Loadbalancer.org Appliance Administration v4.1.5

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Introduction

The Loadbalancer.org appliance is a standard x86 based server running the GNU/Linux operating system with a kernel configured for load balancing. Loadbalancer.org appliances should always be deployed in a failover configuration for maximum reliability. Each load balancer must be individually configured. The only data that is replicated between the load balancers automatically is the cluster configuration file, this means that when failover occurs your clients should not notice. NB. Failover is going to be very very rare.

You can either configure the load balancers at the console by plugging in a keyboard, mouse & monitor or remotely via the secure web based interface.

NB. If the appliance is already running you can plug a USB keyboard in and it will work, we recommend you leave it plugged into a KVM switch preferably with Remote IP Console access.

Console configuration

The load balancer can be configured locally from either the bash shell, or using a text based web browser locally such as links.

- At the login prompt login as *root*
- The default password is *loadbalancer*

The following commands are useful :

ipvsadm	:	Direct control of the load balancing routing table
route	:	Control of the ip routing table
ifconfig	:	IP Address configuration
iptables	:	Firewall configuration
vi	:	For editing /etc/ha.d/conf/loadbalancer.cf

But in general just use : **links 127.0.0.1**

This will bring up the web based administration interface, By starting the links web browser on the local machine. Use the 'down' cursor key to select a link and the 'right' cursor key to follow a link

Remote Configuration

Remote configuration is possible but not recommended if you are changing the physical IP address and or the main shared virtual IP address, use the console to avoid any costly mistakes.

You can access each load balancer , lbmaster & lbslave via its own IP address using to following tools:

- OpenSSH or PuTTy   Secure Shell Access

- OpenSCP or WinSCP2   Secure File Transfer

- HTTP or HTTPS   Web based Administration

NB. The default IP Address for a loadbalancer.org appliance is 10.0.0.21/255.255.0.0

For SSH and SCP login as *root* password *loadbalancer*

The Web based Administration interface uses a different set of user accounts and passwords based on the simple .htaccess files. This allows you to set up users in three groups configuration, maintenance and reports.

To access the web based administration interface use :

http://*ipaddress*/lbadmin/

INFO : You will be prompted for a password and the default username and password are both 'loadbalancer'

Which should bring up the following screen :

You can then select an option from one of the main menus. The menu options are as follows :

- **View Configuration :** View the network & loadbalancer configuration

- **Edit Configuration :** Setup or modify the physical and virtual configuration

- **Maintenance :** Take servers offline or bring them back online

- **Reports:** View the actual live status of the load balancer or historical statistics

- **Logs:** View Ldirectord, Lbadmin or Heartbeat logs

Edit Configuration

Setup or modify the physical and virtual configuration of the load balancer appliance.

Logical Load balancer configuration..

Modify Logical Virtual Severs

This menu option allows you to add, remove or modify real servers from your cluster.

What is a *virtual server* ?

Each Virtual Server has a number of real servers, for example One Virtual Server can have any number of real servers in its cluster.

You need one virtual server for each distinct cluster *AND* protocol that you wish to load balance. So if you want to serve both HTTP and HTTPS then you will need two virtual servers :

192.168.1.30:80 & 192.168.1.30:443

NB. *Assuming that 192.168.1.30 is the Physical Virtual IP address shared between the master and slave load balancer.*

This is a very similar dialogue to the real server one, but their is a big difference between the *Add Virtual Server* and *Modify Virtual Server* dialogues.

Adding a virtual server is a simple case of specifying the ip address & port number. If you require the client connections to stick to the first real server they hit then say *'yes'* to sticky connections. This is recommended for HTTPS to stop clients repeatedly re-negotiating SSL keys.

Loadbalancer.org STRONGLY recommend that HTTP is NOT made sticky, no matter what other vendors say we think it is PISS POOR DESIGN if your real servers don't store session data in a back end database.

The modify virtual server has several more options that have been filled in by default when you added the virtual server.

Virtual Server (ipaddress:port)   192.168.1.13:443
Do you want Sticky Connections ?   yes
(recommended for HTTPS)
How long do you want connections to be sticky ?   300
Scheduler   wlc
Fallback Server   127.0.0.1:443
Checktype (negotiate/Niconnect)   connect
Service to check (http/https/ftp)   https
Protocol (tcp/udp)   tcp
File to check   /oops/loadbalancer.ts
Response Expected   TestPage

Modify Virtual Server 2

Here you can modify :

- The virtual ip address and port.
- Whether you want sicky connections
- How long should the connections persist in seconds (300 should be fine)
- What type of scheduler to use :
  - WLC – Weighted Least Connection
  - RR – Round Robin
  - WRR – Weighted Round Robin (This is the default and should be fine)
  - LC – Least Connections
- What server to fall back to if ALL the real servers fail (the default is the local maintenance page)
- The type of health checks to carry out on the real servers :
  - Connect – This is the default just check that a server is responding correctly
  - Negotiate – Request a specified URL and check that the response is as expected
  - Off – All real servers are offline
  - None – No checking is performed
  - 5 – Do a connect check 5 times then one negotiate then repeat
  - 10 – Do a connect check 10 times then one negotiate then repeat
- Service to check -
  - HTTP
  - HTTPS
  - FTP
- Protocol (this should always be TCP)
- File to check is the URL checked if negotiate is the type of health check selected
- Response expected is a string required to be present on the page returned by the URL

Modify Logical Real Severs

This menu option allows you to add, remove or modify real servers from your cluster.

What is a *real server* ?

Each Virtual Server has a number of real servers, for example One Virtual Server can have any number of real servers in its cluster.

A real server is a combination of ipaddress and port number in the following format : ipaddress:port i.e 192.168.1.101:80 for a web server.

NB. The port number is usually the same as the parent virtual server i.e. Virtual port 80 on the virtual ip address goes to real ip address on a real server and real port 80
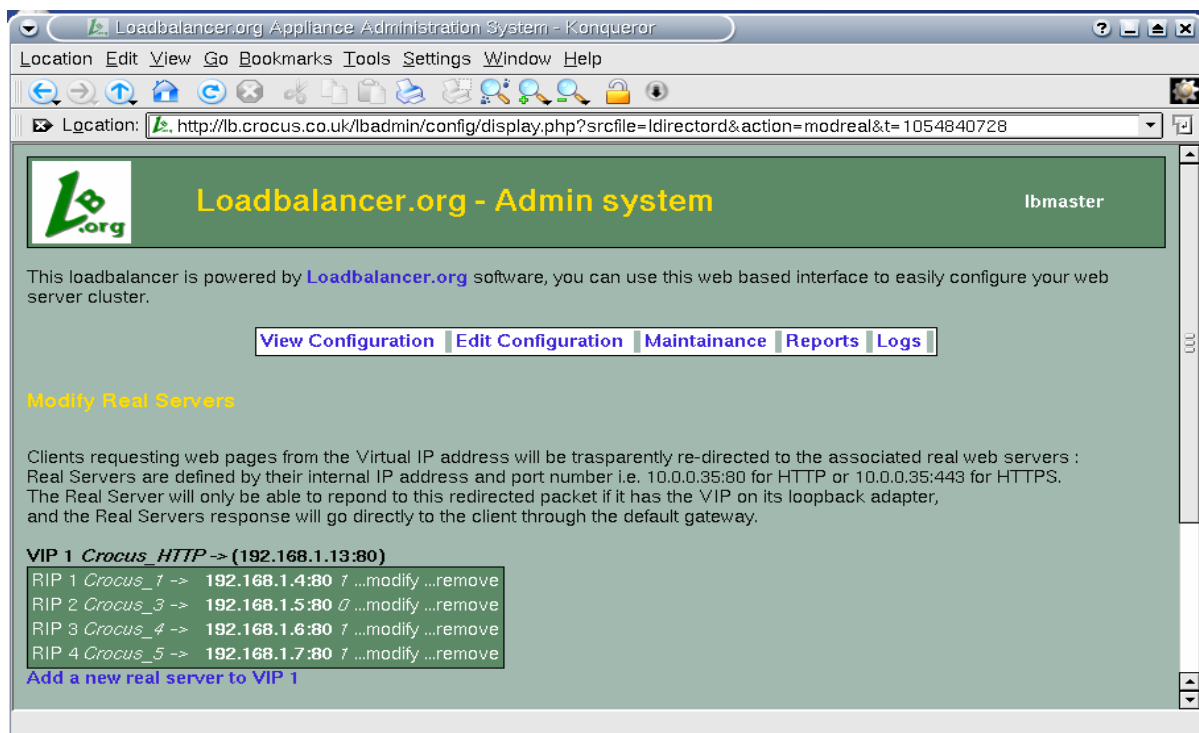
From the overview you can see each web server in the cluster, the ip address port number and relative weight (0 is offline).

Adding a new real server to a cluster is a simple case of specifying ip address, port number and weight.

NB. The default weight is 0 (offline) change it to 1 if you want it online straight away

The forwarding method defaults to that defined for the virtual server you will normally leave this as gate (direct routing), masq (NAT) can be used when you have two NICs and ipip (TUN) can be used to route through a tunnel across the Internet or WAN.

Selecting modify will bring up a similar dialogue where you can change the details, This is the normal way that you would change the weight (priority) of a server.

Why would you change the weight of a real server ?

Say you had a 2 processor Xeon 2.4Ghz web server and a 1GHz Celeron web server, its possible you would increase the weight of the Xeon so that it took more of the load. Although in general most web server are so fast these days you tend to find an even distribution of page processing power.

NB. If you take a server offline from the maintenance page and then bring it back online, the weight will be set back to one, just click on the 1 in order to link through to the modify real server screen and change the weight back to the desired amount.

Modify Global Settings

This form allows to to change the global time outs for the health checking agent *'Ldirectord'*. It is recommended that you leave the checkinterval at 10 seconds and checktimeout at 5 seconds. You may want these settings higher if you have hundreds of real servers or lower for very important servers say 5 & 3 seconds respectively.

The quiescent setting controls whether a real server is completely removed from the load balancer routing table when it has failed a health check or if the weight is just set to zero. In a production environment there is little practical difference between these two settings.

Server Configuration...

Modify the physical Real IP address of this load balancer

This form allows you to modify the physical ip address of the load balancer.

WARNING: Obviously its safer to do this from the local console

The *eth0* interface is for the internal network and is the only network you need for the default Direct Routing configuration. If you want to use MASQ (NAT) routing then you will need to configure the external network *eth1* as well.

Modify the physical network configuration of this load balancer

This form provides a single place to modify the physical network configuration of the load balancer.

It is important that the master and slave load balancer have the correct hostname set in order for replication of data via SCP to work. After both lbslave & lbmaster are configured with the correct ip addresses and hostnames you need to tell lbmaster the slave load balancers ip address. Once this is done all changes will be relicated correctly to the slave load balancer.

The default gateway is optional but useful when combined with DNS servers, this will allow any reports that reverse lookup ip address info to work correctly and will also allow online updates via the Loadbalancer.org web site in future releases of the software.

Modify the physical Virtual IP(s) of this load balancer

In order for the load balancer to work the box must physically own the virtual ip address that client think they are accessing before they get re-directed to a real server in the cluster. The physical virtual ip(s) are controlled by heartbeat to ensure that only one of the load balancers (normally the master) owns the VIP(s). You can add as many virtual ip addresses as you like.

NB. If you are configuring two servers in failover then it is recommended that you configure the server hostname then the ip address on both servers, then tell lbmaster the ip address of lbslave. This will let all changes configured on lbmaster to be automatically replicated to lbslave.

Security & Maintenance....

Change passwords..

 This section allows you to manage the user accounts that have access to the web based administration system, any changes you make will need to be done on both *lbmaster* and *lbslave*.

The administration account is *loadbalancer* and its default password is *loadbalancer* . This account cannot be deleted but the password should be changed.

When you modify a user you can select its security group from either :

- Conf – Configuration access (same as the loadbalancer account)

- Maint – Maintenance access ability to take servers on and offline only

- Report – Access to the management reports only

*NB. These passwords are simple apache .htaccess style password and nothing to do with the local Linux accounts for the **root** or **loadbalancer** users.*

Modify the maintenance (holding) page of this load balancer

This section allows you to view and modify the local holding page on the load balancer. This page will only be shown if ALL of the real servers in a cluster are unavailable. If you have a master and slave load balancer then you must change this on both servers.

NB. If you manually take all the servers offline this page will NOT be shown, it you want to force it o show then shut down your web servers.

You can use any valid HTML for the default page simply cut and paste from your favourite editor.

WARNING: If you are using localhost as your holding page and your web servers are offline then the local apache server is exposed to hacking attempts, if you are concerned about this you can change the fallback server to one of your internal servers

Modify the firewall script of this load balancer

Similar to the modify maintenance form this allows you to directly edit /etc/rc.d/rc.firewall.

WARNING: BE CAREFULL ! Make a backup before changing this script so that you know you can roll everything back if you cause a problem !

This can either be used for belt & braces security i.e. Replicate your normal firewall settings onto the load balancer as well for double security. What kind of settings ? Well normally you don't want any customers to be able to access the admin ip addresses on the load balancers you only want them to have access to say port 80 & 443 on the VIP interface.

You can also use the script to group ports together using Firewall Marks (see advanced topics).

If you are planning to use NAT you may also want to use the load balancer as your main firewall which is fine but we think it is a lot simpler to keep your firewall separate from your load balancer. Especially if you want to setup VPNs etc.

Initialise statistics tracking database (rrdtool)

 Once you have configured all of your virtual and real servers you will probably want to initialise the statistics tracking database. Clicking this menu option will construct a series of RRDTool databases and relevant cron jobs to update those databases using the output from LVSGSP. More cron jobs are then used to generate the daily,weekly,monthly and yearly charts accessible from the reports section.

WARNING: All of your old statistics will be lost when you use this function.

Re-Initialise statistics tracking database (rrdtool)

This will allow you re-initialise small changes such as ip addresses or labels etc. to the graphs but will not pick up new VIPs or RIPs. You will need to initialise the whole database from scratch for that.

Backup & Recovery....

Your loadbalancer.org appliance is covered by a return to base warranty, and re-configuration is simple from the default install BUT its always nice to have a backup !

Using the recovery CD

The recovery CD supplied will enable you to restore a completely new image of the loadbalancer software back onto the appliance. Once you have done this you will either need to re-configure from scratch or restore from your backups.

Simply plug an ATAPI CD-DRIVE into the front IDE socket and power supply and allow the appliance to boot from the CD. At the prompts press return to accept the defaults to re-format the hard drive and re-install the image of the default loadbalancer.org appliance software.

Make a configuration backup

This option will instantly backup the current configuration to the local disk, this is useful when yo u want to make a major change and yet have the ability to roll back quickly if it didn't have the desired effect.

Restore configuration from backup

This quickly restores the configuration from a previous local backup, use this if you have made a big mistake when re-configuring the device. In order to ensure that any changes take effect cleanly you may need to restart both heartbeat and ldirectord.

Disaster Recovery Options

This section gives you the following options :

• Restore manufacturers settings – Handy if you want to start all over again

• Download Config – Allows you to download ldirectord.cf (virtual and real server config)

• Download Real IP Address Info – Your physical ip address

• Download VIPs – Your physical virtual ip address info

• Download Firewall Script – The firewall configuration (for creating firewall marks)

- Upload a previously saved config file – To upload a previous ldirectord.cf file.

Services....

Restart Heartbeat...

Heartbeat controls the failover between the master and slave load balancer, if you make any changes to the physical ip address or physical virtual ip address then you will need to restart heartbeat ON BOTH *lbmaster* and *lbslave*.

With a simple restart the old vitual addresses may be left active so you may wish to do a full re-boot to be sure all changes are clean. Obviously this kind of thing should be done from the console

Restart Ldirectord...

It is unlikely that you will ever need to use this function.

Power Control....

Shutdown and restart server

Fairly self explanatory

Shutdown and halt server

You don't normally want to do this !

Advanced

Execute a shell command

This allows you to remotely execute a shell command as a SUDO root user. Useful if you accidentally kill your SSH server or something.

WARNING: You should really know what you are doing if you use this function.

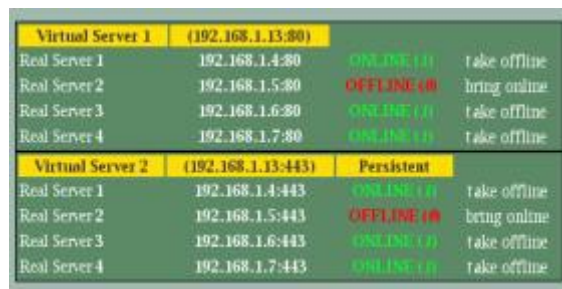The output of the command will be displayed on screen.

Maintenance

This menu only has one option :

Maintain Real Servers....

Take a real server offline or online

This form allows you to view all of the virtual and associated real servers ip addresses, port numbers and weights. Clicking take offline or bring online will change the weight of the server to either 0 or 1 respectively.

Some points to bear in mind :

- If you want to take a server down for maintenance
  - Take it offline (i.e. Set the weight to zero)
  - Then either wait 2 mins (even HTTP 1.1 has some persistence)
  - Or look in the status report and wait for active connections to fall to zero
- The online or offline status here is what you WANT not what you've GOT.
  - The active or inactive status is what you've GOT after health checks are taken into account.
- Changes may take a few seconds to take effect depending on the current status of ldirectord
- When you take a server offline and then bring it back online the weight is always set to 1, if you need to change the weight just click on it to be taken to the modify real server screen.

Reports

The reports are broken down into real time and statistical.

The real time reports are :

- Status (Current Active and Inactive connections)
- Traffic rate per second
- Traffic Qty (Since last counter reset with 64 bit counters)
- Current Connections (with or without DNS lookup)

NB. These reports are generated in real time and make take a few seconds... You may also need to refresh the screen if your browser is caching the results. Because Direct Routing is the default load balancing method you will not see any stats for return packets (as they do not pass through the load balancer.) You would however see them if you were in NAT mode.

Graphical stats over time....

This link goes to a page generated by the *initialise statistics database* command. The graphs generated are great for showing management pretty pictures they wont understand !

Why does the average activity get lower over time ?

There is a good mathematical reason for this, but the graphs now also show max connections as well as average connections.
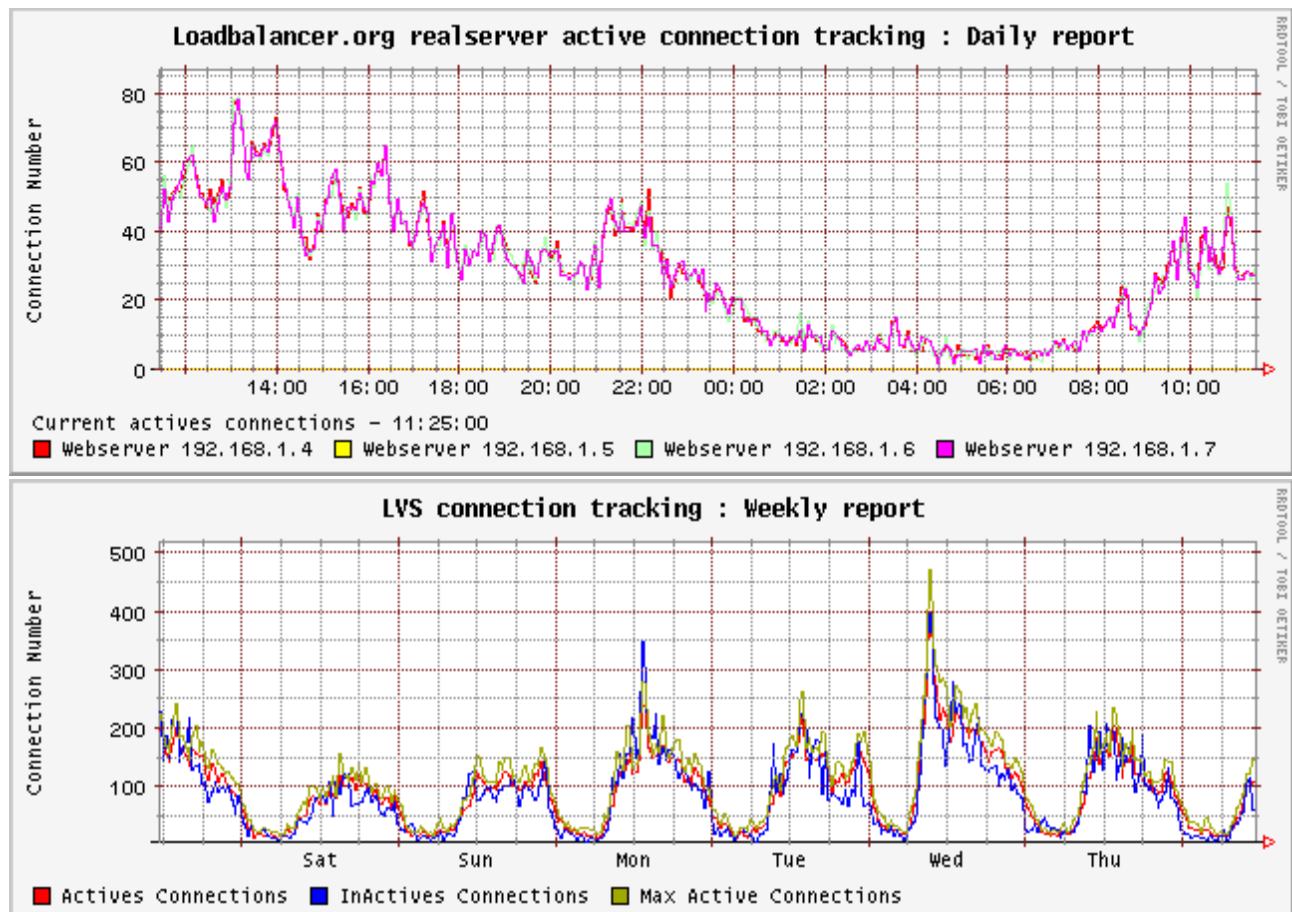
Advanced Topics

Firewall Marks

You can use the modify firewall script option to group certain protocols together in one cluster. So rather than specifying VIP as Ipaddress:Port you can specify it as '1' i.e. Firewall mark 1.

Then any incoming packets that you mark with a '1' will be associated with that VIP. This is especially usefull if you need persistence as clients move from HTTP to HTTPS i.e. An ecomerce web site without a proper backend database for session state.

```
# This example marks HTTP & HTTPS connections only
VIP1="192.168.0.66"
 /sbin/iptables -t mangle -A PREROUTING -p tcp -d $VIP1 --dport 80 -j MARK --set-mark 1
 /sbin/iptables -t mangle -A PREROUTING -p tcp -d $VIP1 --dport 443 -j MARK --set-mark 1
```

Persistence State Table Replication

If you want the current persistent connection table to work when the master load balancer swaps over to the slave then you can start the synchronisation daemons on each load balancer to replicate the data in real time.

First login to lbmaster using SSH or the console, then as root run the following command :

```
ipvsadm –start-daemon master
```

Then login to lbslave using SSH or the console, then as root run the following command :

```
ipvsadm –start-daemon master
```

After a few seconds you can confirm that it is working by seeing the output from :

```
ipvsadm -Ln
```

This should give the same output as running the same command on lbmaster i.e. The state table is being replicated. NB. This is the same command that the *'status'* report is based on.

Failover is such a rare occurrence that we really don't see the point in using up the bandwidth to do this but then that's up to the customer.

Round Up

Hopefully you have enough info here to be productive with your Loadbalancer.org appliance.

There are many aspects to the Loadbalancer.org appliance that have not been covered here please contact support@loadbalancer.org if you have any questions or suggestions for improvements in the documentation.