Load Balancing Hitachi Content Platform
Version 1.0.0
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1. About this Brief

This brief outlines the steps required to configure a load balanced Hitachi Content Platform environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any Hitachi Content Platform 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 Administration Manual.

2. Loadbalancer.org Appliances Supported

All our products can be used with Hitachi Content Platform. For full specifications of available models please refer to https://www.loadbalancer.org/products.

Some features may not be supported in all cloud platforms due to platform specific limitations, please check with Loadbalancer.org support for further details.

3. Loadbalancer.org Software Versions Supported

- V8.6.1 and later

   Note: The screenshots used throughout this document aim to track the latest Loadbalancer.org software version. If using an older software version, note that the screenshots presented here may not match the WebUI exactly.

4. Hitachi Content Platform Software Versions Supported

- Hitachi Content Platform – all versions

5. Hitachi Content Platform

Hitachi Content Platform is a massively scalable object storage solution with robust security, high performance, and compliance considerations built-in.

6. Load Balancing Hitachi Content Platform

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

   Persistence (aka Server Affinity)

   Source IP-based persistence is required for all three services related to HCP. This ensures that clients continue to stick to the same server for the duration of their session.

   Virtual Service (VIP) Requirements

   To provide load balancing and HA for Hitachi Content Platform, the following VIPs are required:
   
   - Data (for HTTP and HTTPS-based data requests)
   - Metadata Query Engine (MQE)
Port Requirements

The following table shows the ports that are load balanced:

<table>
<thead>
<tr>
<th>Ports</th>
<th>Protocols</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>80, 443</td>
<td>TCP/HTTP(S)</td>
<td>HTTP(S)-based data access</td>
</tr>
<tr>
<td>8888</td>
<td>TCP</td>
<td>Used for access to the Metadata Query Engine</td>
</tr>
<tr>
<td>8000</td>
<td>TCP/HTTPS</td>
<td>HTTPS-based access for the Namespace Browser</td>
</tr>
</tbody>
</table>

TLS/SSL Termination

It is possible to terminate TLS connections at the load balancer, however this is outside the scope of this document.

For simplicity and best performance, TLS termination should be performed on the real servers.

7. 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 the section Configuring HA - Adding a Secondary Appliance in the appendix for more details on configuring a clustered pair.

8. Load Balancer Deployment Methods

The load balancer can be deployed in 4 fundamental ways: Layer 4 DR mode, Layer 4 NAT mode, Layer 4 SNAT mode, and Layer 7 SNAT mode.

For Hitachi Content Platform, using layer 7 SNAT mode is recommended. This mode is described below and is used for the configurations presented in this guide. For configuring using layer 7 SNAT mode please refer to the
Appliance Configuration for Hitachi Content Platform – Using Layer Layer 7 SNAT Mode

Layer 7 SNAT Mode

Layer 7 SNAT mode uses a proxy (HAProxy) at the application layer. Inbound requests are terminated on the load balancer and HAProxy generates a new corresponding request to the chosen Real Server. As a result, Layer 7 is typically not as fast as the Layer 4 methods. Layer 7 is typically chosen when either enhanced options such as SSL termination, cookie based persistence, URL rewriting, header insertion/deletion etc. are required, or when the network topology prohibits the use of the layer 4 methods.

- Because layer 7 SNAT mode is a full proxy, any server in the cluster can be on any accessible subnet including across the Internet or WAN.

- Layer 7 SNAT mode is not transparent by default, i.e. the Real Servers will not see the source IP address of the client, they will see the load balancer’s own IP address by default, or any other local appliance IP address if preferred (e.g. the VIP address). This can be configured per layer 7 VIP. If required, the load balancer can be configured to provide the actual client IP address to the Real Servers in 2 ways. Either by inserting a header that contains the client’s source IP address, or by modifying the Source Address field of the IP packets and replacing the IP address of the load balancer with the IP address of the client. For more information on these methods please refer to Transparency at Layer 7.

- Layer 7 SNAT mode can be deployed using either a one-arm or two-arm configuration. For two-arm deployments, eth0 is normally used for the internal network and eth1 is used for the external network although this is not mandatory.

- Requires no additional configuration changes to the load balanced Real Servers.

- Port translation is possible with Layer 7 SNAT mode, e.g. VIP:80 → RIP:8080 is supported.

- You should not use the same RIP:PORT combination for layer 7 SNAT mode VIPs and layer 4 SNAT mode VIPs because the required firewall rules conflict.

9. Loadbalancer.org Appliance – the Basics

Virtual Appliance
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, XEN and Nutanix AHV and has been optimized for each Hypervisor. By default, the VA is allocated 2 vCPUs, 4GB of RAM and has a 20GB 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 Virtual Appliance Installation and the ReadMe.txt text file included in the VA download for additional information on deploying the VA using the various Hypervisors.

Note: The VA has 4 network adapters. For VMware only the first adapter (eth0) is connected by default. For HyperV, KVM, XEN and Nutanix AHV all adapters are disconnected by default. Use the network configuration screen within the Hypervisor to connect the required adapters.

Initial Network Configuration
After boot up, follow the instructions on the appliance console to configure the management IP address, subnet mask, default gateway, DNS Server and other network settings.

Important: Be sure to set a secure password for the load balancer, when prompted during the setup routine.

Accessing the WebUI
The WebUI is accessed using a web browser. By default, user authentication is based on local Apache .htaccess files. User administration tasks such as adding users and changing passwords can be performed using the WebUI menu option: Maintenance > Passwords.

Note: A number of compatibility issues have been found with various versions of Internet Explorer and Edge. The WebUI has been tested and verified using both Chrome & Firefox.

Note: If required, users can also be authenticated against LDAP, LDAPS, Active Directory or Radius. For more information please refer to External Authentication.

1. Using a browser, access the WebUI using the following URL:


2. Log in to the WebUI:

   Username: loadbalancer
   Password: <configured-during-network-setup-wizard>

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

Once logged in, the WebUI will be displayed as shown below:
Note: The WebUI for the VA is shown, the hardware and cloud appliances are very similar. The yellow licensing related message is platform & model dependent.

3. You’ll be asked if you want to run the Setup Wizard. If you click **Accept** the Layer 7 Virtual Service configuration wizard will start. If you want to configure the appliance manually, simply click **Dismiss**.

**Main Menu Options**

- **System Overview** - Displays a graphical summary of all VIPs, RIPs and key appliance statistics
- **Local Configuration** - Configure local host settings such as IP address, DNS, system time etc.
- **Cluster Configuration** - Configure load balanced services such as VIPs & RIPs
- **Maintenance** - Perform maintenance tasks such as service restarts and taking backups
- **View Configuration** - Display the saved appliance configuration settings
- **Reports** - View various appliance reports & graphs
- **Logs** - View various appliance logs

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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 unit is covered in the section Configuring HA - Adding a Secondary Appliance of the appendix.

10. Appliance Configuration for Hitachi Content Platform – Using Layer 7 SNAT Mode

Configuring VIP 1 – Data

Configuring the Virtual Service (VIP)

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

2. Define the Label for the virtual service as required, e.g. HCP-Data.

3. Set the Virtual Service IP Address field to the required IP address, e.g. 192.168.85.150.

4. Set the Ports field to 80,443.

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. Set Health Checks to Negotiate HTTP (GET).

9. Set Request to send to /node_status.
10. Click Update.

Defining the Real Servers (RIPs)
1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Real Servers and click on Add a new Real Server next to the newly created VIP.
2. Define the Label for the real server as required, e.g. HCP_Node1.
3. Set the Real Server IP Address field to the required IP address, e.g. 192.168.85.200.
4. Click Update.
5. Repeat these steps to add the remaining HCP nodes.

Configuring VIP 2 – Metadata Query Engine (MQE)

Configuring the Virtual Service (VIP)
1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service.
2. Define the Label for the virtual service as required, e.g. HCP-MQE.
3. Set the Virtual Service IP Address field to the required IP address, e.g. 192.168.85.150.
4. Set the Ports field to 8888.
5. Set the Layer 7 Protocol to TCP Mode.
6. Click Update to create the virtual service.
Defining the Real Servers (RIPs)
1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Real Servers and click on Add a new Real Server next to the newly created VIP.
2. Define the Label for the real server as required, e.g. HCP_Node1.
3. Set the Real Server IP Address field to the required IP address, e.g. 192.168.85.200.
4. Click Update.
5. Repeat these steps to add the remaining HCP nodes.

Configuring VIP 3 – Namespace Browser (NSB)

Configuring the Virtual Service (VIP)
1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service.
2. Define the Label for the virtual service as required, e.g. HCP-NSB.
3. Set the Virtual Service IP Address field to the required IP address, e.g. 192.168.85.150.
4. Set the Ports field to 8000.
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. Set Health Checks to Negotiate HTTPS (GET).

9. Set Request to send to /node_status

10. Click Update.

Defining the Real Servers (RIPs)

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

2. Define the Label for the real server as required, e.g. HCB_Node1.

3. Set the Real Server IP Address field to the required IP address, e.g. 192.168.85.200.

4. Set the Real Server Port to 443.

5. Click Update.

6. Repeat these steps to add the remaining HCP nodes.
Optional Multi-Site Failover

If an HCP deployment is made up of two unique clusters at two sites, with replication taking place across a multi-site link, it is possible to set up a failover mechanism in the event that one HCP deployment should become unavailable.

For each virtual service in turn:

1. Click Modify next to the VIP in question.
2. Under the Fallback Server section, set the IP Address to the VIP address of the HCP service at the other site, e.g. 192.168.1.1.
3. Ensure that the Port field is empty.
4. Click Update.

11. Testing & Verification

Note For additional guidance on diagnosing and resolving any issues you may have, please also refer to Diagnostics & Troubleshooting.

Using System Overview

The System Overview can be viewed in the WebUI. It shows a graphical view of all VIPs & RIPs (i.e. the HCP nodes) and shows the state/health of each server as well as the state of the cluster as a whole. The example below shows that all services and all HCP nodes are healthy and available to accept connections:
12. 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.

13. Further Documentation


14. Conclusion

Loadbalancer.org appliances provide a very cost effective solution for highly available load balanced Hitachi Content Platform environments.
15. Appendix

**Configuring HA - Adding a Secondary Appliance**

Our recommended configuration is to use a clustered HA pair of load balancers to provide a highly available and resilient load balancing solution.

We recommend that the Primary appliance should be configured first, then the Secondary should be added. Once the Primary and Secondary are paired, all load balanced services configured on the Primary are automatically replicated to the Secondary over the network using SSH/SCP.

**Note** For Enterprise Azure, the HA pair should be configured first. In Azure, when creating a VIP using an HA pair, 2 private IPs must be specified – one for the VIP when it’s active on the Primary and one for the VIP when it’s active on the Secondary. Configuring the HA pair first, enables both IPs to be specified when the VIP is created.

The clustered HA pair uses Heartbeat to determine the state of the other appliance. Should the active device (normally the Primary) suffer a failure, the passive device (normally the Secondary) will take over.

**Non-Replicated Settings**

A number of settings are not replicated as part of the Primary/Secondary pairing process and therefore must be manually configured on the Secondary appliance. These are listed by WebUI menu option in the table below:

<table>
<thead>
<tr>
<th>WebUI Main Menu Option</th>
<th>Sub Menu Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Configuration</td>
<td>Hostname &amp; DNS</td>
<td>Hostname and DNS settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Network Interface Configuration</td>
<td>All network settings including IP address(es), bonding configuration and VLANs</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Routing</td>
<td>Routing configuration including default gateways and static routes</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>System Date &amp; time</td>
<td>All time and date related settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Physical – Advanced Configuration</td>
<td>Various settings including Internet Proxy, Management Gateway, Firewall connection tracking table size, NIC offloading, SMTP relay, logging and Syslog Server</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Security</td>
<td>Appliance security settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>SNMP Configuration</td>
<td>Appliance SNMP settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Graphing</td>
<td>Appliance graphing settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>License Key</td>
<td>Appliance licensing</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Software Updates</td>
<td>Appliance software update management</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Firewall Script</td>
<td>Appliance firewall (iptables) configuration</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Firewall Lockdown Wizard</td>
<td>Appliance management lockdown settings</td>
</tr>
</tbody>
</table>

**Important** Make sure that if these settings/updates have been configured on the Primary appliance, they’re also configured on the Secondary appliance.

*To add a Secondary node - i.e. create a highly available clustered pair:*
Note: If you have already run the firewall lockdown wizard on either appliance, you'll need to ensure that it is temporarily disabled on both appliances whilst performing the pairing process.

1. Deploy a second appliance that will be the Secondary and configure initial network settings.

2. Using the WebUI on the Primary appliance, navigate to: Cluster Configuration > High-Availability Configuration.

3. Specify the IP address and the loadbalancer user's password for the Secondary (peer) appliance as shown above.

4. Click Add new node.

5. The pairing process now commences as shown below:

6. Once complete, the following will be displayed on the Primary appliance:
7. 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 Primary appliance will also automatically restart heartbeat on the Secondary appliance.

Note For more details on configuring HA with 2 appliances, please refer to **Appliance Clustering for HA**.

Note For details on testing and verifying HA, please refer to **Clustered Pair Diagnostics**.
## 16. Document Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
<th>Reason for Change</th>
<th>Changed By</th>
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</thead>
<tbody>
<tr>
<td>1.0.0</td>
<td>14 July 2022</td>
<td>Initial version</td>
<td></td>
<td>AH</td>
</tr>
</tbody>
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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.