



# Implementing Load Balancing

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## F5 Load Balancing

Cisco UCS Director supports the creation and monitoring of F5 load balancers.

Although load balancing may be prevalent in the routing environment, it is also of growing importance in the virtual networking and VM environment. Server load balancing is a mechanism for distributing traffic across multiple virtual servers, offering high application and server resource utilization.

Server load balancing (SLB) is the process of deciding to which server a load-balancing device should send a client request for service. For example, a client request can consist of an HTTP GET for a web page or an FTP GET to download a file. The job of the load balancer is to select the server that can successfully fulfill the client request and do so in the shortest amount of time without overloading either the server or the server farm as a whole.

Depending on the load-balancing algorithm or predictor that you configure, the F5 BIG-IP performs a series of checks and calculations to determine the server that can best service each client request. F5 BIG-IP bases server selection on several factors, including the server with the fewest connections regarding load, source or destination address, cookies, URLs, or HTTP headers.

A high-level process flow of load balancing is as follows:

- 1 A client attempts to connect with a service on the load balancer.
- 2 The load balancer accepts the connection.
- 3 The load balancer decides which host should receive the connection and changes the destination IP address (or port) in order to match the service of the selected host.
- 4 The host accepts the load balancer's connection and responds to the original source, to the client (through its default route), and to the load balancer.

- 5 The load balancer acquires the return packet from the host and changes the source IP address (or port) to correspond to the virtual server IP address and port, and forwards the packet back to the client.
- 6 The client receives the return packet, assuming it came from the virtual server, and continues the rest of the process.

Cisco UCS Director enables the management, orchestration, and monitoring of the F5 load balancer. Following is a summary of the crucial processes:

- 1 Add the F5 load balancer. To add the F5 load balancer, navigate to **Administration > Physical Accounts > Managed Network Element > Add Network Element**.
- 2 On adding the F5 load balancer as a managed element, Cisco UCS Director triggers Cisco UCS Director task inventory collection. The polling interval configured on the **System Tasks** tab specifies the frequency of inventory collection.
- 3 After the F5 load balancer is added to the Pod, it is listed with all other components of the pod environment at the account level. To see the F5 component information, navigate to **Physical > Network > Network Managed Elements**.

There are two ways to implement load balancing on an F5 device using Cisco UCS Director:

- 1 Use an iApps (BIG-IP) application service.  
iApps application templates let you configure the BIG-IP system for your HTTP applications, by functioning as an interface to consistently deploy, manage, and monitor your servers. You can use default iApps templates or create and customize a template to implement load balancing on the F5 device.
- 2 Use Cisco UCS Director to:
  - Set up a managed element
  - Create a Pool
  - Add pool members
  - Create a virtual server

## About the Workflow Task for F5 Application Container Setup

Cisco UCS Director includes an F5 BIG-IP workflow task to aid in connecting to the Load Balancer using the Workflow Designer. The crucial workflow tasks are:

- Allocate Container VM Resources
- Provision Container - Network
- Provision Container - VM
- Re-synch Container - VMs
- Setup Container Gateway
- Setup Container F5 Load Balancer
- Send Container Email

## F5 Load Balancing Application Container Prerequisites

You must complete the following tasks before you can create and implement an F5 Load Balancing Application Container within Cisco UCS Director.

- Fenced Container Setup
- Fenced Container Setup - ASA Gateway

**Tip**

The Setup Container Load Balancer task is provided for manual creation of the application service. This task is integrated with the Fenced Container Setup-ASA Gateway task to create an F5 load balancing application container.

## Requirements for Setup of a F5 Load Balancing Application Container

Cisco UCS Director can create an application container that provides F5 load balancing properties to the contained VMs. The Cisco UCS Director process workflow is summarized below:

- 1 Create a load balancing policy
- 2 Add a network element
- 3 Create a virtual infrastructure policy
- 4 Create a tiered application gateway policy (optional)
- 5 Create a container template
- 6 Create a container

## F5 Big IP Network Settings Limitations

You must configure the required network settings in the gateway as well as in F5 BIG-IP device manually.

**Note**

Configuring the VLAN and NAT settings in the gateway, as well as related network settings in the F5 device, cannot be performed using Cisco UCS Director as part of F5 application container support. This particular automation process will be addressed in an upcoming release of Cisco UCS Director.

## Adding a Network Element

In order to create a virtual server that supports load balancing, first add a network element in Cisco UCS Director. After a Load Balancer is added as a network element in Cisco UCS Director, it appears under the **Managed Network Element** tab.

**Before You Begin**

You must be logged in to the appliance to complete this task.

**Step 1** On the menu bar, choose **Administration > Physical Accounts**.

**Step 2** Choose the **Managed Network Elements** tab.

**Step 3** Click **Add Network Element**.

**Step 4** In the **Add Network Element** dialog box, complete the following fields:

Name	Description
Pod drop-down list	Choose the pod to which the network element belongs.
Device Category drop-down list	Choose the device category for this network element. For example: <b>F5 Load Balancer</b> .
Device IP field	The IP address for this device.
Protocol drop-down list	Choose the protocol to be used. The list may include the following: <ul style="list-style-type: none"> <li>• Telnet</li> <li>• SSH</li> <li>• HTTP</li> <li>• HTTPS</li> </ul> <p><b>Note</b> When working with an F5 load balancer device, HTTP and HTTPS are the only valid selections.</p>
Port field	The port to use.
Login field	The login name.
Password field	The password associated with the login name.

**Step 5** Click **Submit**.

Adding the F5 Load Balancer triggers the system task inventory collection. The polling interval configured on the **System Tasks** tab specifies the frequency of inventory collection.

**What to Do Next**

To modify or edit a virtual server, choose the server, then click the **Modify** button. To remove a virtual server, choose the server, then click the **Delete** button.

## Adding an F5 Load Balancing Policy

- Step 1** On the menu bar, choose **Policies > Application Containers**.
- Step 2** Click the **F5 Load Balancer Policies** tab.
- Step 3** Click (+) **Add Policy**.
- Step 4** In the **Add F5 Load Balancer Policy** dialog box, complete the following fields:

*Table 1:*

Name	Description
Policy Name field	The name you assign to an F5 load balancer application policy.
Policy Description field	A description of this policy.
Load Balancer Account Type drop-down list	Choose <b>Physical</b> .
Select F5 Account drop-down list	Choose an <b>F5 load balancer</b> account from the available list.

- Step 5** Click **Next**.
- Step 6** Click **Submit**.

### What to Do Next

Create a virtual infrastructure policy.

## Adding an F5 Load Balancing Virtual Infrastructure Policy

- Step 1** From the menu bar, choose **Policies > Application Containers**.
- Step 2** Click the **Virtual Infrastructure Policies** tab.
- Step 3** Click (+) **Add Policy**.
- Step 4** In the **Virtual Infrastructure Policy Specification** dialog box, complete the following fields:

Name	Description
Template Name field	A unique name for the policy.
Template Description field	A description of this policy.

Name	Description
Container Type drop-down list	Choose <b>Fenced Virtual</b> as a container type.
Select Virtual Account drop-down list	Choose a virtual account to which you want to apply the virtual infrastructure policy.

**Step 5** Click **Next**.

**Step 6** In the **Virtual Infrastructure Policy - Fencing Gateway** dialog box, complete the following fields:

Name	Description
Gateway Required check box	Check this check box to select a gateway policy, otherwise click <b>Next</b> .
Select Gateway Policy drop-down list	If the <b>Gateway Required</b> check box is checked, this field allows you to choose a gateway policy for the virtual infrastructure policy.

**Step 7** Click **Next**.

**Step 8** In the **Virtual Infrastructure Policy - Fencing Load Balancing** dialog box, complete the following fields:

Name	Description
F5 Load Balancer Required check box	Check this check box to choose an F5 load balancing for the virtual infrastructure policy.
Select F5 Load Balancer Policy drop-down list	If the <b>F5 Load Balancer Required</b> check box is checked, this field allows you to choose an F5 load balancing policy.

**Step 9** Click **Next**.

**Step 10** Click **Submit**.

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### What to Do Next

Configure the Tiered Application Gateway Policies.

## Creating a Tiered Application Gateway Policy

**Step 1** On the menu bar, choose **Policies > Application Containers**.

**Step 2** Click the **Tiered Applications Gateway Policies** tab.

**Step 3** Click (+) **Add Policy**.

**Step 4** In the **Add Gateway Policy** dialog box, complete the following fields:

Name	Description
<b>Policy Name</b> field	The name you assign to an F5 load balancer tiered application gateway policy.
<b>Policy Description</b> field	A description of this policy.
<b>Gateway Type</b> drop-down list	Choose a gateway type.
<b>Select Virtual Account</b> drop-down list	Choose a cloud account to deploy the container.

**Step 5** Click **Next**.

**Step 6** In the **Add Gateway Policy** dialog box, complete the following fields for the Linux gateway selection (if applicable):

Name	Description
<b>VM Image for the Gateway</b> drop-down list	Choose an VM image for the gateway from the list.
<b>Number of Virtul CPUs</b> field	The number of virtual CPUs allowed as per policy.
<b>Memory</b> drop-down list	Choose the size of the memory.
<b>CPU Reservation in MHz</b> field	The number of CPU reserved as per the policy.
<b>Memory Reservation in MB</b> field	The maximum limit of memory reserved as per the policy in MB.
<b>Root Login for the Template</b> field	The root login name for accessing the template.
<b>Root password for the Template</b> field	The root password for accessing the template.
<b>Gateway Password Sharing Option</b> drop-down list	If and how to share the root password for the gateway VM with end users.

**Step 7** In the **Add Gateway Policy** screen , complete the following fields for the Cisco ASA (if applicable) selection:

Name	Description
Select Device drop-down list	Choose a Cisco ASA device.
Outside Interface drop-down list	Choose the outside interface for the Cisco ASA device.
Outside Interface IP Address field	The IP address of the outside interface.
Outside Interface VLAN ID field	The VLAN ID associated to the outside interface.
Inside Interfaces field	Choose <b>Select</b> and choose an inside interface.

**Step 8** In the **Add Gateway Policy** screen , complete the following fields for the Cisco ASAv (if applicable) selection:

Name	Description
ASAv OVF field	Click <b>Select</b> and choose an OVF file for the Cisco ASAv device from the table.
ASAv Policy field	Click <b>Select</b> and choose the ASAv deployment policy from the table. This deployment policy is created earlier by choosing <b>Policies &gt; Virtual / Hypervisor Policies &gt; Service Delivery &gt; ASAv Deployment Policy</b> .
Outside Interface field	Click <b>Select</b> and choose an outside interface from the table.
Inside Interfaces field	Click <b>Select</b> and choose an inside interface from the table.

**Step 9** Click **Next**.

**Step 10** Click **Submit**.

## Creating an Application Container Template



### Note

This procedure does not capture the steps to update a template. If you change the templates, the template is applied only to the newly created containers from that template. With this template you can create application containers for use in a variety of networks (including DFA Networks).



### Before You Begin

Create a virtual infrastructure policy.

**Step 1** On the menu bar, choose **Policies > Application Containers**.

**Step 2** Click the **Application Container Templates** tab.

**Step 3** Click **Add Template**. The **Application Container Template** dialog box appears. Complete the following fields:

Name	Description
Template Name field	The name of the new template.
Template Description field	The description of the template.

**Step 4** Click **Next**.

**Step 5** The **Application Container Template - Select a Virtual infrastructure policy** dialog box appears. Complete the following selection:

Name	Description
Select Virtual Infrastructure Policy drop-down list	Choose a policy to deploy the container. <b>Note</b> Select a policy that supports load balancing (future wizard screens are then populated with applicable load balancing information).

**Step 6** Click **Next**. The **Application Container: Template - Internal Networks** dialog box appears. You can add and configure multiple networks for a container. These networks are applicable to the VM that is provisioned using this template.

**Step 7** Click the (+) **Add** icon to add a network. The **Add Entry to Networks** dialog box appears. Complete the following fields:

Name	Description
Dynamic Fabric Network check box	If checked, enables the application container for use in Digital Fabric Automation Networks.
Network Name field	The network name. The name should be unique within the container.
Fabric Account drop-down list	Choose a fabric account.
Network IP Address field	The network IP address for the container.
Network Mask field	The network mask address for the container.
Gateway IP Address field	The IP address of the default gateway for the network. A NIC with this IP address is created on the GW VM.

**Step 8** Click **Submit**.

Next, you can add and configure the VM that will be provisioned in the application container.

**Step 9** Click **OK**.

**Step 10** Click the **Add (+)** icon to add a VM. The **Add Entry to Virtual Machines** dialog box appears. Complete the following fields:

Name	Description
<b>VM Name</b> field	The VM name.
<b>Description</b> field	The description of the VM.
<b>VM Image</b> drop-down list	Choose the VM image to be deployed.
<b>Number of Virtual CPUs</b> drop-down list	Choose the number of virtual CPUs that can be allowed in the container.
<b>Memory</b> drop-down list	Choose the size of the memory.
<b>CPU Reservation (MHz)</b> field	The CPU reservation for the VM.
<b>Memory Reservation (MB)</b> field	The memory reservation for the VM.
<b>Disk Size (GB)</b> field	The custom disk size for the VM. To use the template disk size specify the value of 0. The specified disk size overrides the disk size of the selected image.
<b>VM Password Sharing Option</b> drop-down list	Choose an option to share the VM's username and password with the end users. If <b>Share after password reset</b> or <b>Share template credentials</b> is chosen, the end user needs to specify a username and password for the chosen templates.
<b>VM Network Interfaces</b> field	Choose the VM network interface information. If you are adding another network interface, go to Step 9.
<b>Maximum Quality</b> field	States the maximum number of instances that can be added in this container after it is created.
<b>Initial Quality</b> field	States the number of VM instances to provision when the container is created.

**Step 11** Click **Next**.

**Step 12** (Optional) Click the **Add (+)** icon to add a new (multiple) VM network interface. Complete the following fields:

Name	Description
<b>VM Network Interface Name</b> field	The name of the VM network interface.
<b>Select the Network</b> drop-down list	Choose a network.
<b>Adapter Type</b> drop-down list	Choose the type of the adapter.

Name	Description
IP Address field	The IP address of the network.

**Step 13** In the **Application Container Template - F5 Application Service** dialog box, complete the following fields:

Name	Description
Application Service Name field	The name of the application service.
Template field	Choose a template.
IP Address field	The IP address of the network.
Virtual Server IP field	IP address of the virtual server.
Virtual Server Port field	Port used on the virtual server.
FQDN names of Virtual Server field	Name of the FQDN virtual server. <b>Note</b> Separate each FQDN name with a comma.
Nodes List drop-down list	Select a node from the Nodes list and click <b>Submit</b> . If the Nodes list fails to present a node that you want to associate with the virtual server: <ul style="list-style-type: none"> <li>• Click <b>Add (+)</b> icon to add the nodes. The <b>Add Entry to Nodes list</b> dialog box appears.</li> <li>• Provide the Node IP address, the port, and the connection limit; then click <b>Submit</b>.</li> </ul>

**Step 14** Click **Next**.

**Step 15** The **Application Container Template - Deployment Policies** dialog box appears. You must select the compute, storage, network, system policy, and cost model required for VM provisioning. A policy is a group of rules that determine where and how a new VM is to be provisioned within an application container (based on the availability of system resources).

- The network policy is used only to deploy the outside interface of the virtual firewall (container gateway).
- The selected *Portgroup in Network Policy* should be on the host on which the Gateway VM is provisioned.
- The network policy can use either a *Static IP Pool* or *DHCP*. However, for container type VSG the network policy should use a Static IP Pool only. The VSG VM requires IP addresses as input. There is no current provision to specify DHCP for deploying a VSG VM.
- The network adapter settings for a provisioned VM (container gateway) should be similar to the settings in the template. You may or may not have to check the *Copy Adapter from Template* check box in the network policy used for this application container.

Complete the following fields:

Name	Description
Compute Policy drop-down list	Choose a computer policy.
Storage Policy drop-down list	Choose a storage policy.
Network Policy drop-down list	Choose a network policy.
Systems Policy drop-down list	Choose a systems policy.
Cost Model drop-down list	Choose a cost model.

**Step 16** Click **Next**. The **Application Container: Template - Options** dialog box appears. You can select options to enable or disable certain privileges for the self-service end user.

Complete the following fields:

Name	Description
Enable Self-Service Power Management of VMs check box	If checked, enables self-service power management of VMs.
Enable Self-Service Resizing of VMs check box	If checked, enables self-service resizing of VMs.
Enable Self-Service VM Snapshot Management check box	If checked, enables self-service VM snapshot management.
Enable VNC Based Console Access check box	If checked, enables self-service VNC based console access.
Enable Self-Service Deletion of Containers check box	If checked, enables self-deletion of containers.
Technical Support Email Addresses field	The technical support email address. A detailed technical email is sent to one or more email addresses entered into this field after a container is deployed.

**Step 17** Click **Next**. The **Application Container: Template - Setup Workflows** dialog box appears. Complete the following field:

Name	Description
Container Setup Workflow drop-down list	Choose a workflow to establish the application container.

**Step 18** Click **Next** to complete the creation of the application container template and review the **Summary** screen.

**Note** Notice the inclusion of a Load Balancing Criteria Summary entry.

**Step 19** Click **Submit**.

## Creating an Application Container Using a Template

Once you create a application container template you can use the template administrator to create other application containers. If you want to create a template for use in a VSG environment, see [Creating an Application Template for a VSG](#).



**Note** An application container must use a unique VLAN for its own network. There can be no other port group on (VMware) vCenter using VLAN.

**Step 1** Choose **Policies > Application Containers**.

**Step 2** Click the **Application Container Templates** tab.

**Step 3** Choose a template.

**Step 4** Click **Create Container**.

**Step 5** In the **Create container from template** dialog box, complete the following fields:

**Note** The combined length of the private network name, service name, and container name must not exceed 32 characters.

Name	Description
<b>Container Name</b> field	The name of the container. This name must be unique.
<b>Container Label</b> field	The label for the container.
<b>Tenant</b> field	Click <b>Select</b> and choose a tenant from the table.
<b>Private Network Name</b> field	This field appears only when the tenant with private network is selected. Click <b>Select</b> and choose the name of a private network associated with the selected tenant.
<b>Network Throughput</b> drop-down list	Choose the throughput of the network. <b>Note</b> This field is not supported for a tenant with private network.

The following fields appear only when the tenant with private network is selected in the **Tenant** field. That is, these fields appear only for the tenant which has the capability of supporting varied VM instances per internal tier.

Name	Description
<b>VM Labels Prefix Customization</b> field	The customized prefix name of the VM for each tier. <b>Note</b> The prefix name is obtained from the VM label prefix of the application profile where the administrator defines the prefix for each tier. During application container deployment, you can update the prefix from what is defined in the application profile.
The maximum quantity of the internal tiers such as WEB/APP/DB tiers are illustrated only as examples in the following fields. There can be more than three tiers as per the definition in the application profile. The number of fields appear based on the number of internal tiers that are defined as part of the application profile.	
<b>Maximum Quantity for &lt;WEB&gt; tier</b> field	The maximum number of VM instances in the <i>&lt;web&gt;</i> tier.
<b>Maximum Quantity for &lt;APP&gt; tier</b> field	The maximum number of VM instances in the <i>&lt;application&gt;</i> tier.
<b>Maximum Quantity for &lt;DB&gt; tier</b> field	The maximum number of VM instances in the <i>&lt;database&gt;</i> tier.
<b>Note</b>	The internal tier names given in the application profile are dynamically fetched and displayed in the fields during create container action. If the maximum quantity for any internal tier is changed during create container action, this value is considered as maximum number of host size for allocating subnet per tier.
The following fields will not appear in the tenant with private network is selected in the <b>Tenant</b> field.	
<b>Enable Disaster Recovery</b> check box	Check this check box to enable the disaster recovery service for the container.
<b>Enable Resource Limits</b> check box	Check this check box to specify the number of vCPUs, memory, maximum storage, and maximum number of servers for the container.
<b>Enable Network Management</b> check box	Check this check box to enable the network management service for the container. <b>Note</b> This field is applicable only for Layer 4 and Layer 7 devices that are managed by APIC device package.
<b>Tier Label Customization</b> area	This field appears only for APIC containers. The customized name of the tier label.

**Step 6** Click **Submit**. The **Submit Result** dialog box appears.

**Note** Remember to make a note of the service request presented in the **Submit Result** dialog box.

**Step 7** Click **OK**.

**Note** You can view the progress of the container's creation by viewing the details of the service request.

**Step 8** Click the **Application Containers** tab.

The new container appears in the **Application Containers** pane.

## Initiating a Service Request



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**Note** F5 Load Balancing is only supported on fenced virtual containers.

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- Step 1** On the menu bar, choose **Organization > Service Request**.
  - Step 2** Click the **Advanced Filter** button (far right side of interface).
  - Step 3** Choose **Request Type** from the **Search** drop-down list.
  - Step 4** Enter **Advanced** in the **Test** field.
  - Step 5** Click **Search**.
  - Step 6** Click the **Fenced Container Setup** workflow.
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