows or UNIX license server set the environment variable like in this example:

- `export LM_LICENSE_FILE=27000@server1:27000@server2:27000@server3`

Multiple license servers using license search path

In large scale licensing deployment, you can distribute floating license keys among multiple independent license servers.

Consider deploying multiple license servers in an environment when you have multiple Rational products across geographically distributed sites, where each site requires a local license server. Also consider deploying multiple license servers when the number of concurrent connections to one license server exceeds 4000 or above on Windows platforms.

In multiple independent license server environments, clients can point to multiple license servers available across sites. It provides backup, failover protection if the local license server of one site goes down. Moreover, clients can also checkout or fetch license key from another license server available in other sites when one server run out of licenses.

In multiple license server environments, note that license servers do not communicate with each other. It also implies that one license server cannot use licenses available on another license server. In this example, clients from Site A point to both Site A and Site B license servers to avoid potential downtime. Below diagram explains that clients from Site A are pointing to both Site A and Site B license servers to avoid any unplanned downtime:

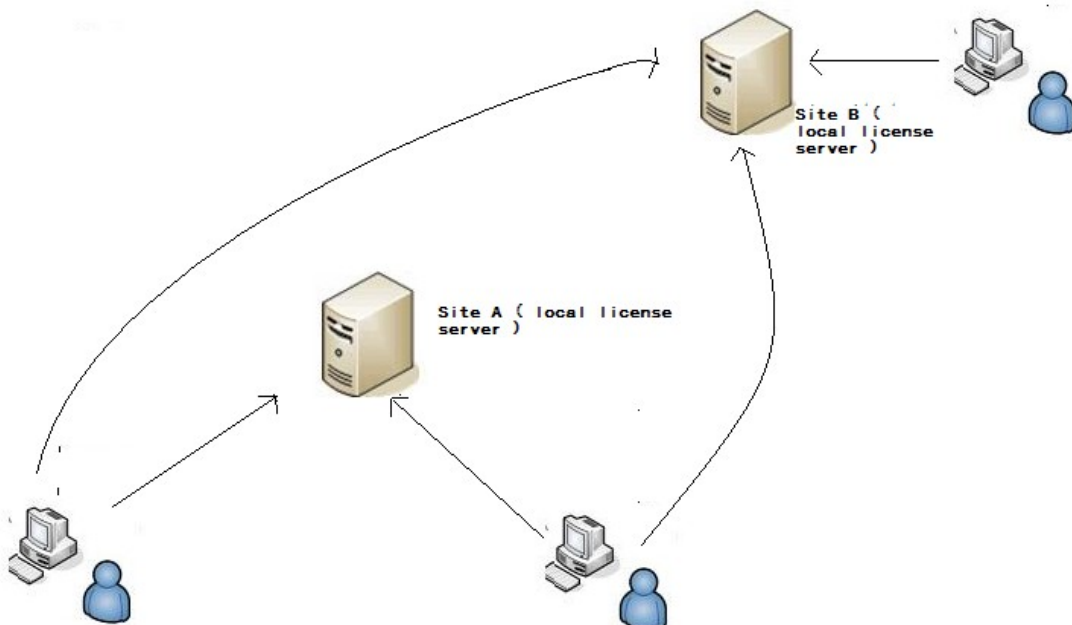


Figure 5: Multiple License Server Overview

Configure client to point to multiple license servers

On Windows platforms, use Rational License Key Administrator to configure Windows clients to use multiple license server.

1. On the Windows client, open Rational License Key Administrator.
2. Select the menu option **Settings > Client/Server configuration**.
3. Check the box labeled **Use License server**.
4. Click **Add Server** to add another entry the **Search Order** box called "New-Server".
5. To change the name of the server, go to the **Settings** box. Enter the license server name in the **Values** column next to **Server Name**. If using a firewall, you might also need to enter a port ID.
6. Verify that you are able to connect and view the licenses served by multiple license servers.

On UNIX platforms, to point the client to multiple license server set the environment variable like in this example:

- ```
export
LM_LICENSE_FILE=27000@siteAserver;27000@siteBserver;siteZserver
```

## **Optimize performance for redundant license servers**

- Select stable systems as license server machine. Do not pick up systems that are frequently rebooted or shut down for one reason or another.
- Each of the three-server systems can be on any architecture or operating systems supported by Rational License Key Server. The servers are not all required to be on the same architecture or operating system.
- All the three servers must have stable network communication between them. Never configure redundant license servers with slow communication or slow networks.
- Setting up redundant license servers across multiple sites (in different geographic locations) does not provide effective fault tolerance. Redundant license servers must be at the same site or location and on the same subnet.

## Troubleshoot license issues

**Error message when starting license server:** "Redundant server quorum enabled. Attempting to establish quorum... Segmentation fault"

### Solution:

This error is in license server logs when redundant license servers start without a defined port number in the license file on all three SERVER lines. After specifying the port number in the license file, you are able to start the redundant license server successfully. For example, if the SERVER lines in the license file reads:

```
Server hostname hostid
Server hostname hostid
Server hostname hostid
```

Change them to read:

```
Server hostname hostid 27000
Server hostname hostid 27000
Server hostname hostid 27000
```

**Error when importing license file on UNIX:** "Cannot import this license file... It contains 3 Server lines. Currently, license\_setup cannot import a redundant server license file" when importing license file on UNIX systems

### Solution:

This occurs when the **license\_setup** script runs to import the license key file (.upd) on a redundant license server system. You must copy the license key file to the "<rational\_dir>/config" directory manually. You must maintain the file on all three servers. Copy and rename the file to **rational.dat** like in this example:

```
cp license.upd rational_dir/config/license.dat
```

**Error:** "Lost redundant license server quorum... Disconnected from Primary redundant license server.."

### Solution:

The error occurs when you make any changes in redundant license server configuration. For example, generating a license key for one machine due to a networking card or other hardware change. Make sure to import the new license file to all three license servers in a redundant license server environment.

## Conclusion

In summary, it is important to keep license server backup plans in place to ensure high availability of licenses to the clients in all circumstances.

All backup or fail over protection solutions for Rational License Key Server address planned and unplanned downtime. This whitepaper provided you insights of backup license server implementation and benefits of various available backup plans.

## References

- Rational Common Licensing Information Center:  
<http://publib.boulder.ibm.com/infocenter/rational/v0r0m0/index.jsp>
- Rational Licensing Support  
<https://www.ibm.com/software/rational/support/licensing/>
- Rational License Key Center  
<http://www.ibm.com/software/rational/support/licensing/toIntraware.html>

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