Load Balancing iRODS

v1.1.3

Deployment Guide

NOTE: This guide has been archived and is no longer being maintained. While the content is still valid for the particular software versions mentioned, it may refer to outdated software that has now reached end-of-life. For more information please contact support@loadbalancer.org.

loadbalancer.org

Contents

1. About this Guide

This guide details the steps required to configure a load balanced Integrated Rule-Oriented Data System (iRODS) environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any iRODS configuration changes that are required to enable load balancing.

For more information about initial appliance deployment, network configuration and using the Web User Interface (WebUI), please also refer to the relevant Administration Manual:

- v7 Administration Manual

- v8 Administration Manual

2. Loadbalancer.org Appliances Supported

All our products can be used for load balancing iRODS. The complete list of models is shown below:

Discontinued Models	Current Models *
Enterprise R16	Enterprise R20
Enterprise VA R16	Enterprise MAX
Enterprise VA	Enterprise 10G
Enterprise R320	Enterprise 40G
	Enterprise Ultra
	Enterprise VA R20
	Enterprise VA MAX
	Enterprise AWS **
	Enterprise AZURE **
	Enterprise GCP **

* For full specifications of these models please refer to: http://www.loadbalancer.org/products/hardware

** Some features may not be supported, please check with Loadbalancer.org support

3. Loadbalancer.org Software Versions Supported

- v7.6.4 and later

4. iRODS Software Versions Supported

- iRODS – all versions

5. Load Balancing iRODS

As mentioned here, to achieve full redundancy within an iRODS Zone, the following iRODS components should be replicated / load balanced:

- iCAT Database

    > Note: Implementing redundancy for the database is outside the scope of this document.

- Catalog Provider (iCAT Server) - Redundancy is achieved by having two Catalog Providers behind a load balancer
- Catalog Consumer (Resource Server) - The built-in replication resource hierarchy provides data redundancy

As described in the *Deployment Concept* section below, the Catalog Provider servers are placed behind a Virtual Service (VIP) on the load balancer. Clients then connect to this VIP rather than connecting directly to one of the Catalog Providers.

> Note: It's highly recommended that you have a working iRODS environment first before implementing the load balancer.

Load Balancer Deployment Mode

The load balancer is deployed at Layer 7. This mode requires no changes to the load balanced Catalog Providers.

Timeouts

The client and server timeouts are set to 1 minute.

Port Requirements

The following table shows the ports that are load balanced:

Port	Protocols	Use
1247	TCP	iRODS communications
1248	TCP	iRODS control plane

Health Checks

By default, a simple 'Connect to port' health check is used. If required, a more comprehensive negotiate check can be configured to provide a more robust check.

Deployment Concept
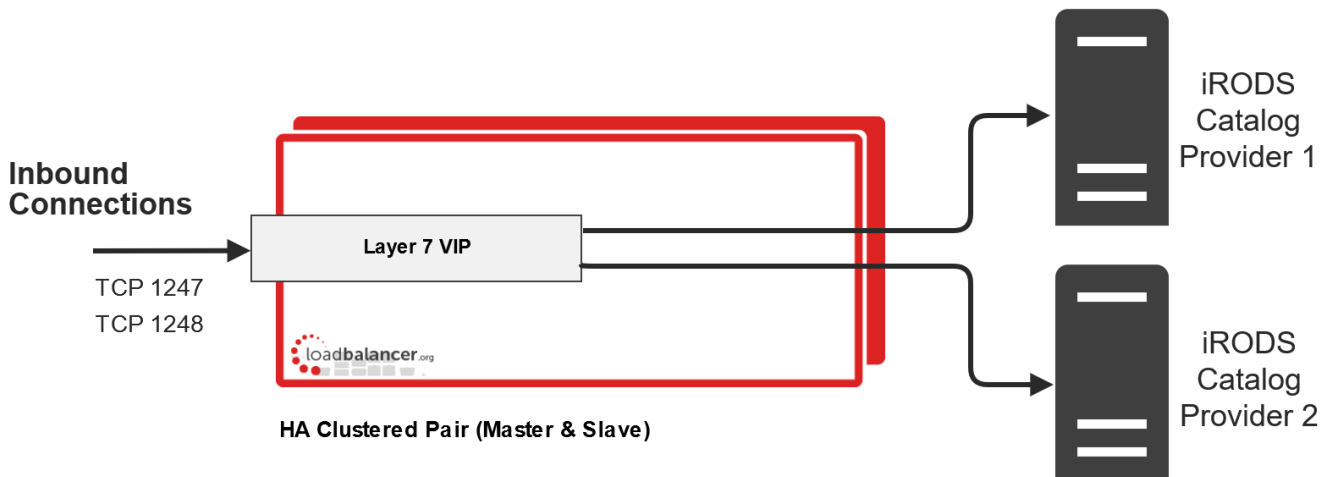
VIPs = Virtual IP Addresses

> Note: The load balancer can be deployed as a single unit, although Loadbalancer.org recommends a clustered pair for resilience & high availability. Please refer to section 1 in the appendix on page 11 for more details on configuring a clustered pair.

6. Loadbalancer.org Appliance – the Basics

Virtual Appliance Download & Deployment

A fully featured, fully supported 30 day trial is available if you are conducting a PoC (Proof of Concept) deployment. The VA is currently available for VMware, Virtual Box, Hyper-V, KVM and XEN and has been optimized for each Hypervisor. By default, the VA is allocated 1 CPU, 2GB of RAM and has an 8GB virtual disk. The Virtual Appliance can be downloaded here.

> Note: The same download is used for the licensed product, the only difference is that a license key file (supplied by our sales team when the product is purchased) must be applied using the appliance's WebUI.

> Note: Please refer to the Administration Manual and the ReadMe.txt text file included in the VA download for more detailed information on deploying the VA using various Hypervisors.

Initial Network Configuration

The IP address, subnet mask, default gateway and DNS settings can be configured in several ways as detailed below:

Method 1 - Using the Network Setup Wizard at the console

After boot up, follow the instructions on the console to configure the IP address, subnet mask, default gateway and DNS settings.

Method 2 - Using the WebUI

Using a browser, connect to the WebUI on the default IP address/port: **https://192.168.2.21:9443**

To set the IP address & subnet mask, use: *Local Configuration > Network Interface Configuration*

To set the default gateway, use: *Local Configuration > Routing*

To configure DNS settings, use: *Local Configuration > Hostname & DNS*

Accessing the Web User Interface (WebUI)

The WebUI can be accessed via HTTPS at the following URL: **https://192.168.2.21:9443/lbadmin**

* Note the port number → 9443

(replace 192.168.2.21 with the IP address of your load balancer if it's been changed from the default)

Login using the following credentials:

> **Username:** loadbalancer
>
> **Password:** loadbalancer

> Note: To change the password , use the WebUI menu option: Maintenance > Passwords.

Once logged in, the WebUI will be displayed as shown below:

HA Clustered Pair Configuration

Loadbalancer.org recommend that load balancer appliances are deployed in pairs for high availability. In this guide a single unit is deployed first, adding a secondary slave unit is covered in section 1 of the appendix on page 11.

7. Configuring iRODS for Load Balancing

All iRODS components must be setup with appropriate hostnames and IP addresses to ensure that the correct data paths are used once the load balancer is deployed.

Internally, the Catalog Providers will each refer to themselves using the FQDN of the Virtual Service (VIP) on the load balancer. This is also how all other servers will refer to them.

All components when acting as a client access the Catalog Providers via the load balancer.

Note: More details and an example iRODS configuration can be found here.

8. Appliance Configuration for iRODS

VIP Configuration

Configuring The Virtual Service (VIP)

1. Using the WebUI, navigate to *Cluster Configuration > Layer 7 – Virtual Services* and click on **Add a new Virtual Service**

2. Enter an appropriate name for the VIP in the *Label* field, e.g. **Catalog-Providers**

3. Set the *IP address* field to the required IP address, e.g. **192.168.100.100**

4. Set the *Ports* field to **1247,1248**

5. Set the *Layer 7 Protocol* to **TCP Mode**

6. Click **Update** to create the virtual service

7. Click **Modify** next to the newly created VIP

8. Scroll down to the *Persistence* section and set *Persistence Mode* to **None**

9. Scroll down to the *Other* section and click **[Advanced]**

10. Enable (check) the Timeout checkbox and set both Client Timeout & Real Server Timeout to **1m** (i.e. 1 minute)

11. Click **Update**

Defining The Real Servers (RIPs)

1. Using the WebUI, navigate to *Cluster Configuration > Layer 7 – Real Servers* and click on **Add a new Real Server** next to the newly created VIP

2. Enter an appropriate name for the server in the *Label* field, e.g. **CatalogProvider1**

3. Change the *Real Server IP Address* field to the required IP address, e.g. **192.168.100.110**

4. Leave the *Real Server Port* field blank

5. Click **Update**

6. Repeat these steps to add your additional Catalog Provider(s)

Finalizing the Configuration

To apply the new settings, HAProxy must be restarted as follows:

1. Using the WebUI, navigate to: *Maintenance > Restart Services* and click **Restart HAProxy**

9. Testing & Verification

Using System Overview

The System Overview can be viewed in the WebUI. It shows a graphical view of all VIPs & RIPs (i.e. the Catalog Provider servers) and shows the state/health of each server as well as the state of the cluster as a whole. This can be used to ensure all servers are up and available.

10. Technical Support

For more details about configuring the appliance and assistance with designing your deployment please don't hesitate to contact the support team using the following email address: support@loadbalancer.org

11. Further Documentation

The Administration Manual contains much more information about configuring and deploying the appliance. It's available here: http://pdfs.loadbalancer.org/loadbalanceradministrationv8.pdf

12. Conclusion

Loadbalancer.org appliances provide a very cost effective solution for highly available load balanced iRODS environments.

13. Appendix

1 – Clustered Pair Configuration – Adding a Slave Unit

If you initially configured just the master unit and now need to add a slave - our recommended procedure, please refer to the relevant section below for more details:

Note: A number of settings are not replicated as part of the master/slave pairing process and therefore must be manually configured on the slave appliance. These are listed below:

- Hostname & DNS settings
- Network settings including IP addresses, bonding configuration and VLANs
- Routing configuration including default gateways and static routes
- Date & time settings
- Physical – Advanced Configuration settings including Internet Proxy IP address & port, Firewall table size, SMTP relay and Syslog server
- SNMP settings
- Graphing settings
- Firewall Script & Firewall Lockdown Script settings
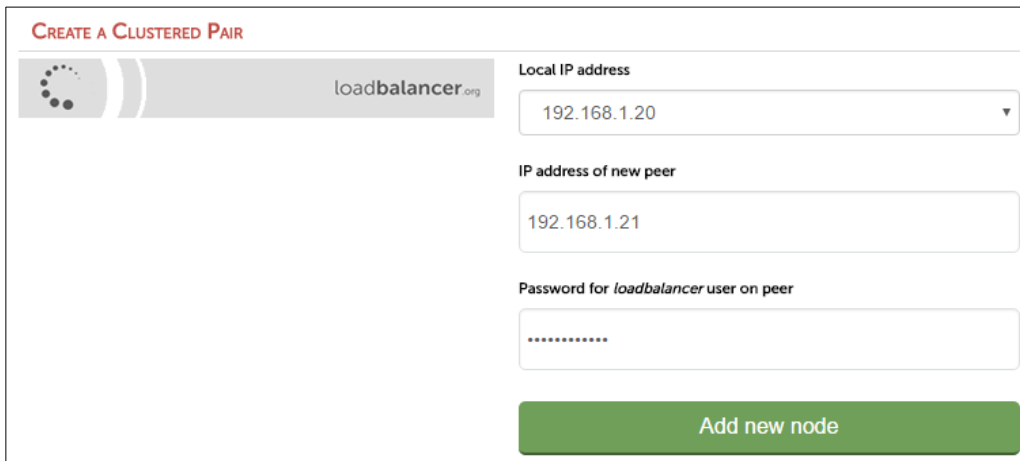- Software updates

Version 7:

Please refer to **Chapter 8 – Appliance Clustering for HA** in the v7 Administration Manual.

Version 8:

To add a slave node – i.e. create a highly available clustered pair:

- Deploy a second appliance that will be the slave and configure initial network settings

- Using the WebUI, navigate to: *Cluster Configuration > High-Availability Configuration*

- Specify the IP address and the *loadbalancer* users password (the default is 'loadbalancer') for the slave (peer) appliance as shown above

- Click **Add new node**

- The pairing process now commences as shown below:

- Once complete, the following will be displayed:

- To finalize the configuration, restart heartbeat and any other services as prompted in the blue message box at the top of the screen

Note: Clicking the Restart Heartbeat button on the master appliance will also automatically restart heartbeat on the slave appliance.

Note: Please refer to chapter 9 – Appliance Clustering for HA in the Administration Manual for more detailed information on configuring HA with 2 appliances.

14. Document Revision History

Version	Date	Change	Reason for Change	Changed By
1.1.0	9 September 2019	Styling and layout	General styling updates	AH
1.1.1	20 December 2019	Updated iRODS component terminology, load balanced port requirements and added section on how iRODS needs to be configured to enable load balancing	To comply with iRODS load balancing recommendations	RJC
1.1.2	7 January 2020	Minor changes	To improve readability	RJC
1.1.3	20 July 2020	New title page Updated Canadian contact details	Branding update Change to Canadian contact details	AH

About Loadbalancer.org

Loadbalancer.org's mission is to ensure that its clients' businesses are never interrupted. The load balancer experts ask the right questions to get to the heart of what matters, bringing a depth of understanding to each deployment. Experience enables Loadbalancer.org engineers to design less complex, unbreakable solutions - and to provide exceptional personalized support.

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