



Manage QoS policies

ONTAP 9.7 REST API reference

NetApp
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Manage QoS policies

Storage QoS policies endpoint overview

Quality of Service Configuration

A QoS policy defines measurable service level objectives (SLOs) that apply to the storage objects with which the policy is associated. There are two types of policies that can be configured: fixed, which defines a fixed SLO, or adaptive which defines a variable SLO for a storage object. Adaptive policies vary the SLO depending on the space usage of the storage object. A policy can be either a fixed policy or an adaptive one, not both. Service level objectives include minimum and maximum limits on throughput in terms of IOPS. Only maximum limits can be set in terms of both IOPS and/or throughput (MB/s). A QoS policy can be used to enforce SLOs for multiple storage objects by specifying "capacity_shared" to true. For example, if a QoS policy with "capacity_shared" is set to true and it has maximum_throughput_iops set to 1000, and this policy is assigned to four volumes, then the combined throughput of all four volumes is limited to 1000 IOPS. If "capacity_shared" is set to false then, each storage object will have its SLOs enforced individually. For example, in the previous case if the same policy was applied to four volumes but with "capacity_shared" set to false, then each of the volumes would be limited to 1000 IOPS individually. Once "capacity_shared" is set, it cannot be modified. Adaptive parameters can specify the variable SLOs in terms of IOPS/TB. The actual IOPS enforced on the storage object can be calculated using the allocated space on the storage object. The policies are enforced individually amongst storage objects.

Examples

1) Create a fixed QoS policy

The following example shows how to create a fixed QoS policy to limit throughput for a storage object between 5000 IOPS and 10000 IOPS which has capacity_shared set to false. This QoS policy can be used as a template to apply on multiple storage objects to provide individual SLOs to each object.

```
curl -X POST
"https://172.21.69.245/api/storage/qos/policies?return_timeout=0" -H
"accept: application/json" -H "Content-Type: application/json" -d "{
\"fixed\": { \"capacity_shared\": false, \"max_throughput_iops\": 10000,
\"min_throughput_iops\": 5000 }, \"name\":
\"qos_policy_5000_to_10000_iops\", \"svm\": { \"name\": \"vs0\" }}"
```

2) Create an adaptive QoS policy

The following example shows how to create an adaptive QoS policy which provides 5000 IOPS per GB of allocated space for a storage object with a peak of 6000 IOPS. Minimum IOPS regardless of allocated space are 1000 IOPS.

```
curl -X POST
"https://172.21.69.245/api/storage/qos/policies?return_timeout=0" -H
"accept: application/json" -H "Content-Type: application/json" -d "{
\"adaptive\": { \"absolute_min_iops\": 1000, \"expected_iops\": 5000,
\"peak_iops\": 6000 }, \"name\": \"adaptive_pg_5k_to_6k\", \"svm\": {
\"name\": \"vs0\" } }"
```

3) Update an existing QoS policy

The following example shows how to update SLOs of an existing QoS policy and also rename it.

```
curl -X PATCH "https://172.21.69.245/api/storage/qos/policies/d38bafc0-
5a51-11e9-bd5b-005056ac6f1f?return_timeout=0" -H "accept:
application/json" -H "Content-Type: application/json" -d "{ \"fixed\": {
\"max_throughput_iops\": 15000, \"min_throughput_iops\": 10000 },
\"name\": \"qos_policy_10k_to_15k_iops\"}"
```

4) Delete an existing QoS policy

When a QoS policy is deleted any associations of the policy with a storage objects are also removed.

```
curl -X DELETE "https://172.21.69.245/api/storage/qos/policies/d38bafc0-
5a51-11e9-bd5b-005056ac6f1f?return_timeout=0" -H "accept:
application/json"
```

Retrieve QoS policies

GET /storage/qos/policies

Retrieves a collection of QoS policies.

Learn more

- [DOC /storage/qos/policies](#)

Parameters

Name	Type	In	Required	Description
uuid	string	query	False	Filter by uuid
fixed.capacity_share d	boolean	query	False	Filter by fixed.capacity_share d
fixed.min_throughput _iops	integer	query	False	Filter by fixed.min_throughpu t_iops
fixed.max_throughpu t_mbps	integer	query	False	Filter by fixed.max_throughp ut_mbps
fixed.max_throughpu t_iops	integer	query	False	Filter by fixed.max_throughp ut_iops
object_count	integer	query	False	Filter by object_count
svm.uuid	string	query	False	Filter by svm.uuid
svm.name	string	query	False	Filter by svm.name
name	string	query	False	Filter by name
adaptive.expected_i ops	integer	query	False	Filter by adaptive.expected_i ops
adaptive.peak_iops	integer	query	False	Filter by adaptive.peak_iops
adaptive.absolute_m in_iops	integer	query	False	Filter by adaptive.absolute_m in_iops
fields	array[string]	query	False	Specify the fields to return.
max_records	integer	query	False	Limit the number of records returned.

Name	Type	In	Required	Description
return_records	boolean	query	False	The default is true for GET calls. When set to false, only the number of records is returned.
return_timeout	integer	query	False	The number of seconds to allow the call to execute before returning. When iterating over a collection, the default is 15 seconds. ONTAP returns earlier if either max records or the end of the collection is reached.
order_by	array[string]	query	False	Order results by specified fields and optional [asc

Response

Status: 200, Ok

Name	Type	Description
_links	_links	
error	error	
num_records	integer	Number of records
records	array[qos_policy]	

Example response

```
{
  "_links": {
    "next": {
      "href": "/api/resourcelink"
    },
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "error": {
    "arguments": {
      "code": "string",
      "message": "string"
    },
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  },
  "records": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    },
    "name": "extreme",
    "object_count": 0,
    "svm": {
      "_links": {
        "self": {
          "href": "/api/resourcelink"
        }
      },
      "name": "svm1",
      "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
    },
    "uuid": "1cd8a442-86d1-11e0-ae1c-123478563412"
  }
}
```

Error

Status: Default, Error

Name	Type	Description
error	error	

Example error

```
{
  "error": {
    "arguments": {
      "code": "string",
      "message": "string"
    },
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

Definitions

See Definitions

href

Name	Type	Description
href	string	

_links

Name	Type	Description
next	href	
self	href	

error_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

error

Name	Type	Description
arguments	array[error_arguments]	Message arguments
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.

_links

Name	Type	Description
self	href	

adaptive

Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.

Name	Type	Description
absolute_min_iops	integer	Specifies the absolute minimum IOPS that is used as an override when the expected_iops is less than this value. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.
expected_iops	integer	Expected IOPS. Specifies the minimum expected IOPS per TB allocated based on the storage object allocated size. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.
peak_iops	integer	Peak IOPS. Specifies the maximum possible IOPS per TB allocated based on the storage object allocated size or the storage object used size.

fixed

QoS policy-groups define a fixed service level objective (SLO) for a storage object.

Name	Type	Description
capacity_shared	boolean	Specifies whether the capacities are shared across all objects that use this QoS policy-group. Default is false.
max_throughput_iops	integer	Maximum throughput defined by this policy. It is specified in terms of IOPS. 0 means no maximum throughput is enforced.
max_throughput_mbps	integer	Maximum throughput defined by this policy. It is specified in terms of Mbps. 0 means no maximum throughput is enforced.

Name	Type	Description
min_throughput_iops	integer	Minimum throughput defined by this policy. It is specified in terms of IOPS. 0 means no minimum throughput is enforced. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.

svm

Name	Type	Description
_links	_links	
name	string	The name of the SVM.
uuid	string	The unique identifier of the SVM.

qos_policy

Name	Type	Description
_links	_links	
adaptive	adaptive	Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.
fixed	fixed	QoS policy-groups define a fixed service level objective (SLO) for a storage object.
name	string	Name of the QoS policy.
object_count	integer	Number of objects attached to this policy.
svm	svm	
uuid	string	

Create a QoS policy

POST /storage/qos/policies

Creates a QoS policy.

Required properties

- `svm.uuid` or `svm.name` - The existing SVM owning the QoS policy.
- `name` - The name of the QoS policy.
- `fixed.*` or `adaptive.*` - Either of the fixed or adaptive parameters.

Default property values

- If `fixed.*` parameters are specified, then `capacity.shared` is set to `false` by default.

Related ONTAP commands

- `qos policy-group create`
- `qos adaptive-policy-group create`

Learn more

- [DOC /storage/qos/policies](#)

Parameters

Name	Type	In	Required	Description
<code>return_records</code>	boolean	query	False	The default is false. If set to true, the records are returned.

Name	Type	In	Required	Description
return_timeout	integer	query	False	The number of seconds to allow the call to execute before returning. When doing a POST, PATCH, or DELETE operation on a single record, the default is 0 seconds. This means that if an asynchronous operation is started, the server immediately returns HTTP code 202 (Accepted) along with a link to the job. If a non-zero value is specified for POST, PATCH, or DELETE operations, ONTAP waits that length of time to see if the job completes so it can return something other than 202.

Request Body

Name	Type	Description
_links	_links	
adaptive	adaptive	Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.
fixed	fixed	QoS policy-groups define a fixed service level objective (SLO) for a storage object.
name	string	Name of the QoS policy.
object_count	integer	Number of objects attached to this policy.

Name	Type	Description
svm	svm	
uuid	string	

Example request

```
{
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "name": "extreme",
  "object_count": 0,
  "svm": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    },
    "name": "svm1",
    "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
  },
  "uuid": "1cd8a442-86d1-11e0-ae1c-123478563412"
}
```

Response

Status: 202, Accepted

Name	Type	Description
job	job_link	

Example response

```
{
  "job": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    },
    "uuid": "string"
  }
}
```

Error

Status: Default

ONTAP Error Response Codes

Error Code	Description
8454147	The maximum limit for QoS policies has been reached.
8454154	The name specified for creating conflicts with an existing QoS policy name.
8454260	Invalid value for maximum and minimum fields. Valid values for max_throughput_iops and max_throughput_mbps combination is for the ratio of max_throughput_mbps and max_throughput_iops to be within 1 to 4096.
8454273	Invalid value for an adaptive field. Value should be non-zero.
8454277	The name specified for creating an adaptive QoS policy conflicts with an existing fixed QoS policy name.
8454278	The name specified for creating a fixed QoS policy conflicts with an existing adaptive QoS policy name.

Name	Type	Description
error	error	

Example error

```
{
  "error": {
    "arguments": {
      "code": "string",
      "message": "string"
    },
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

Definitions

See Definitions

href

Name	Type	Description
href	string	

_links

Name	Type	Description
self	href	

adaptive

Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.

Name	Type	Description
absolute_min_iops	integer	Specifies the absolute minimum IOPS that is used as an override when the expected_iops is less than this value. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.
expected_iops	integer	Expected IOPS. Specifies the minimum expected IOPS per TB allocated based on the storage object allocated size. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.
peak_iops	integer	Peak IOPS. Specifies the maximum possible IOPS per TB allocated based on the storage object allocated size or the storage object used size.

fixed

QoS policy-groups define a fixed service level objective (SLO) for a storage object.

Name	Type	Description
capacity_shared	boolean	Specifies whether the capacities are shared across all objects that use this QoS policy-group. Default is false.
max_throughput_iops	integer	Maximum throughput defined by this policy. It is specified in terms of IOPS. 0 means no maximum throughput is enforced.
max_throughput_mbps	integer	Maximum throughput defined by this policy. It is specified in terms of Mbps. 0 means no maximum throughput is enforced.
min_throughput_iops	integer	Minimum throughput defined by this policy. It is specified in terms of IOPS. 0 means no minimum throughput is enforced. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.

svm

Name	Type	Description
_links	_links	
name	string	The name of the SVM.
uuid	string	The unique identifier of the SVM.

qos_policy

Name	Type	Description
_links	_links	
adaptive	adaptive	Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.
fixed	fixed	QoS policy-groups define a fixed service level objective (SLO) for a storage object.

Name	Type	Description
name	string	Name of the QoS policy.
object_count	integer	Number of objects attached to this policy.
svm	svm	
uuid	string	

job_link

Name	Type	Description
_links	_links	
uuid	string	The UUID of the asynchronous job that is triggered by a POST, PATCH, or DELETE operation.

error_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

error

Name	Type	Description
arguments	array[error_arguments]	Message arguments
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.

Delete a QoS policy

DELETE /storage/qos/policies/{policy.uuid}

Deletes a QoS policy. All QoS workloads associated with the policy are removed.

Related ONTAP commands

- `qos policy-group delete`
- `qos adaptive-policy-group delete`

Learn more

- [DOC /storage/qos/policies](#)

Parameters

Name	Type	In	Required	Description
policy.uuid	string	path	True	
return_timeout	integer	query	False	The number of seconds to allow the call to execute before returning. When doing a POST, PATCH, or DELETE operation on a single record, the default is 0 seconds. This means that if an asynchronous operation is started, the server immediately returns HTTP code 202 (Accepted) along with a link to the job. If a non-zero value is specified for POST, PATCH, or DELETE operations, ONTAP waits that length of time to see if the job completes so it can return something other than 202.

Response

Status: 202, Accepted

Name	Type	Description
job	job_link	

Example response

```
{
  "job": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    },
    "uuid": "string"
  }
}
```

Error

Status: Default, Error

Name	Type	Description
error	error	

Example error

```
{
  "error": {
    "arguments": {
      "code": "string",
      "message": "string"
    },
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

Definitions

See Definitions

href

Name	Type	Description
href	string	

_links

Name	Type	Description
self	href	

job_link

Name	Type	Description
_links	_links	
uuid	string	The UUID of the asynchronous job that is triggered by a POST, PATCH, or DELETE operation.

error_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

error

Name	Type	Description
arguments	array[error_arguments]	Message arguments
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.

Retrieve a QoS policy

GET /storage/qos/policies/{policy.uuid}

Retrieves a specific QoS policy.

Related ONTAP commands

- `qos policy-group show`
- `qos adaptive-policy-group show`

Learn more

- [DOC /storage/qos/policies](#)

Parameters

Name	Type	In	Required	Description
policy.uuid	string	path	True	
fields	array[string]	query	False	Specify the fields to return.

Response

Status: 200, Ok

Name	Type	Description
_links	_links	
adaptive	adaptive	Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.
fixed	fixed	QoS policy-groups define a fixed service level objective (SLO) for a storage object.
name	string	Name of the QoS policy.
object_count	integer	Number of objects attached to this policy.
svm	svm	
uuid	string	

Example response

```
{
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "name": "extreme",
  "object_count": 0,
  "svm": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    },
    "name": "svm1",
    "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
  },
  "uuid": "1cd8a442-86d1-11e0-ae1c-123478563412"
}
```

Error

Status: Default, Error

Name	Type	Description
error	error	

Example error

```
{
  "error": {
    "arguments": {
      "code": "string",
      "message": "string"
    },
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

Definitions

See Definitions

href

Name	Type	Description
href	string	

_links

Name	Type	Description
self	href	

adaptive

Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.

Name	Type	Description
absolute_min_iops	integer	Specifies the absolute minimum IOPS that is used as an override when the expected_iops is less than this value. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.
expected_iops	integer	Expected IOPS. Specifies the minimum expected IOPS per TB allocated based on the storage object allocated size. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.
peak_iops	integer	Peak IOPS. Specifies the maximum possible IOPS per TB allocated based on the storage object allocated size or the storage object used size.

fixed

QoS policy-groups define a fixed service level objective (SLO) for a storage object.

Name	Type	Description
capacity_shared	boolean	Specifies whether the capacities are shared across all objects that use this QoS policy-group. Default is false.
max_throughput_iops	integer	Maximum throughput defined by this policy. It is specified in terms of IOPS. 0 means no maximum throughput is enforced.
max_throughput_mbps	integer	Maximum throughput defined by this policy. It is specified in terms of Mbps. 0 means no maximum throughput is enforced.
min_throughput_iops	integer	Minimum throughput defined by this policy. It is specified in terms of IOPS. 0 means no minimum throughput is enforced. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.

svm

Name	Type	Description
_links	_links	
name	string	The name of the SVM.
uuid	string	The unique identifier of the SVM.

error_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

error

Name	Type	Description
arguments	array[error_arguments]	Message arguments

Name	Type	Description
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.

Update a QoS policy

PATCH /storage/qos/policies/{policy.uuid}

Update a specific QoS policy.

Related ONTAP commands

- `qos policy-group modify`
- `qos adaptive-policy-group modify`

Learn more

- [DOC /storage/qos/policies](#)

Parameters

Name	Type	In	Required	Description
policy.uuid	string	path	True	

Name	Type	In	Required	Description
return_timeout	integer	query	False	The number of seconds to allow the call to execute before returning. When doing a POST, PATCH, or DELETE operation on a single record, the default is 0 seconds. This means that if an asynchronous operation is started, the server immediately returns HTTP code 202 (Accepted) along with a link to the job. If a non-zero value is specified for POST, PATCH, or DELETE operations, ONTAP waits that length of time to see if the job completes so it can return something other than 202.

Request Body

Name	Type	Description
_links	_links	
adaptive	adaptive	Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.
fixed	fixed	QoS policy-groups define a fixed service level objective (SLO) for a storage object.
name	string	Name of the QoS policy.
object_count	integer	Number of objects attached to this policy.

Name	Type	Description
svm	svm	
uuid	string	

Example request

```
{
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "name": "extreme",
  "object_count": 0,
  "svm": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    },
    "name": "svm1",
    "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
  },
  "uuid": "1cd8a442-86d1-11e0-ae1c-123478563412"
}
```

Response

Status: 202, Accepted

Name	Type	Description
job	job_link	

Example response

```
{
  "job": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    },
    "uuid": "string"
  }
}
```

Error

Status: Default

ONTAP Error Response Codes

Error Code	Description
8454147	The maximum limit for QoS policies has been reached.
8454154	The name specified for creating conflicts with an existing QoS policy name.
8454260	Invalid value for maximum and minimum fields. Valid values for max_throughput_iops and max_throughput_mbps combination is for the ratio of max_throughput_mbps and max_throughput_iops to be within 1 to 4096.
8454273	Invalid value for an adaptive field. Value should be non-zero.
8454277	The name specified for creating an adaptive QoS policy conflicts with an existing fixed QoS policy name.
8454278	The name specified for creating a fixed QoS policy conflicts with an existing adaptive QoS policy name.
8454286	Modifications on these cluster scoped preset policies is prohibited.
8454327	The existing fixed QoS policy cannot be modified to an adaptive QoS policy.
8454328	The existing adaptive QoS policy cannot be modified to a fixed QoS policy.

Name	Type	Description
error	error	

Example error

```
{
  "error": {
    "arguments": {
      "code": "string",
      "message": "string"
    },
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

Definitions

See Definitions

href

Name	Type	Description
href	string	

_links

Name	Type	Description
self	href	

adaptive

Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.

Name	Type	Description
absolute_min_iops	integer	Specifies the absolute minimum IOPS that is used as an override when the expected_iops is less than this value. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.
expected_iops	integer	Expected IOPS. Specifies the minimum expected IOPS per TB allocated based on the storage object allocated size. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.
peak_iops	integer	Peak IOPS. Specifies the maximum possible IOPS per TB allocated based on the storage object allocated size or the storage object used size.

fixed

QoS policy-groups define a fixed service level objective (SLO) for a storage object.

Name	Type	Description
capacity_shared	boolean	Specifies whether the capacities are shared across all objects that use this QoS policy-group. Default is false.
max_throughput_iops	integer	Maximum throughput defined by this policy. It is specified in terms of IOPS. 0 means no maximum throughput is enforced.
max_throughput_mbps	integer	Maximum throughput defined by this policy. It is specified in terms of Mbps. 0 means no maximum throughput is enforced.
min_throughput_iops	integer	Minimum throughput defined by this policy. It is specified in terms of IOPS. 0 means no minimum throughput is enforced. These floors are not guaranteed on non-AFF platforms or when FabricPool tiering policies are set.

svm

Name	Type	Description
_links	_links	
name	string	The name of the SVM.
uuid	string	The unique identifier of the SVM.

qos_policy

Name	Type	Description
_links	_links	
adaptive	adaptive	Adaptive QoS policy-groups define measurable service level objectives (SLOs) that adjust based on the storage object used space and the storage object allocated space.
fixed	fixed	QoS policy-groups define a fixed service level objective (SLO) for a storage object.

Name	Type	Description
name	string	Name of the QoS policy.
object_count	integer	Number of objects attached to this policy.
svm	svm	
uuid	string	

job_link

Name	Type	Description
_links	_links	
uuid	string	The UUID of the asynchronous job that is triggered by a POST, PATCH, or DELETE operation.

error_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

error

Name	Type	Description
arguments	array[error_arguments]	Message arguments
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.

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