NITRO API

http://docs.citrix.com/content/docs/en-us/netscaler/11/nitro-api.html
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NITRO API

The NetScaler NITRO protocol allows you to configure and monitor the NetScaler appliance programmatically by using Representational State Transfer (REST) interfaces. Therefore, NITRO applications can be developed in any programming language. Additionally, for applications that must be developed in Java or .NET or Python, NITRO APIs are exposed through relevant libraries that are packaged as separate Software Development Kits (SDKs).

Important

- XML API are deprecated from NetScaler 10.5 onwards.

- Until specified otherwise, this NITRO documentation applies to NetScaler versions 11.0 and 10.5.

To use NITRO, you must have a basic understanding of the NetScaler appliance and you must make sure that the client application has the following:

- Access to a NetScaler appliance, version 9.2 or later.
- To use REST interfaces, you must have a system to generate HTTP or HTTPS requests (payload in JSON format) to the NetScaler appliance. You can use any programming language or tool.
- For Java clients, you must have a system where Java Development Kit (JDK) 1.5 or later is available. The JDK can be downloaded from http://www.oracle.com/technetwork/java/javase/downloads/index.html .
- For .NET clients, you must have a system with .NET framework 3.5 or later installed. The .NET framework can be downloaded from http://www.microsoft.com/downloads/en/default.aspx.
- The Python SDK is available from NetScaler 10.5 onwards. For Python clients, you must have a system with Python 2.7 or above version and the Requests library (available in <NITRO_SDK_HOME>/lib) installed. The NITRO library must be installed on the client path. For installation instructions, read the <NITRO_SDK_HOME>/README.txt file.

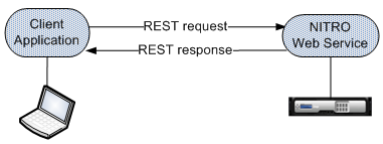
Obtaining the NITRO Package

The NITRO package is available as a tar file on the **Downloads** page of the NetScaler appliance's configuration utility. You must download and un-tar the file to a folder on your local system. This folder contains the NITRO libraries in the **lib** subfolder. The libraries must be added to the client application classpath to access NITRO functionality.

Note: The REST package contains only documentation for using the REST interfaces.

How NITRO Works

The NITRO infrastructure consists of a client application and the NITRO Web service running on a NetScaler appliance. The communication between the client application and the NITRO web service is based on REST architecture using HTTP or HTTPS.



As shown in the above figure, a NITRO request is executed as follows:

1. The client application sends REST request message to the NITRO web service. When using the SDKs, an API call is translated into the appropriate REST request message.

2. The web service processes the REST request message.
3. The NITRO web service returns the corresponding REST response message to the client application. When using the SDKs, the REST response message is translated into the appropriate response for the API call.

To minimize traffic on the NetScaler network, you retrieve the whole state of a resource from the server, make modifications to the state of the resource locally, and then upload it back to the server in one network transaction. For example, to update a load balancing virtual server, you must retrieve the object, update the properties, and then upload the changed object in a single transaction.

Note: Local operations on a resource (changing its properties) do not affect its state on the server until the state of the object is explicitly uploaded.

NITRO APIs are synchronous in nature. This means that the client application waits for a response from the NITRO web service before executing another NITRO API.

REST Web Services

REST (REpresentational State Transfer) is an architectural style based on simple HTTP requests and responses between the client and the server. REST is used to query or change the state of objects on the server side. In REST, the server side is modeled as a set of entities where each entity is identified by a unique URL.

For information on the NITRO SDKs, see Java, .NET, and Python API.

The general format for NITRO URLs is as follows:

- **For configurations.** http://<netscaler-ip-address>/nitro/v1/config/<resource-type>
- **For retrieving statistics.** http://<netscaler-ip-address>/nitro/v1/stat/<resource-type>

For example, for a load balancing virtual server, <resource-type> can be replaced by lbvserver.

> **Important**
>
> From NetScaler 10.1 version onwards, the following Content-Type is supported:
>
> Content-Type:application/json.
>
> However, content types such as "application/x-www-form-urlencoded" and of the form "application/vnd.com.citrix.netscaler" that were supported in NetScaler 9.3 and earlier versions can also be used. You must make sure that the payload is the same as used in earlier versions.
>
> The payloads provided in this documentation are applicable only for the "application/json" Content-Type.

Some points to remember:

- In addition to the CRUD operations (Create, Read, Update, and Delete), resources (such as lbvserver) can support other operations or actions. These operations use the HTTP POST method, with the URL specifying the operation to be performed and the request body specifying the parameters for that operation.
- All NITRO operations are logged in the /var/log/nitro.log file on the NetScaler appliance.

For more information on the REST objects and the usage, see the documentation provided in the <NITRO_SDK_HOME>/index.html file.

Connecting to the NetScaler Appliance

The first step towards using NITRO is to establish a session with the NetScaler appliance and then authenticate the session by using the NetScaler administrator's credentials. You must specify the username and password in the `login` object. The session ID that is created must be specified in the request header of all further operations in the session.

Note:

- You must have a user account on the appliance to log on to it. The configuration operations that you can perform are limited by the administrative roles assigned to your account.
- To ensure secure communication, use the HTTPS protocol in NITRO requests.
- Instead of creating a NITRO session, you can logon to the NetScaler appliance while performing individual operations. To do this, you must specify the username and password in the **request header** of the NITRO request as follows:

```
X-NITRO-USER:<username>
X-NITRO-PASS:<password>
Content-Type:application/vnd.com.citrix.netscaler.lbvserver+json
```

For example, to connect and create a session with a NetScaler appliance with NSIP address 10.102.29.60 by using the HTTP protocol:

- **Request:**

  HTTP Method
  POST
  URL
  http://10.102.29.60/nitro/v1/config/login
  Request Headers

```
Content-Type:application/vnd.com.citrix.netscaler.login+json
```

  Request Payload

```
{
    "login":
    {
        "username":"<username>",
        "password":"<password>"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  201 Created
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.
  Response Header

```
Set-Cookie:
NITRO_AUTH_TOKEN=<tokenvalue>;
path=/nitro/v1
```

Modifying the Session Timeout

You can modify the timeout period by specifying a new timeout period (in seconds) in the `login` object. For example, to modify the timeout period to 60 minutes:

```
{
    "login":
    {
        "username":"<username>",
        "password":"<password>",
        "timeout":"3600"
    }
}
```

Some points to note with regards to session timeout for NetScaler 10.5 and later versions:

- When restricted timeout param is enabled, NITRO, by default, uses the timeout value that is configured for the logged in user. You can customize this value but it must be limited to the value specified for the user. If no value is specified for the user, the default timeout value of 15 minutes is used.
- When restricted timeout param is not enabled, NITRO uses the default value of 30 minutes as session timeout.

Enabling NetScaler Features and Modes

Some NetScaler features and modes are disabled by default and therefore must be enabled before they can be configured. To enable a NetScaler feature or mode, specify the action as "enable" in the URL query string, and in the request payload, specify the feature or mode to be enabled.

For example, to enable the load balancing and content switching features:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/nsfeature?action=enable
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.nsfeature+json
```

  Request Payload

```
{
    "nsfeature":
    {
        "feature":
        [
            "LB",
            "CS"
        ]
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

For example, to enable the L2 and fast ramp modes:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/nsmode?action=enable
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.nsmode+json
```

  Request Payload

```
{
    "nsmode":
    {
        "mode":
        [
            "L2",
            "FR"
        ]
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Note: To disable a feature or mode, in the URL query string, specify the action as "disable".

Saving NetScaler Configurations

To make sure that the configurations persist on rebooting the appliance, you must save the NetScaler configurations. To save the configurations, specify the action as "save" in the URL query string.

To save the configurations:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/nsconfig?action=save
  Request Headers

  ```
  Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
  Content-Type:application/vnd.com.citrix.netscaler.nsconfig+json
  ```

  Request Payload

  ```
  {
      "nsconfig":
      {}
  }
  ```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

General API Usage

A NetScaler appliance has multiple features, and each feature has multiple resources. Each NetScaler resource, depending on the operation to be performed on it, has a unique URL associated with it. URLs for configuration operations have the following format:

`http://<netscaler-ip-address>/nitro/v1/config/<resource_type>/<resource_name>`.

For example, to access the lbvserver named MyFirstLbVServer on a NetScaler with IP 10.102.29.60, the URL is:

`http://10.102.29.60/nitro/v1/config/lbvserver/MyFirstLbVServer`.

This section explains, in general, the different types of operations that can be performed on the NetScaler appliance by using NITRO API.

Before going into the details of these operations, you must be aware of the following functionality:

- You can use the "action" query parameter in the URL to perform operations such as save, enable, disable, and kill sessions.
- You can use the "attrs", "filter", "args", "count" and other query parameters when retrieving NetScaler resources. For more information, see Retrieving Details of NetScaler Resources.
- You can perform bulk operations and thus minimize network traffic. To perform a bulk operation, specify the required parameters in the same request payload. You can also control the behavior of a bulk operation in case of failure of some operations. To do this, in the request header, specify the appropriate value for the X-NITRO-ONERROR parameter. For more information, see Performing Bulk Operations.
- NetScaler NITRO clearly shows the errors so that corrective actions can be taken. For more information, see Error Handling.

Adding a NetScaler Resource

To create a new resource (for example, an lbvserver) on the appliance, specify the resource name and other related arguments in the specific resource object.

For example, to create an load balancing virtual server named MyFirstLbVServer:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/lbvserver
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.lbvserver+json
```

  Request Payload

```
{
    "lbvserver":
    {
        "name":"MyFirstLbVServer",
        "servicetype":"http"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 Created
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Enabling a NetScaler Resource

To enable a resource on the NetScaler appliance, specify the action as "enable" in the URL query string, and in the request payload, specify the resource to be enabled.

For example, to enable a load balancing virtual server named MyFirstLbVServer:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/lbvserver?action=enable
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.lbvserver+json
```

  Request Payload

```
{
    "lbvserver":
    {
        "name":"MyFirstLbVServer"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Note: To disable a resource, in the URL query string, specify the action as "disable".

Getting the Count of NetScaler Resources

To get a count of a specific resource type, in the URL specify the count query parameter as "yes".

For example, to get a count of all the load balancing virtual servers:

- **Request:**

  HTTP Method
  : GET

  URL
  : http://<netscaler-ip-address>/nitro/v1/config/lbvserver?count=yes

  Request Headers

  ```
  Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
  Accept:application/vnd.com.citrix.netscaler.lbvserver+json
  ```

- **Response:**

  HTTP Status Code on Success
  : 200 OK

  HTTP Status Code on Failure
  : 4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

  Response Header

  ```
  Content-Type:application/vnd.com.citrix.netscaler.lbvserver+json
  ```

  Response Payload

  ```
  {
      "lbvserver":
      [
          {
              "__count": 4
          }
      ]
  }
  ```

Retrieving Details of NetScaler Resources

NITRO provides multiple approaches using which you can retrieve resources and their relevant details. The following table explains each of these approaches with the required URL.

Note: A sample format of the request and response is provided below the table.

Retrieving all details of all resources of a specific type	In the URL, specify the type of resource for which you want to retrieve the details. For example, to retrieve all details of load balancing virtual servers available on a NetScaler appliance. http://<netscaler-ip-address>/nitro/v1/config/lbvserver
Retrieving all details of a specific resource	In the URL, specify the name of resource for which you want to retrieve the details. For example, to retrieve all details of a load balancing virtual server named MyFirstLbVServer: http://<netscaler-ip-address>/nitro/v1/config/lbvserver/MyFirstLbVServer
Retrieving summary or detailed view of resources	In the URL, use the "view" query parameter to specify whether you want to view the summary (mandatory parameters) or detail (all parameters). For example, to view the mandatory parameters for all load balancing virtual servers: http://<netscaler-ip-address>/nitro/v1/config/lbvserver?view=summary Note: By default, the retrieved results are displayed in detail view (?view=detail).
Retrieving all details of resources that have multiple unique identifiers	In the URL, specify the type of resource and use the "args" query parameter to specify the unique attributes and the values for those attributes. For example, to get the application firewall profiles that have unique identifiers "name" and "starturl" as appfw1 and aa respectively. http://<netscaler-ip-address>/nitro/v1/config/appfwprofile?args=name:appfw1,starturl:aa
Retrieving specific details of all resources of a specific type	In the URL, specify the type of the resource and use the "attrs" query parameter to specify the resource details that you want to retrieve. For example, to retrieve the "name" and "lbmethod" of all load balancing virtual servers: http://<netscaler-ip-address>/nitro/v1/config/lbvserver?attrs=name,lbmethod
Retrieving specific details of a specific resource	In the URL, specify the type and name of the resource and use the "attrs" query parameter to specify the resource details that you want to retrieve. For example, to retrieve the "name" and "lbmethod" of a load balancing virtual server named "MyFirstLbVServer": http://<netscaler-ip-address>/nitro/v1/config/lbvserver/MyFirstLbVServer?attrs=name, lbmethod
Filtering the retrieved resources	In the URL, specify the type of resource and use the "filter" query parameter to specify the attribute(s) and the value(s) of the attributes. The resources fetched will be filtered based on the filter criteria. Note: The filter query parameter supports the use of PCRE regular expressions. For example, to filter the load balancing virtual servers where the "lbmethod" is ROUNDROBIN. http://<netscaler-ip-address>/nitro/v1/config/lbvserver?filter=lbmethod:ROUNDROBIN

Retrieving resources in paginated manner	If the request is likely to result in a large number of resources, you can divide the results into pages and retrieve them page by page (paginated). For example, if you are retrieving all the 53 load balancing virtual servers of a NetScaler appliance, instead of retrieving all 53 in one response, you can configure the results to be divided into 6 pages each having 10 results. In the URL, specify the name of the resource and use the following query parameters: • "pageno" - The page number to be displayed. • "pagesize" - The number of resources to be displayed in each page. For example, to retrieve the load balancing virtual servers in a paginated form, first get a count (using the "count" query parameter shown in below row) of the load balancing virtual servers. Then, accordingly specify the number of results for each page and then specify the page number to be displayed. http://<netscaler-ip-address>/nitro/v1/config/lbvserver?pagesize=10&pageno=3

For example, to retrieve only the name and load balancing method of all load balancing virtual servers on a NetScaler:

- **Request:**

  HTTP Method
  GET
  URL
  http://<netscaler-ip-address>/nitro/v1/config/lbvserver?attrs=name,lbmethod
  Request Headers

  ```
  Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
  Accept:application/vnd.com.citrix.netscaler.lbvserver_list+json
  ```

  Note: If the operation returns a list of objects, the Accept header does not require the resource type to be appended by "_list".

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.
  Response Header

  ```
  Content-Type:application/vnd.com.citrix.netscaler.lbvserver_list+json
  ```

  Note: For a single object, the Content-Type header does not require the resource type to be appended by "_list".
  Response Payload

  ```
  {
      lbvserver:
      {
          name: "test",
          lbmethod: "LEASTCONNECTION"
      }
      {
          name: "test1",
          lbmethod: "LEASTCONNECTION"
      }
  }
  ```

Retrieving Statistics of NetScaler Resources

The NetScaler appliance collects statistics about the usage of its features and the corresponding resources. NITRO can retrieve these statistics.

- To get statistics of a feature, the URL format must be: *http://<netscaler-ip-address>/nitro/v1/stat/<feature_name>*.
- To get statistics of a resource, the URL format must be: *http://<netscaler-ip-address>/nitro/v1/stat/<resource_type>/<resource_name>*.
- To get statistics of the services and service groups that are bound to a load balancing virtual server, the URL format must be: *http://<netscaler-ip-address>/nitro/v1/stat/lbvserver/<name>?statbindings=yes.*

For example, to get the statistics of a load balancing virtual server named MyFirstLbVServer:

- **Request:**

  HTTP Method
  GET
  URL
  http://<netscaler-ip-address>/nitro/v1/stat/lbvserver/MyFirstLbVServer
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Accept:application/vnd.com.citrix.netscaler.lbvserver+json
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.
  Response Header

```
Content-Type:application/vnd.com.citrix.netscaler.lbvserver+json
```

  Response Payload

```
{
    "lbvserver":
    [
        {
            "name":"MyFirstLbVServer",
            "establishedconn":0,
            "vslbhealth":0,
            "primaryipaddress":"0.0.0.0",
            ...
        }
    ]
}
```

Note: Not all NetScaler features and resources have statistic objects associated with them.

Resetting Properties of a NetScaler Resource

To unset the value of an attribute of a NetScaler object or reset it to its default value (similar to the "unset" NetScaler CLI commands), specify the action as "unset" in the URL query string, and in the request payload, specify the value of the attributes to be unset as "true" (boolean).

For example, to unset the load balancing method and the comments attributes of a load balancer virtual server named MyFirstLbVServer:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/lbvserver?action=unset
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.lbvserver+json
```

  Request Payload

```
{
    "lbvserver":
    {
        "name":"MyFirstLbVServer",
        "lbmethod":"true",
        "comment":"true"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Renaming a NetScaler Resource

To change the name of an existing resource, specify the action as "rename" in the URL query string, and in the request payload, specify the existing name and the new name.

For example, to change the name of a load balancing virtual server from MyFirstLbVServer to MyServer:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/lbvserver?action=rename
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.lbvserver+json
```

  Request Payload

```
{
    "lbvserver":
    {
        "name":"MyFirstLbVServer",
        "newname":"MyServer"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Updating a NetScaler Resource

To update the details of an existing resource on the NetScaler appliance, specify the name of the resource in the URL, and in the request payload,within the specific resource object, specify the name and the updated details of the resource.

For example, to change the load balancing method to ROUNDROBIN and update the comment property for a load balancing virtual server named MyFirstLbVServer:

- **Request:**

  HTTP Method
  PUT
  URL
  http://<netscaler-ip-address>/nitro/v1/config/lbvserver/MyFirstLbVServer
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.lbvserver+json
```

  Request Payload

```
{
    "lbvserver":
    {
        "name":"MyFirstLbVServer",
        "lbmethod":"ROUNDROBIN",
        "comment":"Updated comments"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Binding NetScaler Resources

NetScaler resources form relationships with each other through the process of binding. This is how services are associated with a load balancing virtual server, or how policies are bound to a load balancing virtual server. Each binding relationship is represented by its own object. A binding resource has properties representing the name of each NetScaler resource in the binding relationship. It can also have other properties related to that relationship (for example, the weight of the binding between an lbvserver resource and a service resource).

Read through the following examples to get a better understanding of the bind and unbind operation.

Example 1: To bind a service named "svc_prod" to a load balancing virtual server named "MyFirstLbVServer" and specify a weight for the binding:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/lbvserver_service_binding
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.lbvserver_service_binding
```

  Request Payload

```
{
    "lbvserver_service_binding":
    {
        "servicename":"svc_prod",
        "weight":"20",
        "name":"MyFirstLbVServer"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  201 Created
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Example 2: To bind a policy to a policy label:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/authenticationpolicylabel_authenticationpolicy_binding
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.authenticationpolicylabel
```

  Request Payload

```
{
    "authenticationpolicylabel_authenticationpolicy_binding":
    {
        "policyname":"p1",
        "priority":"100",
        "gotopriorityexpression":"END",
        "labelname":"pl1"
```

```
        }
    }
```

- **Response:**

  HTTP Status Code on Success
  : 201 Created

  HTTP Status Code on Failure
  : 4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

To unbind a resource, use the DELETE method and specify an "args" query string parameter in the URL that contains the attribute name and value in the relationship resource that designates the secondary resource.

For example, to unbind the service "svc_prod" from the load balancing virtual server "MyFirstLbVServer":

- **Request:**

  HTTP Method
  : DELETE

  URL
  : http://<netscaler-ip-address>/nitro/v1/config/lbvserver_service_binding/MyFirstLbVServer?args=servicename:svc_prod

  Request Header

  ```
  Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
  ```

- **Response:**

  HTTP Status Code on Success
  : 200 OK

  HTTP Status Code on Failure
  : 4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Globally Binding NetScaler Resources

Some NetScaler resources can be bound globally to affect the whole system. For example, if a compression policy is bound to an load balancing virtual server, the policy affects only the traffic on that virtual server. However, if bound globally, it can affect any traffic on the NetScaler appliance regardless of the virtual server that handles the traffic.

The names of NITRO resources that can be used to bind resources globally have the pattern <featurename>global_<resourcetype>_binding. For example, the object aaaglobal_aaapreauthenticationpolicy_binding is used to bind preauthentication policies globally.

For example, to bind the policy named preautpol1 globally at priority 200:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/aaaglobal_aaapreauthenticationpolicy_binding/preautpol1
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.aaaglobal_aaapreauthentic
```

  Request Payload

```
{
    "aaaglobal_aaapreauthenticationpolicy_binding":
    {
        "policy":"preautpol1",
        "priority":"200"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

To unbind a global resource, in the URL use the args query parameter to specify the resource to be unbound.

For example, to unbind the policy named preautpol1:

- **Request:**

  HTTP Method
  DELETE
  URL
  http://<netscaler-ip-address>/nitro/v1/config/aaaglobal_aaapreauthenticationpolicy_binding?args=policy:preautpol1
  Request Header

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Deleting a NetScaler Resource

The usage of the delete operation depends on the unique identifiers (UIDs) of the resource being deleted.

Deleting Resource with Single UID

To delete a NetScaler resource that can be identified by a single identifier, specify the resource name in the URL.

For example, to delete a load balancing virtual server named MyFirstLbVServer:

- **Request:**

  HTTP Method
  DELETE
  URL
  http://<netscaler-ip-address>/nitro/v1/config/lbvserver/MyFirstLbVServer
  Request Header

  ```
  Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
  ```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Deleting Resource with Multiple UIDs

To delete a NetScaler resource that is identified using multiple identifiers, use the "args" query parameter to specify the unique attributes along with their values.

For example, consider a SNIP (10.102.29.71) that belongs to two traffic domains (TDs) 123 and 110. To delete the SNIP from one of the traffic domains, specify the IP address and the relevant TD in the URL as follows:

- **Request:**

  HTTP Method
  DELETE
  URL
  http://<netscaler-ip-address>/nitro/v1/config/nsip?args=ipaddress:10.102.29.71,td:123
  Request Header

  ```
  Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
  ```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Performing Bulk Operations

You can create and update multiple resources simultaneously and thus minimize network traffic. For example, you can add multiple load balancing virtual servers in the same operation. To perform a bulk operation, specify the required parameters in the same request payload.

To account for the failure of some operations within the bulk operation, NITRO allows you to configure one of the following behaviors:

- **Exit.** When the first error is encountered, the execution stops. The NITRO operations that were executed before the error are committed. This is the default behavior.
- **Rollback.** When the first error is encountered, the execution stops. The NITRO operations that were executed before the error are rolled back. Rollback is only supported for add and bind NITRO operations.
- **Continue.** All the NITRO operations in the list are executed even if some operations fail.

You must specify the behavior of the bulk operation in the request header using the X-NITRO-ONERROR parameter.

For example, to add two load balancing virtual servers in one operation, and continue even if one of the add operation fails:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/lbvserver
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.lbvserver_list+json
X-NITRO-ONERROR:continue
```

  Request Payload

```
{
    "lbvserver":
    [
        {
            "name":"new_lbvserver1",
            "servicetype":"http"
        },

        {
            "name":"new_lbvserver2",
            "servicetype":"http"
        }
    ]
}
```

- **Response:**

  HTTP Status Code on Success
  201 Created for the add operation and 200 OK for the update operation.
  HTTP Status Code on Failure
  207 Multi Status with error details in the response payload. For more information, see Error Handling.

Performing File Operations

NetScaler operations such as configuring SSL certificates requires the input files to be available locally on the NetScaler appliance. NITRO allows you to perform file operations such as uploading files, retrieving files, retrieving file content, and deleting files of types.

Note:

- File size must be less than or equal to 2 MB.
- Use the "BASE64" value for the fileencoding attribute in the request payload. This is the only valid encoding currently supported.
- The filelocation path must be URL encoded. For example, if the path is /nsconfig/ssl, encode the / and use the file location as %2Fnsconfig%2Fssl.
- When uploading a file, make sure that each directory of the file path has the 755 (read, write, execute) permission. For example, to upload a file to the "/nsconfig/ssl/" directory, the following directories must have the 755 permission:
  flash (because the "/nsconfig" folder is actually a link to "/flash/nsconfig/" directory)
  nsconfig
  ssl

Uploading a File

To upload a file to the NetScaler, specify a name for the file, the location where the file must be created on the NetScaler, and the content of the file.

For example, to upload a file named cert1.crt in the /nsconfig/ssl/ directory:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/systemfile
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/json
```

  Request Payload

```
{
    "systemfile":
    {
        "filename": "cert1.crt",
        "filelocation": "/nsconfig/ssl/",
        "filecontent":"VGhpcyBpcyBteSBmaWxl",
        "fileencoding": "BASE64"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Retrieving the Files

To retrieve the files from a specific NetScaler directory, specify the directory path in the URL.

For example, to retrieve the files from the /nsconfig/ssl directory.

- **Request:**

  HTTP Method
  GET
  URL
  http://<netscaler-ip-address>/nitro/v1/config/systemfile?args=filelocation:%2Fnsconfig%2Fssl
  Request Header

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
```

```
Accept:application/json
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.
  Response Header

```
Content-Type:application/json
```

  Response Payload

```
{
    "systemfile":
    [
        {
            "filename": "ns-root.key",
            "filelocation": "/nsconfig/ssl",
            "fileaccesstime": "Tue Jan 14 19:27:01 2014",
            "filemodifiedtime": "Tue Nov  5 17:16:00 2013"
        },
        {
            "filename": "ns-root.req",
            "filelocation": "/nsconfig/ssl",
            "fileaccesstime": "Tue Jan 14 19:27:01 2014",
            "filemodifiedtime": "Tue Nov  5 17:16:00 2013"
        }
    ]
}
```

Retrieving Contents of a Specific File

To retrieve the contents of a file, specify the filename and its directory path in the URL.

For example, to retrieve the contents of the ns-root.key file from the /nsconfig/ssl directory.

- **Request:**

  HTTP Method
  GET
  URL
  http://<netscaler-ip-address>/nitro/v1/config/systemfile/ns-root.key?args=filelocation:%2Fnsconfig%2Fssl
  Request Header

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
```

```
Accept:application/json
```

- **Response:**

HTTP Status Code on Success
200 OK
HTTP Status Code on Failure
4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.
Response Header

```
Content-Type:application/json
```

Response Payload

```
{
    "systemfile":
    [
        {
            "filename": "ns-root.key",
            "filelocation": "/nsconfig/ssl",
            "filecontent": "LS0tLS1CRUdJTiBSU0EgUFJJVkFU0tLQo=",
            "fileencoding": "BASE64",
            "fileaccesstime": "Tue Jan 14 19:27:01 2014",
            "filemodifiedtime": "Tue Nov  5 17:16:00 2013"
        }
    ]
}
```

Deleting a File

To delete a file from the NetScaler appliance, specify the filename and the directory path in the URL.

For example, to delete the ns-root.key file from the /nsconfig/ssl directory.

- **Request:**

HTTP Method
DELETE
URL
https://<netscaler-ip-address>/nitro/v1/config/systemfile/ns-root.key?args=filelocation:%2Fnsconfig%2Fssl
Request Header

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
```

- **Response:**

HTTP Status Code on Success
200 OK
HTTP Status Code on Failure
4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Killing a System Session

A NetScaler administrator can kill any system session by specifying the action as "kill" in the URL query string and by specifying the required system session ID in the request payload.

For example, to kill a system session that has ID as 311:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/systemsession?action=kill
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.systemsession+json
```

  Request Payload

```
{
    "systemsession":
    {
        "sid":"311"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Disconnecting from the NetScaler Appliance

Before disconnecting (logging out) from the NetScaler appliance, make sure that you have saved the NetScaler configurations.

To logout of the NetScaler appliance:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/logout
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.logout+json
```

  Request Payload

```
{
    "logout":{}
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Usage Scenarios

In this section, we provide NITRO API specific to certain resources and scenarios. We will be adding more scenarios in future updates to this documentation.

Configuring a NetScaler Cluster

You can use NITRO to add or create and manage a NetScaler cluster.

Cluster Instance Operations

All operations on a cluster instance must be performed on the `clusterinstance` object.

For example, to create a cluster instance with ID 1, connect to the NetScaler appliance that you are first adding to the cluster:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/clusterinstance
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.clusterinstance+json
```

  Request Payload

```
{
    "clusterinstance":
    {
        "clid":1,
        "preemption":"ENABLED"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  201 Created
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Cluster Node Operations

All operations on a cluster node must be performed on the `clusternode` object.

For example, to add a NetScaler appliance with NSIP address 10.102.29.60 to the cluster:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/clusternode
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.clusternode+json
```

  Request Payload

```
{
    "clusternode":
    {
        "nodeid":1,
        "ipaddress":"10.102.29.60",
        "state":"ACTIVE",
```

```
            "backplane":"1/1/2"
        }
    }
```

- **Response:**

  HTTP Status Code on Success
  201 Created
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Add a Cluster IP Address

To define a cluster IP address, specify the required parameters in the `nsip` object.

For example, to configure a cluster IP address:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/nsip
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.nsip+json
```

  Request Payload

```
{
    "nsip":
    {
        "ipaddress":"10.102.29.61",
        "netmask":"255.255.255.255",
        "type":"CLIP"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  201 Created
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Add a Spotted IP Address

To configure an IP address as spotted, specify the required parameters in the `nsip` object. This configuration must be done on the cluster IP address.

For example, to configure a spotted SNIP address on a node with ID 1:

- **Request:**

  HTTP Method
  POST
  URL
  http://<cluster-ip-address>/nitro/v1/config/nsip
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.nsip+json
```

Request Payload

```
{
    "nsip":
    {
        "ipaddress":"10.102.29.77",
        "netmask":"255.255.255.0",
        "type":"SNIP",
        "ownernode":1
    }
}
```

- **Response:**

HTTP Status Code on Success
201 Created
HTTP Status Code on Failure
4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Join NetScaler Appliance to Cluster

To join an appliance to a cluster, specify the required parameters in the `cluster` object.

For example, to join a NetScaler appliance to a cluster:

- **Request:**

HTTP Method
POST
URL
http://<netscaler-ip-address>/nitro/v1/config/cluster
Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.cluster+json
```

Request Payload

```
{
    "cluster":
    {
        "clip":"10.102.29.61",
        "password":"verysecret"
    }
}
```

- **Response:**

HTTP Status Code on Success
200 OK
HTTP Status Code on Failure
4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Linkset Operations

To configure a linkset, do the following:

1. Create a linkset by specifying the required parameters in the `linkset` object.
   For example, to add a linkset LS/1:

   - **Request:**

   HTTP Method
   POST

URL
http://<cluster-ip-address>/nitro/v1/config/linkset
Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.linkset+json
```

Request Payload

```
{
    "linkset":
    {
        "id":"LS/1"
    }
}
```

- **Response:**

HTTP Status Code on Success
201 Created
HTTP Status Code on Failure
4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

2. Bind the required interfaces to the linkset by specifying the interfaces in the `linkset_interface_binding` object. For example, to bind interfaces 1/1/2 and 2/1/2 to linkset LS/1:

- **Request:**

HTTP Method
PUT
URL
http://<cluster-ip-address>/nitro/v1/config/linkset_interface_binding/LS%2F1?action=bind
Note: The linkset name (LS/1), must be URL encoded as LS%2F1.
Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.linkset_interface_bi
```

Request Payload

```
{
    "linkset_interface_binding":
    {
        "id":"LS/1",
        "ifnum":"1/1/2 2/1/2"
    }
}
```

- **Response:**

HTTP Status Code on Success
200 OK
HTTP Status Code on Failure
4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Configuring Admin Partitions

To create an admin partition, you must perform a set of operations on the default partition. To understand this procedure, let us consider a company that has two departments each of which has an application that requires the NetScaler functionality. The NetScaler admin wants to have a different partition for each department so that there is isolation of users and configurations. The NetScaler admin must do the following (the sample shows configurations only for a single admin partition):

Note: For detailed information and best practices, see Admin Partitions.

1. Create a partition and allocate the required resources to that partition.

   - **Request:**

     HTTP Method
     POST
     URL
     http://<netscaler-ip-address>/nitro/v1/config/nspartition
     Request Headers

     ```
     Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
     Content-Type:application/vnd.com.citrix.netscaler.nspartition+json
     ```

     Request Payload

     ```
     {
         "nspartition":
         {
             "partitionname":"partition-dept1",
             "maxbandwidth":"10240",
             "minbandwidth":"10240",
             "maxconn":"1024",
             "maxmemlimit":"10"
         }
     }
     ```

   - **Response:**

     HTTP Status Code on Success
     200 Created
     HTTP Status Code on Failure
     4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

2. Associate the appropriate users with the partition.

   - **Request:**

     HTTP Method
     PUT
     URL
     http://<netscaler-ip-address>/nitro/v1/config/systemuser_nspartition_binding/user1
     Request Headers

     ```
     Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
     Content-Type:application/vnd.com.citrix.netscaler.systemuser_nspartiti
     ```

     Request Payload

     ```
     {
         "systemuser_nspartition_binding":
         {
             "username":"user1",
     ```

```
            "partitionname":"partition-dept1"
        }
    }
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

3. Associate an appropriate command policy to the admin partition user.

   - **Request:**

     HTTP Method
     PUT
     URL
     http://<netscaler-ip-address>/nitro/v1/config/systemuser_systemcmdpolicy_binding/user1
     Request Headers

     ```
     Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
     Content-Type:application/vnd.com.citrix.netscaler.systemuser_systemcmd
     ```

     Request Payload

     ```
     {
         "systemuser_systemcmdpolicy_binding":
         {
             "username":"user1",
             "policyname":"partition-admin",
             "priority":"1"
         }
     }
     ```

   - **Response:**

     HTTP Status Code on Success
     200 OK
     HTTP Status Code on Failure
     4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

4. Specify the VLANs or bridgegroups to be associated with the partition. This step ensures network isolation of the traffic. Traffic received on the interfaces of the VLAN or bridgegroup is isolated from the traffic of other partitions.

   - **Request:**

     HTTP Method
     PUT
     URL
     http://<netscaler-ip-address>/nitro/v1/config/nspartition_vlan_binding/partition-dept1
     Request Headers

     ```
     Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
     Content-Type:application/vnd.com.citrix.netscaler.nspartition_vlan_bin
     ```

     Request Payload

     ```
     {
         "nspartition_vlan_binding":
         {
             "partitionname":"partition-dept1",
             "vlan":"2"
     ```

```
        }
    }
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

5. Save the configurations.

   - **Request:**

     HTTP Method
     POST
     URL
     http://<netscaler-ip-address>/nitro/v1/config/nsconfig?action=save
     Request Headers

     ```
     Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
     Content-Type:application/vnd.com.citrix.netscaler.nsconfig+json
     ```

     Request Payload

     ```
     {
         "nsconfig":
         {
         }
     }
     ```

   - **Response:**

     HTTP Status Code on Success
     200 OK
     HTTP Status Code on Failure
     4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

   The admin partition is created.

6. Now, to configure this admin partition, you must logout of the default partition and logon again. You are automatically taken to the admin partition to which you were first bound and once there you can configure the NetScaler.
   Note: If you want to configure another admin partition, perform the switch operation given in the next step before performing this step.
7. [Optional] If you are associated with multiple admin partitions, you can switch to the required partition.

   - **Request:**

     HTTP Method
     POST
     URL
     http://<netscaler-ip-address>/nitro/v1/config/nspartition?action=Switch
     Request Headers

     ```
     Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
     Content-Type:application/vnd.com.citrix.netscaler.nspartition+json
     ```

     Request Payload

     ```
     {
         "nspartition":
         {
     ```

```
            "partitionname":"partition-dept2"
        }
    }
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

8. View the partitions that are available on the NetScaler appliance. If a user is associated with more than one partition, the response payload includes the "partitiontype" attribute the value of which indicates the partition to which the user is currently logged on.

- **Request:**

  HTTP Method
  GET
  URL
  http://<netscaler-ip-address>/nitro/v1/config/nspartition
  Request Headers

  ```
  Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
  Accept:application/vnd.com.citrix.netscaler.nspartition+json
  ```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.
  Response Header

  ```
  Content-Type:application/vnd.com.citrix.netscaler.nspartition+json
  ```

  Response Payload

  ```
  {
      "nspartition":
      {
          "partitionname":"partition-dept1",
          "partitionid": "2",
          "partitiontype": "Current Partition",
          "maxbandwidth":"10240",
          "minbandwidth":"10240",
          "maxconn":"1024",
          "maxmemlimit":"10"
      }
  }
  ```

Managing AppExpert Applications

To export an AppExpert application, specify the parameters needed for the export operation in the `apptemplateinfo` object. Optionally, you can specify basic information about the AppExpert application template, such as the author of the configuration, a summary of the template functionality, and the template version number, in the `template_info` object. This information is stored as part of the template file that is created.

For example, to export an AppExpert application named MyApp1:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/apptemplateinfo?action=export
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.apptemplateinfo+json
```

  Request Payload

```
{
    "apptemplateinfo":
    {
        "appname":"MyApp1",
        "apptemplatefilename":"BizAp.xml",
        "template_info":
        {
            "templateversion_major":"2",
            "templateversion_minor":"1",
            "author":"XYZ",
            "introduction":"Intro",
            "summary":"Summary"
        }
     }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

To import an AppExpert application, specify the parameters needed for the import operation in the `apptemplateinfo` object.

For example, to import an AppExpert application named MyApp1:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/apptemplateinfo?action=import
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.apptemplateinfo+json
```

  Request Payload

```
{
   "apptemplateinfo":
```

```
    {
        "apptemplatefilename":"BizAp.xml",
        "deploymentfilename":"BizAp_deployment.xml",
        "appname":"MyApp1"
    }
}
```

- **Response:**

  HTTP Status Code on Success
  200 OK
  HTTP Status Code on Failure
  4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

To import an AppExpert application by specifying different deployment settings:

- **Request:**

  HTTP Method
  POST
  URL
  http://<netscaler-ip-address>/nitro/v1/config/apptemplateinfo?action=import
  Request Headers

```
Cookie:NITRO_AUTH_TOKEN=<tokenvalue>
Content-Type:application/vnd.com.citrix.netscaler.apptemplateinfo+json
```

  Request Payload

```
{
   "apptemplateinfo":
   {
      "apptemplatefilename":"BizAp.xml",
      "appname":"Myapp2",
       "deploymentinfo":
       {
           "appendpoint":
           [
               {
                   "ipv46":"11.2.3.8",
                   "port":80,
                   "servicetype":"HTTP"
               }
           ],
           "service":
           [
               {
                   "ip":"12.3.3.15",
                   "port":80,
                   "servicetype":"SSL"
               },
               {
                   "ip":"14.5.5.16",
                   "port":443,
                   "servicetype":"SSL"
               }
           ]
       }
   }
}
```

- **Response:**

  HTTP Status Code on Success

200 OK

HTTP Status Code on Failure

4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors). The response payload provides details of the error.

Error Handling

In case of a failed request, NITRO provides the required information through the HTTP status code and in the response header and response payload.

- Error in a Single Resource Operation
- Error in a Bulk Operations
- Warnings

Error in a Single Resource Operation

The response of a single erroneous operation is as follows:

HTTP Status Code
: 4xx <string> (for general HTTP errors) or 5xx <string> (for NetScaler-specific errors)

Response Header

```
Content-Type:application/vnd.com.citrix.netscaler.error+json
```

Response Payload

```
{
    errorcode: <Error code>
    message: "<Error message>"
    severity: "ERROR"
}
```

Error in a Bulk Operation

When there is a failure in one of the bulk operations, the response payload gives a combination of success and failure (depends on the value set for X-NITRO-ONERROR in the request header).

HTTP Status Code
: 207 Multi Status

Response Header

```
Content-Type:application/vnd.com.citrix.netscaler.error_list+json
```

Response Payload when X-NITRO-ONERROR is set to continue
: When the first operation fails, the request is not terminated. The response payload shows the error details of the failed operation and the success status of the other operations.

```
{
    "errorcode": 1243,
    "message": "Bulk operation failed",
    "severity": "ERROR",
    "response":
    [
        {
            "errorcode": 273,
            "message": "Resource already exists",
            "severity": "ERROR"
        },
        {
            "errorcode": 0,
            "message": "Done",
            "severity": "NONE"
        }
    ]
}
```

Response Payload when X-NITRO-ONERROR is set to exit
: When the first operation fails, the request is terminated. The response payload only shows the error details of the failed operation.

```
{
    "errorcode": 1243,
    "message": "Bulk operation failed",
    "severity": "ERROR",
    "response":
    [
```

```
            {
                "errorcode": 273,
                "message": "Resource already exists",
                "severity": "ERROR"
            }
        ]
    }
```

Warnings in NITRO Operations

Warnings can be captured by specifying the "warning" query parameter as "yes" when performing any NITRO operation. For example, to get warnings while connecting to the NetScaler appliance, the URL is as follows:

http://<netscaler-ip-address>/nitro/v1/config/login?warning=yes

If there are any warnings, the response is as follows:

HTTP Status Code
    209 X-NITRO-WARNING
Response Header

```
    Content-Type:application/vnd.com.citrix.netscaler.warning+json
```

Response Payload

```
    {
        errorcode: <Code>
        message: "<Message>"
        severity: "WARNING"
    }
```

Java, .NET, and Python API

This section provides basic information for using the Java, .NET, and Python SDKs that are provided for the NITRO API. The API are categorized on their scope and purpose.

Important

- All NITRO operations are logged in the /var/log/nitro.log file on the appliance.

- Executable samples are available in the <*NITRO_SDK_HOME*>*/sample* directory.

Tutorial: Create Your First NITRO Application

After completing this tutorial, you will understand and be able to use NITRO to log in to the appliance, create a load balancing virtual server, retrieve details of an lbvserver, delete an lbvserver, save the configurations on the appliance, and log out of the appliance.

- Using Java API to Create your First NITRO Application
- Using .NET API to Create your First NITRO Application

> **Note**
>
> Before you begin, make sure that you have the latest NITRO SDK and that the client application satisfies the prerequisites for using the NITRO SDK.
>
> All NITRO exceptions are captured by the *com.citrix.netscaler.nitro.exception.nitro_exception* class. For a more detailed description, see Exception Handling.
>
> The executable code for the sample is available in the <NITRO_SDK_HOME>/sample/ directory.

Using Java API to Create your First NITRO Application

1. Copy the libraries from <NITRO_SDK_HOME>/lib folder to the project classpath.
2. Create a new class and name it **MyFirstNitroApplication**.
3. Create an instance of `com.citrix.netscaler.nitro.service.nitro_service` class. This instance is used to perform all operations on the appliance:

   ```
   nitro_service ns_session = new nitro_service("10.102.29.170","HTTP");
   ```

   This code establishes a connection with an appliance that has IP address 10.102.29.170 and uses the HTTP protocol. Replace 10.102.29.170 with the IP address of the NetScaler appliance that you have access to.
4. Use the `nitro_service` instance to log in to the appliance using your credentials:

   ```
   ns_session.login("admin","verysecret");
   ```

   This code logs into the appliance, with user name as `admin` and password as `verysecret`. Replace the credentials with your login credentials.
5. Enable the load balancing feature:

   ```
   String[] features_to_be_enabled = {"lb"};
   ns_session.enable_features(features_to_be_enabled);
   ```

   This code first sets the features to be enabled in an array and then enables the LB feature.
6. Create an instance of the `com.citrix.netscaler.nitro.resource.config.lb.lbvserver` class. You will use this instance to perform operations on the lbvserver.

   ```
   lbvserver new_lbvserver_obj = new lbvserver();
   ```

7. Use the `lbvserver` instance to create a new lbvserver:

   ```
   new_lbvserver_obj.set_name("MyFirstLbVServer");
   new_lbvserver_obj.set_ipv46("10.102.29.88");
   new_lbvserver_obj.set_servicetype("HTTP");
   new_lbvserver_obj.set_port(88);
   new_lbvserver_obj.set_lbmethod("ROUNDROBIN");
   lbvserver.add(ns_session,new_lbvserver_obj);
   ```

   This code first sets the attributes (name, IP address, service type, port, and load balancing method) of the lbvserver locally and then adds it to the appliance by using the corresponding `add()` method.
8. Retrieve the details of the lbvserver you have created:

   ```
   new_lbvserver_obj = lbvserver.get(ns_session,new_lbvserver_obj.get_name());
   System.out.println("Name : " +new_lbvserver_obj.get_name() +"\n" +"Protocol : " +new_lb
   ```

This code first retrieves the details of the lbvserver as an object from the NetScaler, extracts the required attributes (name and service type) from the object, and displays the results.

9. Delete the lbvserver you created in the above steps:

```
lbvserver.delete(ns_session, new_lbvserver_obj.get_name());
```

10. Save the configurations:

```
ns_session.save_config();
```

11. Log out of the appliance:

```
ns_session.logout();
```

Using .NET API to Create your First NITRO Application

1. Copy the libraries from <NITRO_SDK_HOME>/lib folder to the project classpath.
2. Create a new class and name it **MyFirstNitroApplication**.
3. Create an instance of `com.citrix.netscaler.nitro.service.nitro_service` class. This instance is used to perform all operations on the appliance:

```
nitro_service ns_session = new nitro_service("10.102.29.170", "http");
```

This code establishes a connection with an appliance that has IP address 10.102.29.170 and uses the HTTP protocol. Replace 10.102.29.170 with the IP address of the NetScaler appliance that you have access to.

4. Use the `nitro_service` instance to log in to the appliance using your credentials:

```
ns_session.login("admin","verysecret");
```

This code logs into the appliance, with user name as `admin` and password as `verysecret`. Replace the credentials with your login credentials.

5. Enable the load balancing feature:

```
String[] features_to_be_enabled = {"lb"};
ns_session.enable_features(features_to_be_enabled);
```

This code enables load balancing on the appliance.

6. Create an instance of the `com.citrix.netscaler.nitro.resource.config.lb.lbvserver` class. You will use this instance to perform operations on the lbvserver.

```
lbvserver new_lbvserver_obj = new lbvserver();
```

7. Use the `lbvserver` instance to create a new lbvserver:

```
new_lbvserver_obj.name = "MyFirstLbVServer";
new_lbvserver_obj.ipv46 = "10.102.29.88";
new_lbvserver_obj.servicetype = "HTTP";
new_lbvserver_obj.port = 80;
new_lbvserver_obj.lbmethod = "ROUNDROBIN";
lbvserver.add(ns_session,new_lbvserver_obj);
```

This code first sets the attributes (name, IP address, service type, port, and load balancing method) of the lbvserver locally and then adds it to the appliance by using the corresponding `add()` method.

8. Retrieve the details of the lbvserver you have created:

```
lbvserver new_lbvserver_obj1 = lbvserver.get(ns_session,new_lbvserver_obj.name);
System.Console.Out.WriteLine("Name : " +new_lbvserver_obj1.name +"\n" +"Protocol : " +r
```

This code first retrieves the details of the lbvserver as an object from the NetScaler, extracts the required attributes (name and service type) from the object, and displays the results.

9. Delete the lbvserver you created in the above steps:

```
lbvserver.delete(ns_session, new_lbvserver_obj.name);
```

10. Save the configurations:

```
ns_session.save_config();
```

11. Log out of the appliance:

```
ns_session.logout();
```

Tutorial: Create a NetScaler Cluster

This tutorial gives you the step-by-step process to create a NetScaler cluster. After completing this tutorial you will be able to create a two-node NetScaler cluster. To add more appliances to the cluster you must repeat the procedure that adds and joins the node to the cluster.

Note

The executable code for the sample is available in the *<NITRO_SDK_HOME>/sample/* directory.

Using Java API to Create a Cluster

1. Copy the libraries from <NITRO_SDK_HOME>/lib folder to the project classpath.
2. Create a new class and name it CreateCluster.
3. Log on to one of the appliances that you want to add to the cluster and create a cluster:

```
//Connect to the first appliance that you want to add to the cluster
nitro_service nonClipSession0 = new nitro_service(nsipAddress0,protocol);
nonClipSession0.login(uName,password);

//Create a cluster instance
clusterinstance newClusterInstance = new clusterinstance();
newClusterInstance.set_clid(1);
clusterinstance.add(nonClipSession0,newClusterInstance);

//Add the appliance to the cluster
clusternode ClusterNode0 = new clusternode();
ClusterNode0.set_nodeid(0);
ClusterNode0.set_ipaddress(nsipAddress0);
ClusterNode0.set_state("ACTIVE");
ClusterNode0.set_backplane("0/1/1");
clusternode.add(nonClipSession0,ClusterNode0);

//Add the cluster IP address
nsip newNSIPAddress = new nsip();
newNSIPAddress.set_ipaddress(clipAddress);
newNSIPAddress.set_netmask("255.255.255.255");
newNSIPAddress.set_type("CLIP");
nsip.add(nonClipSession0,newNSIPAddress);

//Enable the cluster instance
clusterinstance.enable(nonClipSession0, newClusterInstance);

//Save the configurations
nonClipSession0.save_config();

//Warm reboot the appliance
nonClipSession0.reboot(true);
```

   The cluster is created and the first node is added to the cluster. This node becomes the initial configuration coordinator of the cluster.
4. Log on to the cluster IP address to add other appliances to the cluster:

```
//Connect to the cluster IP address
nitro_service clipSession = new nitro_service(clipAddress,protocol);
clipSession.login(uName,password);

//Add the node to the cluster
clusternode ClusterNode1 = new clusternode();
ClusterNode1.set_nodeid(1);
```

```
ClusterNode1.set_ipaddress(nsipAddress1);
ClusterNode1.set_state("ACTIVE");
ClusterNode1.set_backplane("1/1/1");
clusternode.add(clipSession,ClusterNode1);

//Save the configurations
clipSession.save_config();
```

5. Log on to the appliance that you added in the previous step and join it to the cluster:

```
//Connect to the node that you have just added to the cluster
nitro_service nonClipSession1 = new nitro_service(nsipAddress1,protocol);
nonClipSession1.login(uName,password);

//Join the node to the cluster
cluster newCluster = new cluster();
newCluster.set_clip(clipAddress);
newCluster.set_password(password);
cluster.join(nonClipSession1,newCluster);

//Save the configurations
nonClipSession1.save_config();

//Warm reboot the appliance
nonClipSession1.reboot(true);
```

   The second node is now a part of the cluster.

6. Verify the details of the cluster by logging on to the cluster IP address

```
//Retrieving the cluster node details
Long id = new Long(1);
clusternode node= clusternode.get(clipSession, id);
System.out.println("Node ID: "+ node.get_nodeid() + " | Admin state: " + node.get_state

//Retrieving the cluster instance details
Long id1 = new Long(1);
clusterinstance instance= clusterinstance.get(clipSession, id1);
System.out.println("Cluster instance ID: "+ instance.get_clid() + " | Operational state
```

Using .NET API to Create a Cluster

1. Copy the libraries from <NITRO_SDK_HOME>/lib folder to the project classpath.
2. Create a new class and name it CreateCluster.
3. Log on to one of the appliances that you want to add to the cluster and create a cluster:

```
//Connect to the first appliance that you want to add to the cluster
nitro_service nonClipSession0 = new nitro_service(nsipAddress0,protocol);
nonClipSession0.login(uName,password);

//Create a cluster instance
clusterinstance newClusterInstance = new clusterinstance();
newClusterInstance.clid = 1;
clusterinstance.add(nonClipSession0,newClusterInstance);

//Add the appliance to the cluster
clusternode ClusterNode0 = new clusternode();
ClusterNode0.nodeid = 0;
ClusterNode0.ipaddress = nsipAddress0;
ClusterNode0.state = "ACTIVE";
ClusterNode0.backplane = "0/1/1";
clusternode.add(nonClipSession0,ClusterNode0);

//Add the cluster IP address
nsip newNSIPAddress = new nsip();
newNSIPAddress.ipaddress = clipAddress;
newNSIPAddress.netmask = "255.255.255.255";
newNSIPAddress.type = "CLIP";
nsip.add(nonClipSession0,newNSIPAddress);

//Enable the cluster instance
clusterinstance.enable(nonClipSession0, newClusterInstance);
```

```
//Save the configurations
nonClipSession0.save_config();

//Warm reboot the appliance
nonClipSession0.reboot(true);
```

The cluster is created and the first node is added to the cluster. This node becomes the initial configuration coordinator of the cluster.

4. Log on to the cluster IP address to add other appliances to the cluster:

```
//Connect to the cluster IP address
nitro_service clipSession = new nitro_service(clipAddress,protocol);
clipSession.login(uName,password);

//Add the node to the cluster
clusternode ClusterNode1 = new clusternode();
ClusterNode1.nodeid = 1;
ClusterNode1.ipaddress = nsipAddress1;
ClusterNode1.state = "ACTIVE";
ClusterNode1.backplane = "1/1/1";
clusternode.add(clipSession,ClusterNode1);

//Save the configurations
clipSession.save_config();
```

5. Log on to the appliance that you added in the previous step and join it to the cluster:

```
//Connect to the node that you have just added to the cluster
nitro_service nonClipSession1 = new nitro_service(nsipAddress1,protocol);
nonClipSession1.login(uName,password);

//Join the node to the cluster
cluster newCluster = new cluster();
newCluster.clip = clipAddress;
newCluster.password = password;
cluster.join(nonClipSession1,newCluster);

//Save the configurations
nonClipSession1.save_config();

//Warm reboot the appliance
nonClipSession1.reboot(true);
```

The second node is now a part of the cluster.

6. Verify the details of the cluster by logging on to the cluster IP address

```
//Retrieving the cluster node details
uint id = 1;
clusternode node= clusternode.get(clipSession, id);
System.Console.Out.WriteLine("Node ID: " + node.nodeid + " | Admin state: " + node.stat

//Retrieving the cluster instance details
uint id1 = 1;
clusterinstance instance= clusterinstance.get(clipSession, id1);
System.Console.Out.WriteLine("Cluster instance ID: "+ instance.clid + " | Operational s
```

Connecting to the NetScaler Appliance

The first step towards using NITRO is to establish a session with the NetScaler appliance and then authenticate the session by using the NetScaler administrator's credentials.

You must create an object of the *com.citrix.netscaler.nitro.service.nitro_service* class by specifying the NetScaler IP (NSIP) address and the protocol to connect to the appliance (HTTP or HTTPS). You then use this object and log on to the appliance by specifying the user name and the password of the NetScaler administrator.

Note:

- For the python SDK, the package path is of the form *nssrc.com.citrix.netscaler...*
- You must have a user account on that appliance. The configuration operations that you perform are limited by the administrative roles assigned to your account.

The following sample code establishes a session with a NetScaler appliance with IP address 10.102.29.60 by using the HTTPS protocol and also sets a session timeout period (in seconds) of 60 minutes.

Java - Sample code to establish session

```
//Specify the NetScaler appliance IP address and protocol
nitro_service ns_session = new nitro_service("10.102.29.60","https");

//Specify the login credentials
ns_session.login("admin","verysecret",3600);
```

.NET - Sample code to establish session

```
//Specify the NetScaler appliance IP address and protocol
nitro_service ns_session = new nitro_service("10.102.29.60","https");

//Specify the login credentials
ns_session.login("admin","verysecret",3600);
```

Python - Sample code to establish session

```
#Specify the NetScaler appliance IP address and protocol
ns_session = nitro_service("10.102.29.60","https")

#Specify the login credentials
ns_session.login("admin","verysecret",3600)
```

Disable SSL Checks

When using HTTPS, you must make sure that the root CA is added to the truststore. By default, NITRO validates the SSL certificate and verifies the hostname. Disable these validations as shown in the following sample codes.

Java - Sample code for disabling SSL checks

```
ns_session.set_certvalidation(false);
ns_session.set_hostnameverification(false);
```

.NET - Sample code for disabling SSL checks

```
ns_session.certvalidation = false;
ns_session.hostnameverification = false;
```

Python - Sample code for disabling SSL checks

```
ns_session.certvalidation = false
ns_session.hostnameverification = false
```

Some points to note with regards to session timeout for NetScaler 10.5 and later versions:

- When restricted timeout param is enabled, NITRO, by default, uses the timeout value that is configured for the logged in user. You can customize this value but it must be limited to the value specified for the user. If no value is specified for the user, the default timeout value of 15 minutes is used.
- When restricted timeout param is not enabled, NITRO uses the default value of 30 minutes as session timeout.

General API Usage

NetScaler resources are organized into a set of packages or namespaces. Each package or namespace corresponds to a NetScaler feature. For example, all load-balancing related resources, such as load balancing virtual server, load balancing group, and load balancing monitor are available in *com.citrix.netscaler.nitro.resource.config.lb*.

Note: For the python SDK, the package path is of the form *nssrc.com.citrix.netscaler.....*.

Similarly, all application firewall related resources, such as application firewall policy and application firewall archive are available in *com.citrix.netscaler.nitro.resource.config.appfw*.

Each NetScaler resource is represented by a class. For example, the class that represents a load balancing virtual server is called **lbvserver** (in *com.citrix.netscaler.nitro.resource.config.lb*). The state of a resource is represented by properties of a class. You can get and set the properties of the class.

Note: The setter and getter properties are always executed locally on the client. They do not involve any network interaction with the NITRO web service. All properties have basic simple types: integer, long, boolean, and string.

Adding a NetScaler Resource

To create a new resource, instantiate the resource class, configure the resource by setting its properties locally, and then upload the new resource instance to the NetScaler appliance.

The following sample code creates a load balancing virtual server.

Java - Sample code to add a NetScaler resource

```
//Create an instance of the lbvserver class
lbvserver new_lbvserver_obj = new lbvserver();

//Set the properties of the resource locally
new_lbvserver_obj.set_name("MyFirstLbVServer");
new_lbvserver_obj.set_ipv46("10.102.29.88");
new_lbvserver_obj.set_port(88);
new_lbvserver_obj.set_servicetype("HTTP");
new_lbvserver_obj.set_lbmethod("ROUNDROBIN");

//Upload the resource to NetScaler
lbvserver.add(ns_session,new_lbvserver_obj);
```

.NET - Sample code to add a NetScaler resource

```
//Create an instance of the lbvserver class
lbvserver new_lbvserver_obj = new lbvserver();

//Set the properties of the resource locally
new_lbvserver_obj.name = "MyFirstLbVServer";
new_lbvserver_obj.ipv46 = "10.102.29.88";
new_lbvserver_obj.port = 88;
new_lbvserver_obj.servicetype = "HTTP";
new_lbvserver_obj.lbmethod = "ROUNDROBIN";

//Upload the resource to NetScaler
lbvserver.add(ns_session,new_lbvserver_obj);
```

Python - Sample code to add a NetScaler resource

```
#Create an instance of the lbvserver class
new_lbvserver_obj = lbvserver()

#Set the properties of the resource locally
new_lbvserver_obj.name = "MyFirstLbVServer"
new_lbvserver_obj.ipv46 = "10.102.29.88"
new_lbvserver_obj.port = 88
new_lbvserver_obj.servicetype = "HTTP"
new_lbvserver_obj.lbmethod = "ROUNDROBIN"

#Upload the resource to NetScaler
lbvserver.add(ns_session, new_lbvserver_obj)
```

Enabling a NetScaler Resource

To enable a resource, invoke the **enable()** method and to disable, invoke the **disable()** method.

The following sample code enables a load balancing virtual server named "lb_vip".

Java - Sample code to enable a NetScaler resource

```
lbvserver obj = new lbvserver();
obj.set_name("lb_vip");
lbvserver.enable(ns_session, obj);
```

.NET - Sample code to enable a NetScaler resource

```
lbvserver obj = new lbvserver();
obj.name = "lb_vip";
lbvserver.enable(ns_session, obj);
```

Python - Sample code to enable a NetScaler resource

```
obj = lbvserver()
obj.name = "lb_vip"
lbvserver.enable(ns_session, obj)
```

Retrieving Properties of NetScaler Resources

To retrieve the properties of a resource, you retrieve the resource object from the NetScaler appliance. Once the object is retrieved, you can extract the required properties of the resource locally, without further network traffic.

The following sample code retrieves the details of a load balancing virtual server.

Java - Sample code to get details of resource

```
//Retrieve the resource object from the NetScaler
new_lbvserver_obj = lbvserver.get(ns_session,"MyFirstLbVServer");

//Extract the properties of the resource from the object locally
System.out.println(new_lbvserver_obj.get_name());
System.out.println(new_lbvserver_obj.get_servicetype());
```

.NET - Sample code to get details of resource

```
//Retrieve the resource object from the NetScaler
new_lbvserver_obj = lbvserver.get(ns_session,"MyFirstLbVServer");

//Extract the properties of the resource from the object locally
Console.WriteLine(new_lbvserver_obj.name);
Console.WriteLine(new_lbvserver_obj.servicetype);
```

Python - Sample code to get details of resource

```
#Retrieve the resource object from the NetScaler
new_lbvserver_obj = lbvserver.get(ns_session,"MyFirstLbVServer")

#Extract the properties of the resource from the object locally
print(new_lbvserver_obj.name)
print(new_lbvserver_obj.servicetype)
```

Filtering Results

You can also retrieve resources by specifying a filter on the value of their properties by using the *com.citrix.netscaler.nitro.util.filtervalue* class.

For example, you can retrieve all the load balancing virtual servers that have their port set to 80 and servicetype to HTTP.

Java - Sample code to get filtered results

```
filtervalue[] filter = new filtervalue[2];
filter[0] = new filtervalue("port","80");
filter[1] = new filtervalue("servicetype","HTTP");
lbvserver[] result = lbvserver.get_filtered(ns_session,filter);
```

.NET - Sample code to get filtered results

```
filtervalue[] filter = new filtervalue[2];
filter[0] = new filtervalue("port","80");
filter[1] = new filtervalue("servicetype","HTTP");
lbvserver[] result = lbvserver.get_filtered(ns_session,filter);
```

Python - Sample code to get filtered results

```
filter_params = []
filter_params = [ filtervalue() for _ in range(2)]
```

```
filter_params[0] = filtervalue("servicetype","HTTP")
filter_params[1] = filtervalue("port","80")
result = lbvserver.get_filtered(ns_session1, filter_params)
```

Retrieving Statistics of NetScaler Resources

The NetScaler appliance collects statistics about the usage of its features and the corresponding resources. You can retrieve these statistics by using NITRO API. The statistics APIs are available in different packages from the configuration APIs.

For example, the API to retrieve statistics of the load balancing virtual server are available in *com.citrix.netscaler.nitro.resource.stat.lb*.

Note:

- For the python SDK, the package path is of the form *nssrc.com.citrix.netscaler.....*.
- Not all NetScaler features and resources have statistic objects associated with them.

The following sample code retrieves the statistics of a load balancing virtual server and displays some of the statistics returned.

Java - Sample code to get feature statistics

```
lbvserver_stats stats = lbvserver_stats.get(ns_session,"MyFirstLbVServer");
System.out.println(stats.get_curclntconnections());
System.out.println(stats.get_deferredreqrate());
```

.NET - Sample code to get feature statistics

```
lbvserver_stats stats = lbvserver_stats.get(ns_session,"MyFirstLbVServer");
Console.WriteLine(stats.curclntconnections);
Console.WriteLine(stats.deferredreqrate);
```

Python - Sample code to get feature statistics

```
stats = lbvserver_stats.get(ns_session,"MyFirstLbVServer")
print(stats.curclntconnections)
print(stats.deferredreqrate)
```

Resetting Properties of a NetScaler Resource

To unset the value that is set to a parameter, invoke the **unset()** method on the resource class, by passing the name of the resource and the parameters to be unset. If the parameter has a default value, the value is reset to that value.

The following sample code unsets the load balancing method and the comments of a load balancing virtual server named "lb_123".

Java - Sample code to reset properties

```
lbvserver lb1 = new lbvserver();
lb1.set_name("lb_123");
String args[] = {"comment", "lbmethod"};
lbvserver.unset(ns_session, lb1, args);
```

.NET - Sample code to reset properties

```
lbvserver obj = new lbvserver();
obj.name = "lb_123";
String[] args = { "lbmethod","comment" };
lbvserver.unset(ns_session, lb1, args);
```

Python - Sample code to reset properties

```
lb1 = lbvserver()
lb1.name = "lb_123"
args = ["comment", "lbmethod"]
lbvserver.unset(nitroService, lb1, args)
```

Updating a NetScaler Resource

To update the properties of a resource, instantiate the resource class, specify the name of the resource to be updated, configure the resource by updating its properties locally, and then upload the updated resource instance to the NetScaler appliance.

Note: Some properties in some NetScaler resources are not allowed to be modified after creation. The port number or the service type (protocol) of a load balancing virtual server or a service, are examples of such properties. Even though the update method appears to succeed, these properties retain their original values on the appliance.

The following sample code updates the service type and load balancing method of a load balancing virtual server.

Java - Sample code to update a NetScaler resource

```
//Create an instance of the lbvserver class
lbvserver update_lb = new lbvserver();

//Specify the name of the lbvserver to be updated
update_lb.set_name("MyFirstLbVServer");

//Specify the updated service type and lb method
update_lb.set_servicetype("https");
update_lb.set_lbmethod("LEASTRESPONSETIME");

//Upload the resource to NetScaler
lbvserver.update(ns_session,update_lb);
```

.NET - Sample code to update a NetScaler resource

```
//Create an instance of the lbvserver class
lbvserver update_lb = new lbvserver();

//Specify the name of the lbvserver to be updated
update_lb.name = "MyFirstLbVServer";

//Specify the updated service type and lb method
update_lb.servicetype = "https";
update_lb.lbmethod = "LEASTRESPONSETIME";

//Upload the resource to NetScaler
lbvserver.update(ns_session, update_lb);
```

Python - Sample code to update a NetScaler resource

```
#Create an instance of the lbvserver class
update_lb = lbvserver()

#Specify the name of the lbvserver to be updated
update_lb.name = "MyFirstLbVServer"

#Specify the updated service type and lb method
update_lb.servicetype = "https"
update_lb.lbmethod = "LEASTRESPONSETIME"

#Upload the resource to the NetScaler
lbvserver.update(ns_session, update_lb)
```

Binding NetScaler Resources

NetScaler resources form relationships with each other through the process of binding. This is how services are associated with a load balancing virtual server (by binding them to it), or how various policies are bound to a load balancing virtual server. Each binding relationship is represented in NITRO by its own class.

To bind one NetScaler resource to another, you must instantiate the appropriate binding class (for example, to bind a service to a load balancing virtual server, you must instantiate the **lbvserver_service_binding** class) and add it to the NetScaler configuration (by using the static **add()** method on this class).

Binding classes have a property representing the name of each resource in the binding relationship. They can also have other properties related to that relationship (for example, the weight of the binding between a load balancing virtual server and a service).

The following sample code binds a service to a load balancing virtual server, by specifying a certain weight for the binding.

Java - Sample code for binding

```
lbvserver_service_binding bindObj = new lbvserver_service_binding();
bindObj.set_name("MyFirstLbVServer");
bindObj.set_servicename("svc_prod");
bindObj.set_weight(20);
lbvserver_service_binding.add(ns_session,bindObj);
```

.NET - Sample code for binding

```
lbvserver_service_binding bindObj = new lbvserver_service_binding();
bindObj.name = "MyFirstLbVServer";
bindObj.servicename = "svc_prod";
bindObj.weight = 20;
lbvserver_service_binding.add(ns_session,bindObj);
```

Python - Sample code for binding

```
bindObj = lbvserver_service_binding()
bindObj.name = "MyFirstLbVServer"
bindObj.servicename = "svc_prod"
bindObj.weight = 20
lbvserver_service_binding.add(ns_session, bindObj)
```

Unbinding Resources

To unbind a resource from another, invoke the **delete()** method from the resource binding class, by passing the name of the two resources.

The following code sample unbinds a service from a server.

Java - Sample Code for unbinding

```
lbvserver_service_binding bindObj = new lbvserver_service_binding();
bindObj.set_name("MyFirstLbVServer");
bindObj.set_servicename("svc_prod");
lbvserver_service_binding.delete(ns_session,bindObj);
```

.NET - Sample code for unbinding

```
lbvserver_service_binding bindObj = new lbvserver_service_binding();
bindObj.name("MyFirstLbVServer");
bindObj.servicename("svc_prod");
lbvserver_service_binding.delete(ns_session,bindObj);
```

Python - Sample code for unbinding

```
bindObj = lbvserver_service_binding()
bindObj.name = "MyFirstLbVServer"
bindObj.servicename = "svc_prod"
lbvserver_service_binding.delete(ns_session, bindObj)
```

Globally Binding NetScaler Resources

Some NetScaler resources can be bound globally to affect the whole system. For example, a compression policy can be bound to an load balancing virtual server, in which case the policy affects only the traffic on that load balancing virtual server. However, if bound globally, it can affect any traffic on the appliance, regardless of which virtual servers handle the traffic.

Some NITRO classes can be used to bind resources globally. These classes have names that follow the following pattern: **<featurename>global_<resourcetype>_binding**.

For example, the class **aaaglobal_preauthenticationpolicy_binding** is used to bind preauthentication policies globally.

The following sample code creates a preauthentication action and a preauthentication policy that uses that action, and then binds the policy globally at priority 200.

Java - Sample code

```
aaapreauthenticationaction preauth_act1;
aaapreauthenticationpolicy preauth_pol1;
aaaglobal_aaapreauthenticationpolicy_binding glob_binding;
preauth_act1 = new aaapreauthenticationaction();
preauth_act1.set_name("preauth_act1");
preauth_act1.set_preauthenticationaction("ALLOW");
aaapreauthenticationaction.add(ns_session,preauth_act1);

preauth_pol1 = new aaapreauthenticationpolicy();
preauth_pol1.set_name("preauth_pol1");
preauth_pol1.set_rule("CLIENT.APPLICATION.PROCESS(antivirus.exe) EXISTS");
preauth_pol1.set_reqaction("preauth_act1");
aaapreauthenticationpolicy.add(ns_session,preauth_pol1);

glob_binding = new aaaglobal_aaapreauthenticationpolicy_binding();
glob_binding.set_policy("preauth_pol1");
glob_binding.set_priority(200);
aaaglobal_aaapreauthenticationpolicy_binding.add(ns_session,glob_binding);
```

.NET - Sample code

```
aaapreauthenticationaction preauth_act1;
aaapreauthenticationpolicy preauth_pol1;
aaaglobal_aaapreauthenticationpolicy_binding glob_binding;
preauth_act1 = new aaapreauthenticationaction();
preauth_act1.name = "preauth_act1";
preauth_act1.preauthenticationaction = "ALLOW";
aaapreauthenticationaction.add(ns_session, preauth_act1);

preauth_pol1 = new aaapreauthenticationpolicy();
preauth_pol1.name = "preauth_pol1";
preauth_pol1.rule = "CLIENT.APPLICATION.PROCESS(antivirus.exe) EXISTS";
preauth_pol1.reqaction = "preauth_act1";
aaapreauthenticationpolicy.add(ns_session, preauth_pol1);

glob_binding = new aaaglobal_aaapreauthenticationpolicy_binding();
glob_binding.policy = "preauth_pol1";
glob_binding.priority = 200;
aaaglobal_aaapreauthenticationpolicy_binding.add(ns_session,glob_binding);
```

Python - Sample code

```
preauth_act1 = aaapreauthenticationaction()
preauth_act1.name = "preauth_act1"
preauth_act1.preauthenticationaction = "ALLOW"
aaapreauthenticationaction.add(ns_session, preauth_act1)

preauth_pol1 = aaapreauthenticationpolicy()
preauth_pol1.name = "preauth_pol1"
preauth_pol1.rule = "CLIENT.APPLICATION.PROCESS(antivirus.exe) EXISTS"
```

```
preauth_pol1.reqaction = "preauth_act1"
aaapreauthenticationpolicy.add(ns_session, preauth_pol1)

glob_binding = aaaglobal_aaapreauthenticationpolicy_binding()
glob_binding.policy = "preauth_pol1"
glob_binding.priority = 200
aaaglobal_aaapreauthenticationpolicy_binding.add(ns_session, glob_binding)
```

Deleting a NetScaler Resource

To delete an existing resource, invoke the static method **delete()** on the resource class, by passing the name of the resource.

The following sample code deletes a load balancing virtual server with name "MyFirstLbVServer".

Java - Sample code to delete a NetScaler resource

```
lbvserver remove_lb = new lbvserver();
remove_lb.set_name("MyFirstLbVServer");
lbvserver.delete(ns_session, remove_lb);
```

.NET - Sample code to delete a NetScaler resource

```
lbvserver remove_lb = new lbvserver();
remove_lb.name("MyFirstLbVServer");
lbvserver.delete(ns_session, remove_lb);
```

Python - Sample code to delete a NetScaler resource

```
remove_lb = lbvserver()
remove_lb.name = "MyFirstLbVServer"
lbvserver.delete(ns_session, remove_lb)
```

Performing Bulk Operations

You can create, retrieve, update, and delete multiple resources simultaneously and thus minimize network traffic. For example, you can add multiple load balancing virtual servers in the same operation. To perform a bulk operation, you instantiate an array of the resource class, configure the properties of all the instances locally, and then upload all the instances to the NetScaler with one command.

Specifying the Bulk Operation Behavior on the NetScaler

To account for the failure of some operations within the bulk operation, NITRO allows you to configure one of the following behaviors while establishing a connection with the appliance.

- **Exit.** When the first error is encountered, the execution stops. The commands that were executed before the error are committed.
- **Rollback.** When the first error is encountered, the execution stops. The commands that were executed before the error are rolled back. Rollback is only supported for add and bind commands.
- **Continue.** All the commands in the list are executed even if some commands fail.

Java - Sample code to specify bulk operation behavior

```
nitro_service ns_session = new nitro_service("10.102.29.60","http");
ns_session.set_onerror(OnerrorEnum.CONTINUE);
ns_session.login("admin","verysecret");
```

.NET - Sample code to specify bulk operation behavior

```
nitro_service ns_session = new nitro_service("10.102.29.60","http");
ns_session.onerror = OnerrorEnum.CONTINUE;
ns_session.login("admin","verysecret");
```

Python - Sample code to specify bulk operation behavior

```
ns_session = nitro_service("10.102.29.60","http")
ns_session.onerror = OnerrorEnum.CONTINUE
ns_session.login("admin","verysecret")
```

Bulk Operations

The following sample code creates two load balancing virtual servers.

Java - Sample code for bulk creation

```
//Create an array of lbvserver instances
lbvserver[] lbs = new lbvserver[2];

//Specify properties of the first lbvserver
lbs[0] = new lbvserver();
lbs[0].set_name("lbvserv1");
lbs[0].set_servicetype("http");
lbs[0].set_ipv46("10.70.136.5");
lbs[0].set_port(80);

//Specify properties of the second lbvserver
lbs[1] = new lbvserver();
lbs[1].set_name("lbvserv2");
lbs[1].set_servicetype("https");
lbs[1].set_ipv46("10.70.136.5");
lbs[1].set_port(443);

//Upload the properties of the two lbvservers to the NetScaler
lbvserver.add(ns_session,lbs);
```

.NET - Sample code for bulk creation

```
//Create an array of lbvserver instances
lbvserver[] lbs = new lbvserver[2];

//Specify details of first lbvserver
lbs[0] = new lbvserver();
lbs[0].name = "lbvserv1";
lbs[0].servicetype = "http";
lbs[0].ipv46 = "10.70.136.5";
lbs[0].port = 80;

//Specify details of second lbvserver
lbs[1] = new lbvserver();
lbs[1].name = "lbvserv2";
lbs[1].servicetype = "https";
lbs[1].ipv46 = "10.70.136.5";
lbs[1].port = 443;

//upload the details of the lbvservers to the NITRO server
lbvserver.add(ns_session,lbs);
```

Python - Sample code for bulk creation

```
#Create an array of lbvserver instances
lbs = lbvserver[2]

#Specify properties of the first lbvserver
lbs[0] = lbvserver()
lbs[0].name = "lbvserv1"
lbs[0].servicetype = "http"
lbs[0].ipv46 = "10.70.136.5"
lbs[0].port = 80

#Specify properties of the second lbvserver
lbs[1] = lbvserver()
lbs[1].name = "lbvserv2"
lbs[1].servicetype = "https"
lbs[1].ipv46 = "10.70.136.5"
lbs[1].port = 443

#Upload the properties of the two lbvservers to the NetScaler
lbvserver.add(ns_session, lbs)
```

Usage Scenarios

In this section, we provide NITRO API specific to certain resources and scenarios. We will be adding more scenarios in future updates to this documentation.

Configuring a NetScaler Cluster

For managing clusters, you can add or remove a cluster instance or an individual node and perform a few other instance or node operations such as viewing instance or node properties. You can also configure the cluster IP address. Other cluster-management tasks include joining a NetScaler appliance to the cluster and configuring a linkset. For detailed information and best practices, see Clustering.

Note: For the python SDK, the package path is of the form *nssrc.com.citrix.netscaler.....*.

Cluster Instance Operations

The *com.citrix.netscaler.nitro.resource.config.cluster.clusterinstance* class provides APIs to manage a cluster instance.

The following sample code creates a cluster instance with ID 1.

Java - Sample code to create a cluster instance

```
clusterinstance new_cl_inst_obj = new clusterinstance();

//Set the properties of the cluster instance locally
new_cl_inst_obj.set_clid(1);
new_cl_inst_obj.set_preemption("ENABLED");

//Upload the cluster instance
clusterinstance.add(ns_session,new_cl_inst_obj);
```

.NET - Sample code to create a cluster instance

```
clusterinstance new_cl_inst_obj = new clusterinstance();
//Set the properties of the cluster instance locally
new_cl_inst_obj.clid = 1;
new_cl_inst_obj.preemption = "ENABLED";

//Upload the cluster instance
clusterinstance.add(ns_session,new_cl_inst_obj);
```

Python - Sample code to create a cluster instance

```
new_cl_inst_obj = clusterinstance()

#Set the properties of the cluster instance locally
new_cl_inst_obj.clid = 1

#Upload the cluster instance
clusterinstance.add(ns_session, new_cl_inst_obj)
```

Cluster Node Operations

The *com.citrix.netscaler.nitro.resource.config.cluster.clusternode* class provides APIs to manage cluster nodes.

The following sample code adds a cluster node with NSIP address 10.102.29.60.

Java - Sample code to add a cluster node

```
clusternode new_cl_node_obj = new clusternode();
//Set the properties of the cluster node locally
new_cl_node_obj.set_nodeid(0);
new_cl_node_obj.set_ipaddress("10.102.29.60");
new_cl_node_obj.set_state("ACTIVE");
new_cl_node_obj.set_backplane("0/1/1");

//Upload the cluster node
clusternode.add(ns_session,new_cl_node_obj);
```

.NET - Sample code to add a cluster node

```
clusternode new_cl_node_obj = new clusternode();
//Set the properties of the cluster node locally
new_cl_node_obj.nodeid = 0;
new_cl_node_obj.ipaddress = "10.102.29.60";
new_cl_node_obj.state = "ACTIVE";
new_cl_node_obj.backplane = "0/1/1";

//Upload the cluster node
clusternode.add(ns_session,new_cl_node_obj);
```

Python - Sample code to add a cluster node

```
new_cl_node_obj = clusternode()

#Set the properties of the cluster node locally
new_cl_node_obj.nodeid = 0
new_cl_node_obj.ipaddress = "10.102.29.60"
new_cl_node_obj.state = "ACTIVE"
new_cl_node_obj.backplane = "0/1/1"

#Upload the cluster node
clusternode.add(ns_session, new_cl_node_obj)
```

Add a Cluster IP Address

The *com.citrix.netscaler.nitro.resource.config.ns.nsip* class provides the **add()** API to configure an IP address. To configure the IP address as a cluster IP address, you must specify the type as CLIP.

The following sample code configures a cluster IP address on NetScaler appliance with IP address 10.102.29.60.

Java - Sample code to add a cluster IP address

```
nsip new_nsip_obj = new nsip();
//Set the properties locally
new_nsip_obj.set_ipaddress("10.102.29.61");
new_nsip_obj.set_netmask("255.255.255.255");
new_nsip_obj.set_type("CLIP");

//Upload the cluster node
nsip.add(ns_session,new_nsip_obj);
```

.NET - Sample code to add a cluster IP address

```
nsip new_nsip_obj = new nsip();
//Set the properties locally
new_nsip_obj.ipaddress = "10.102.29.61";
new_nsip_obj.netmask = "255.255.255.255";
new_nsip_obj.type = "CLIP";

//Upload the cluster node
nsip.add(ns_session,new_nsip_obj);
```

Python - Sample code to add a cluster IP address

```
new_nsip_obj = nsip()

#Set the properties locally
new_nsip_obj.ipaddress = "10.102.29.61"
new_nsip_obj.netmask = "255.255.255.255"
new_nsip_obj.type = "CLIP"

#Upload the cluster node
nsip.add(ns_session, new_nsip_obj)
```

Add a Spotted IP Address

The *com.citrix.netscaler.nitro.resource.config.ns.nsip* class provides the **add()** API to configure an IP address. To configure the IP address as spotted, you must specify the ID of the node that must own the IP address. This configuration must be done on the cluster IP address.

The following sample code configures a spotted SNIP address on a node with ID 1.

Java - Sample code to configure a spotted IP address

```
nsip new_nsip_obj = new nsip();
//Set the properties locally
new_nsip_obj.set_ipaddress("10.102.29.77");
new_nsip_obj.set_netmask("255.255.255.0");
new_nsip_obj.set_type("SNIP");
new_nsip_obj.set_ownernode(1);

//Upload the cluster node
nsip.add(ns_session,new_nsip_obj);
```

.NET - Sample code to configure a spotted IP address

```
nsip new_nsip_obj = new nsip();
//Set the properties locally
new_nsip_obj.ipaddress = "10.102.29.77";
new_nsip_obj.netmask = "255.255.255.0";
new_nsip_obj.type = "SNIP";
new_nsip_obj.ownernode = 1;

//Upload the cluster node
nsip.add(ns_session,new_nsip_obj);
```

Python - Sample code to configure a spotted IP address

```
#Add a spotted IP address
new_nsip_obj = nsip()

#Set the properties locally
new_nsip_obj.ipaddress = "10.102.29.77"
new_nsip_obj.netmask = "255.255.255.0"
new_nsip_obj.type = "SNIP"
new_nsip_obj.ownernode = 1

#Upload the cluster node
nsip.add(ns_session, new_nsip_obj)
```

Join NetScaler Appliance to Cluster

The *com.citrix.netscaler.nitro.resource.config.cluster.cluster* class provides the **join()** API to join a NetScaler appliance to the cluster. You must specify the cluster IP address and the nsroot password of the configuration coordinator.

The following sample code joins a NetScaler appliance to a cluster.

Java - Sample code to join an appliance to a cluster

```
cluster new_cl_obj = new cluster();
//Set the properties of the cluster locally
new_cl_obj.set_clip("10.102.29.61");
new_cl_obj.set_password("verysecret");

//Upload the cluster
cluster.add(ns_session,new_cl_obj);
```

.NET - Sample code to join an appliance to a cluster

```
cluster new_cl_obj = new cluster();
//Set the properties of the cluster locally
new_cl_obj.clip = "10.102.29.61";
new_cl_obj.password = "verysecret";

//Upload the cluster node
cluster.add(ns_session,new_cl_node_obj);
```

Python - Sample code to join an appliance to a cluster

```
new_cl_obj = cluster()

#Set the properties of the cluster locally
new_cl_obj.clip = "10.102.29.61"
new_cl_obj.password = "verysecret"

#Upload the cluster
cluster.add(ns_session, new_cl_obj)
```

Linkset Operations

The *com.citrix.netscaler.nitro.resource.config.network.linkset* class provides the APIs to manage linksets.

To configure a linkset, do the following:

1. Add a linkset by invoking the **add()** method of the *linkset* class.
2. Bind the interfaces to the linkset using the **add()** method of the *linkset_interface_binding* class.

The following sample code creates a linkset LS/1 and bind interfaces 1/1/2 and 2/1/2 to it.

Java - Sample code to configure linksets

```
linkset new_linkset_obj = new linkset();
new_linkset_obj.set_id("LS/1");
linkset.add(ns_session,new_linkset_obj);

//Bind the interfaces to the linkset
linkset_interface_binding new_linkif_obj = new linkset_interface_binding();
new_linkif_obj.set_id("LS/1");
new_linkif_obj.set_ifnum("1/1/2 2/1/2");
linkset_interface_binding.add(ns_session,new_linkif_obj);
```

.NET - Sample code to configure linksets

```
linkset new_linkset_obj = new linkset();
new_linkset_obj.id = "LS/1";
linkset.add(ns_session,new_linkset_obj);

//Bind the interfaces to the linkset
linkset_interface_binding new_linkif_obj = new linkset_interface_binding();
new_linkif_obj.id = "LS/1";
new_linkif_obj.ifnum = "1/1/2 2/1/2";
linkset_interface_binding.add(ns_session,new_linkif_obj);
```

Python - Sample code to configure linksets

```
#Create a new linkset
new_linkset_obj = linkset()
new_linkset_obj.id = "LS/1"
linkset.add(ns_session, new_linkset_obj)

#Bind the interfaces to the linkset
new_linkif_obj = linkset_interface_binding()
```

```
new_linkif_obj.id = "LS/1"
new_linkif_obj.ifnum = "1/1/2 2/1/2"
linkset_interface_binding.add(ns_session, new_linkif_obj)
```

Configuring Admin Partitions

To create an admin partition, you must perform a set of operations on the default partition. To understand this procedure, let us consider a company that has two departments each of which has an application that requires the NetScaler functionality. The NetScaler admin wants to have a different partition for each department so that there is isolation of users and configurations. The NetScaler admin must do the following (the sample shows configurations only for a single admin partition):

Note: For detailed information and best practices, see Admin Partitions.

Creating an Admin Partition

While creating an admin partition, you must also specify the system resources that must be allocated to that partition.

The following sample code creates an admin partition named "partition-dept1".

Java - Sample code to create an admin partition

```
nspartition nspartitionObject = new nspartition();
nspartitionObject.set_partitionname("partition-dept1");
nspartitionObject.set_maxbandwidth(10240);
nspartitionObject.set_maxconn(1024);
nspartitionObject.set_maxmemlimit(10);
nspartitionObject.set_minbandwidth(1240);
base_response result = nspartition.add(nitroService, nspartitionObject);
```

.NET - Sample code to create an admin partition

```
nspartition nspartitionObject = new nspartition();
nspartitionObject.partitionname = "partition-dept1";
nspartitionObject.maxbandwidth = 10240;
nspartitionObject.maxconn = 1024;
nspartitionObject.maxmemlimit = 10;
nspartitionObject.minbandwidth = 1240;
base_response result = nspartition.add(nitroService, nspartitionObject);
```

Python - Sample code to create an admin partition

```
nspartitionObject = nspartition()
nspartitionObject.partitionname = "partition-dept1"
nspartitionObject.maxbandwidth = 10240
nspartitionObject.maxconn = 1024
nspartitionObject.maxmemlimit = 10
nspartitionObject.minbandwidth = 1240
result = nspartition.add(nitroService, nspartitionObject)
```

Associating Users with Partitions

Associate the appropriate users with the partition.

The following sample code associates "user1" to a partition named "partition-dept1".

Java - Sample code for associating user with partition

```
systemuser_nspartition_binding systemuser_nspartition_binding_object = new
systemuser_nspartition_binding();
systemuser_nspartition_binding_object.set_partitionname("partition-dept1");
systemuser_nspartition_binding_object.set_username("user1");
base_response result = systemuser_nspartition_binding.add(nitroService,
systemuser_nspartition_binding_object);
```

.NET - Sample code for associating user with partition

```
systemuser_nspartition_binding systemuser_nspartition_binding_object = new
systemuser_nspartition_binding();
systemuser_nspartition_binding_object.partitionname = "partition-dept1";
systemuser_nspartition_binding_object.username = "user1";
base_response result = systemuser_nspartition_binding.add(nitroService,
systemuser_nspartition_binding_object);
```

Python - Sample code for associating user with partition

```
systemuser_nspartition_binding_object =  systemuser_nspartition_binding()
systemuser_nspartition_binding_object.partitionname = "partition-dept1"
systemuser_nspartition_binding_object.username = "user1"
result = systemuser_nspartition_binding.add(nitroService,
systemuser_nspartition_binding_object)
```

Specifying Command Policy for Partition Users

Associate an appropriate command policy to the admin partition user.

The following sample code associates the command policy "partition-admin" to "user1".

Java - Sample code to specify command policy for partition user

```
systemuser_systemcmdpolicy_binding binding_object = new
systemuser_systemcmdpolicy_binding();
binding_object.set_username("user1");
binding_object.set_policyname("partition-admin");
binding_object.set_priority(1);
base_response result = systemuser_systemcmdpolicy_binding.add(nitroService,
binding_object);
```

.NET - Sample code to specify command policy for partition user

```
systemuser_systemcmdpolicy_binding binding_object = new
systemuser_systemcmdpolicy_binding();
binding_object.username = "user1";
binding_object.policyname = "partition-admin";
binding_object.priority = 1;
base_response result = systemuser_systemcmdpolicy_binding.add(nitroService,
binding_object);
```

Python - Sample code to specify command policy for partition user

```
binding_object = systemuser_systemcmdpolicy_binding()
binding_object.username = "user1"
binding_object.policyname = "partition-admin"
binding_object.priority = 1
result = systemuser_systemcmdpolicy_binding.add(nitroService,binding_object)
```

Specifying the Admin Partition VLAN or Bridgegroup

Specify the VLANs or bridgegroups to be associated with the partition. This step ensures network isolation of the traffic. Traffic received on the interfaces of the VLAN or bridgegroup is isolated from the traffic of other partitions.

The following sample code specifies a VLAN for an admin partition.

Java - Sample Code to specify the VLAN

```
nspartition_vlan_binding nspartition_vlan_binding_object = new
nspartition_vlan_binding();
nspartition_vlan_binding_object.set_vlan(2);
nspartition_vlan_binding_object.set_partitionname("partition-dept1");
base_response result = nspartition_vlan_binding.add(nitroService,
nspartition_vlan_binding_object);
```

.NET - Sample code to specify the VLAN

```
nspartition_vlan_binding nspartition_vlan_binding_object = new
nspartition_vlan_binding();
nspartition_vlan_binding_object.vlan = 2;
nspartition_vlan_binding_object.partitionname = "partition-dept1";
base_response result = nspartition_vlan_binding.add(nitroService,
nspartition_vlan_binding_object);
```

Python - Sample code to specify the VLAN

```
nspartition_vlan_binding_object = nspartition_vlan_binding()
nspartition_vlan_binding_object.vlan = 2
nspartition_vlan_binding_object.partitionname = "partition-dept1"
result = nspartition_vlan_binding.add(nitroService,
nspartition_vlan_binding_object)
```

Switching Partitions

If you are associated with multiple admin partitions, you can switch to the required partition.

The following sample code switches from current partition to a partition named "partition-dept2".

Java - Sample code to switch partitions

```
nspartition nspartitionObject = new nspartition();
vnspartitionObject.set_partitionname("partition-dept2");
base_response result = nspartition.Switch(nitroService, nspartitionObject);
```

.NET - Sample code to switch partitions

```
nspartition nspartitionObject = new nspartition();
nspartitionObject.partitionname = "partition-dept2";
base_response result = nspartition.Switch(nitroService, nspartitionObject);
```

Python - Sample code to switch partitions

```
nspartitionObject = nspartition()
nspartitionObject.partitionname = "partition-dept2"
result = nspartition.Switch(nitroService, nspartitionObject)
```

Managing AppExpert Applications

Exporting an AppExpert Application

To export an AppExpert application, you must do the following:

1. Instantiate the *com.citrix.netscaler.nitro.resource.config.app.application* class.

   Note: For the python SDK, the package path is of the form *nssrc.com.citrix.netscaler.....*.

2. Configure the properties of the AppExpert locally.
3. Export the AppExpert application.

The following samples export an AppExpert application named "MyApp1".

JAVA - SAMPLE CODE TO EXPORT AN APPEXPERT APPLICATION

```
application myapp = new application();
myapp.set_appname("MyApp1");
myapp.set_apptemplatefilename("myapp_template");
application.export(ns_session,myapp);
```

.NET - SAMPLE CODE TO EXPORT AN APPEXPERT APPLICATION

```
application myapp = new application();
myapp.appname = "MyApp1";
myapp.apptemplatefilename = "myapp_template";
application.export(ns_session,myapp);
```

python - SAMPLE CODE TO EXPORT AN APPEXPERT APPLICATION

```
myapp = application()
myapp.appname = "MyApp1"
myapp.apptemplatefilename = "myapp_template"
application.export(ns_session, myapp)
```

Importing an AppExpert Application

To import an AppExpert application, you must do the following:

1. Instantiate the *com.citrix.netscaler.nitro.resource.config.app.application* class.

   Note: For the python SDK, the package path is of the form *nssrc.com.citrix.netscaler.....*.

2. Configure the properties of the AppExpert locally.
3. Import the AppExpert application.

The following samples import an AppExpert application named "MyApp1".

Java - Sample code to import an AppExpert application

```
application myapp = new application();
myapp.set_appname("MyApp1");
myapp.set_apptemplatefilename("myapp_template");
application.Import(ns_session,myapp);
```

.NET - SAMPLE CODE TO IMPORT AN APPEXPERT APPLICATION

```
application myapp = new application();
myapp.appname = "MyApp1";
myapp.apptemplatefilename = "myapp_template";
application.Import(ns_session,myapp);
```

Python - SAMPLE CODE TO IMPORT AN APPEXPERT APPLICATION

```
myapp = application()
myapp.appname = "MyApp1"
myapp.apptemplatefilename = "myapp_template"
application.Import(ns_session, myapp)
```

Exception Handling

The status of a NITRO request is captured in the `com.citrix.netscaler.nitro.exception.nitro_exception` class. This class provides the following details of the exception:

- **Session ID.** The session in which the exception occurred.
- **Severity.** The severity of the exception: error or warning. By default, only errors are captured. To capture warnings, you must set the warning flag to true, while connecting to the appliance.
- **Error code.** The status of the NITRO request. An error code of 0 indicates that the NITRO request is successful. A non-zero error code indicates an error in processing the NITRO request.
- **Error message.** Provides a brief description of the exception.

For a list of error codes, see the errorlisting.html file available in the <NITRO_SDK_HOME>/doc/api_reference folder.

NITRO Changes Across Releases

Some NITRO API have changed across releases. This topic details information which can help you avoid compatibility issues in your application. The changes are categorized as:

- Changes made from 9.3 -> 10.1/10.5
  - Changes across NITRO flavors
  - Changes specific to NITRO SDKs
- Changes made from 10.5 57.x -> 11.0
  - Changes across NITRO flavors
  - Changes specific to NITRO SDKs

> **Note**
>
> No changes are introduced from NetScaler 10.1 to NetScaler 10.5. Therefore, you should not face any compatibility issues when migrating from NetScaler 10.1 to 10.5.

All NITRO Flavors - Changes from 9.3 to 10.1/10.5

The NITRO changes that were made in NetScaler 10.1/10.5 when compared with NetScaler 9.3.

Type of Change	Resource	Method	Attribute
Resource removed	lbmonitor_lbmetrictable_binding ---------- Replaced with the resource 'lbmonitor_metric_binding'.	-	-
	vserver	GET ---------- Perform the GET operation on specific virtual server types such as lb/cr/cs.	-
	filterpolicy	POST with 'action=unset' ---------- This method is removed as unsetting the attributes('action') of a policy makes it invalid.	-
	auditsyslogpolicy	POST with 'action=unset' ----------	-

Method removed		This method is removed as unsetting the attributes('action') of a policy makes it invalid.	
	auditnslogpolicy	POST with 'action=unset' ---------- This method is removed as unsetting the attributes('action') of a policy makes it invalid.	-
	authorizationpolicy	POST with 'action=unset' ---------- This method is removed as unsetting the attributes('action') of a policy makes it invalid.	-
Return-type changed	snmpengineid	GET ---------- Return type changed to an array.	-
	nshostname	GET ---------- Return type changed to an array.	-
Attribute-type changed	appfwpolicy_lbvserver_binding	-	activepolicy ---------- Data type changed from Boolean to Integer.
	appfwpolicy_appfwglobal_binding	-	activepolicy ---------- Data type changed from Boolean to Integer.
	vlan	-	portbitmap ---------- Data type changed from uint to ulong.

	vlan	-	tagbitmap ---------- Data type changed from uint to ulong.
Attribute removed	policypatset_pattern_binding	-	indextype ---------- This attribute is moved to 'policypatset' resource as this attribute is applicable at patset level.
	system_stats	-	powersupply1failure ---------- Replaced with 'powersupply1status'. Note: Change is applicable from NetScaler 9.3 Build 65.8.
	system_stats	-	powersupply2failure ---------- Replaced with 'powersupply2status'. Note: Change is applicable from NetScaler 9.3 Build 65.8.
	server_servicegroup_binding	-	servicetype ---------- Replaced with 'svctype'.
	server_service_binding	-	servicetype ---------- Replaced with 'svctype'.
	crvserver	-	hits ---------- Hits are calculated per policy binding hence moved this parameter to binding resources.
	crvserver	-	dstvsvr ---------- Replaced with 'destinationvserver'.
	crvserver	-	destvserver ---------- Replaced with 'domain'.

	crvserver	-	dnsvserver ---------- Replaced with 'dnsvservername'.
	appflowpolicylabel	-	type ---------- Replaced with 'policylabeltype'.
	sslcipher	-	ciphgrpals ---------- Replaced with 'ciphergroupname'.
	csvserver_cspolicy_binding	-	targetvserver ---------- Replaced with 'targetlbvserver'. Note: This change is applicable for the 'sslcipher_*_binding' resources also.
	csvserver_cspolicy_binding	-	targetvserver ---------- Replaced with 'targetlbvserver'.
	rewriteaction	-	allow_unsafe_pi1, allow_unsafe_pi ---------- Replaced with 'bypassSafetyCheck'.
	nsconfig	-	nwfwmode ---------- Marked as a hidden attribute.

NITRO SDKs - Changes from 9.3 to 10.1/10.5

The SDK-specific changes that were made in NetScaler 10.1/10.5 when compared with NetScaler 9.3.

Type of Change	Class	Method	Replace withâ€¦
Class removed	Routerbgp	-	This class is removed as all router configurations are deprecated in 9.2.
	dnsptrrec	get(dnsptrrec obj, nitro_service session)	get(nitro_service session, String reversedomain)
	dnsaddrec	get(dnsaddrec obj, nitro_service session)	get(nitro_service session, String hostname)
	dnsnsrec		

Method signature changed		get(dnsnsrec obj, nitro_service session)	get(nitro_service session, String domain)
	snmpengineid	unset(nitro_service session, String[] args)	unset(nitro_service session, snmpengineid resource, String[] args)
	arp	arp.get(nitro_service session, String ipaddress)	arp.get(nitro_service session, arp resource)
	nsip	get(nitro_service session, String ipaddress)	get(nitro_service client, nsip resource)
	nsip6	get(nitro_service session, String ipv6address)	get(nitro_service session, nsip6 resource)
	dnsmxrec	dnsmxrec.get(dnsmxrec obj, nitro_service session)	dnsmxrec[] get(nitro_service service, dnsmxrec_args args)
Method Missing	authenticationnegotiatepolicy	(base_response) unset (nitro_service session, String[] args, String name)' is missing in	-
	authenticationnegotiatepolicy	(base_response) unset (authenticationnegotiatepolicy obj, nitro_service session, String[] args)	-
Attribute missing in method	nsconfig	(base_response) update (nsconfig obj, nitro_service session) ---------- 'nwfwmode' attribute is missing in this method.	-

All NITRO Flavors - Changes from 10.5 57.x to 11.0

The NITRO changes that were made in NetScaler 11.0 when compared with NetScaler 10.5 Build 57.x.

Type of Change	Resource	Attribute
Attribute removed	nstrace	doruntimemerge
	nstrace	tcpdump
	cacheobject	force

NITRO SDKs - Changes from 10.5 57.x to 11.0

The SDK-specific changes that were made in NetScaler 11.0 when compared with NetScaler 10.5 Build 57.x.

Type of Change	Class	Method	Replace with...
Attribute missing in method	cacheobject	(base_response) flush (cacheobject obj, nitro_service session) ---------- 'force' attribute missing in this method.	-
	clustersync	(base_response) Force (clustersync obj, nitro_service session)	(base_response) Force(nitro_service session)

Method missing	shutdown	(base_response) Shutdown (shutdown obj, nitro_service session)	(base_response) Shutdown(nitro_service session)
	systemfile	(systemfile) get(systemfile obj, nitro_service session)	-
	sslfips	(base_response) reset (sslfips obj, nitro_service session)	(base_response) reset(nitro_service session)

Unsupported NetScaler Operations

The topic lists the NetScaler operations that cannot be performed by using NITRO API.

> **Note**
>
> These operations can be performed on the NetScaler CLI or the GUI.

- install API
- diff API on nsconfig resource (supported from NetScaler 10.5 onwards)
- UI-internal APIs (update, unset, and get)
- show ns info
- shutdown
- Application firewall API
  - importwsdl
  - importcustom
  - importxmlschema
  - importxmlerrorpage
  - importhtmlerrorpage
  - rmcustom
  - rmxmlschema
  - rmxmlerrorpage
  - rmhtmlerrorpage
- CLI-specific API
  - ping/ping6
  - traceroute/traceroute6
  - start nstrace/stop nstrace/show nstrace
  - scp
  - configaudit
  - show defaults
  - show permission
  - batch
  - source