



## **View I/O activity for clients**

REST API reference

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# View I/O activity for clients

## View I/O activity for clients

### Overview

You can use this API to retrieve a list of clients with the most I/O activity for a specified volume, within the past several seconds. Use the `top_metric` parameter to specify which type of I/O activity to filter for. This API is used to provide insight into I/O activity and supports ordering by I/O activity types, namely `iops` and `throughput` metrics. This API supports only returning one I/O activity type per request.

### Approximate accounting and error bars

When too many clients have recent activity, some clients might be dropped from the list. In this situation, the spread of values in the `error` field increases, indicating that there are larger error bars on the value for `iops` or `throughput`. As the list becomes increasingly more approximate due to dropped entries, some of the clients that would have otherwise been included might not be present in the final list returned by the API.

### Failure to return list of clients with most I/O activity

The API can sometimes fail to return the list of clients with the most I/O activity, due to the following reasons:

&ndash; The volume does not have the activity tracking feature enabled.

&ndash; The volume has not had any recent NFS/CIFS client traffic.

&ndash; The NFS/CIFS client operations are being served by the client-side filesystem cache.

&ndash; The NFS/CIFS client operations are being buffered by the client operating system.

&ndash; On rare occasions, the incoming traffic pattern is not suitable to obtain the list of clients with the most I/O activity.

&ndash; NFSv4 client read operations using Multi-Processor I/O (MPIO) are not tracked.

### Retrieve a list of the clients with the most I/O activity

For a report on the clients with the most I/O activity returned in descending order, specify the I/O activity type you want to filter for by passing the `iops` or `throughput` I/O activity type into the `top_metric` parameter. If the I/O activity type is not specified, by default the API returns a list of clients with the greatest number of average read operations per second. The current maximum number of clients returned by the API for an I/O activity type is 25.

&ndash; GET `/api/storage/volumes/{volume.uuid}/top-metrics/clients`

### Examples

#### Retrieving a list of the clients with the greatest average number of write operations per second:

```
# The API:  
GET /api/storage/volumes/{volume.uuid}/top-metrics/clients
```

```

# The Call:
curl -X GET "https://<mgmt-ip>/api/storage/volumes/{volume.uuid}/top-
metrics/clients?top_metric=iops.write"

# The Response:
{
  "records": [
    {
      "volume": {
        "name": "vol1"
      },
      "iops": {
        "write": 1495,
        "error": {
          "lower_bound": 1495,
          "upper_bound": 1505
        }
      },
      "client_ip": "172.28.71.128",
      "svm": {
        "uuid": "572361f3-e769-439d-9c04-2ba48a08ff43",
        "name": "vs1",
        "_links": {
          "self": {
            "href": "/api/svm/svms/572361f3-e769-439d-9c04-2ba48a08ff43"
          }
        }
      }
    },
    {
      "volume": {
        "name": "vol1"
      },
      "iops": {
        "write": 1022,
        "error": {
          "lower_bound": 1022,
          "upper_bound": 1032
        }
      },
      "client_ip": "172.28.71.179",
      "svm": {
        "uuid": "572361f3-e769-439d-9c04-2ba48a08ff43",
        "name": "vs1",
        "_links": {

```

```

        "self": {
            "href": "/api/svm/svms/572361f3-e769-439d-9c04-2ba48a08ff43"
        }
    }
},
{
    "volume": {
        "name": "vol1"
    },
    "iops": {
        "write": 345,
        "error": {
            "lower_bound": 345,
            "upper_bound": 355
        }
    },
    "client_ip": "172.28.51.62",
    "svm": {
        "uuid": "572361f3-e769-439d-9c04-2ba48a08ff43",
        "name": "vs1",
        "_links": {
            "self": {
                "href": "/api/svm/svms/572361f3-e769-439d-9c04-2ba48a08ff43"
            }
        }
    }
},
"num_records": 3,
"_links": {
    "self": {
        "href": "/api/storage/volumes/73b293df-e9d7-46cc-a9ce-2df8e52ef864/top-metrics/clients?top_metric=iops.write"
    }
}
}

```

**Example showing the behavior of the API when there is no read/write traffic:**

```

# The Call:
curl -X GET "https://<mgmt-ip>/api/storage/volumes/{volume.uuid}/top-
metrics/clients?top_metric=throughput.write"

# The Response:
{
  "records": [
  ],
  "num_records": 0,
  "notice": {
    "message": "The activity tracking report for volume \"FV\" in SVM
\"vs0\" returned zero records. Check whether the volume have read/write
traffic. Refer to the REST API documentation for more information on why
there might be no records.",
    "code": "124518418"
  },
  "_links": {
    "self": {
      "href": "/api/storage/volumes/9af63729-8ac8-11ec-b1bc-
005056a79da4/top-metrics/clients?top_metric=throughput.write"
    }
  }
}

```

## Retrieve clients with the most I/O activity

GET /storage/volumes/{volume.uuid}/top-metrics/clients

**Introduced In:** 9.10

Retrieves a list of clients with the most I/O activity.

### Parameters

Name	Type	In	Required	Description
volume.uuid	string	path	True	Volume UUID

Name	Type	In	Required	Description
top_metric	string	query	False	I/O activity type <ul style="list-style-type: none"> <li>• Default value: 1</li> <li>• enum: ["iops.read", "iops.write", "throughput.read", "throughput.write"]</li> </ul>
client_ip	string	query	False	Filter by client_ip
throughput.write	integer	query	False	Filter by throughput.write
throughput.read	integer	query	False	Filter by throughput.read
throughput.error.upper_bound	integer	query	False	Filter by throughput.error.upper_bound
throughput.error.lower_bound	integer	query	False	Filter by throughput.error.lower_bound
iops.error.upper_bound	integer	query	False	Filter by iops.error.upper_bound
iops.error.lower_bound	integer	query	False	Filter by iops.error.lower_bound
iops.write	integer	query	False	Filter by iops.write
iops.read	integer	query	False	Filter by iops.read
volume.name	string	query	False	Filter by volume.name
svm.name	string	query	False	Filter by svm.name
svm.uuid	string	query	False	Filter by svm.uuid

Name	Type	In	Required	Description
fields	array[string]	query	False	Specify the fields to return.
max_records	integer	query	False	Limit the number of records returned.
return_records	boolean	query	False	<p>The default is true for GET calls. When set to false, only the number of records is returned.</p> <ul style="list-style-type: none"> <li>Default value: 1</li> </ul>
return_timeout	integer	query	False	<p>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.</p> <ul style="list-style-type: none"> <li>Default value: 15</li> <li>Max value: 120</li> <li>Min value: 0</li> </ul>
order_by	array[string]	query	False	Order results by specified fields and optional [asc]

## Response

Status: 200, Ok

Name	Type	Description
_links	_links	
incomplete_response_reason	incomplete_response_reason	Indicates that the metric report provides incomplete data.

Name	Type	Description
notice	<a href="#">notice</a>	Optional field that indicates why no records are returned by the volume activity tracking REST API.
num_records	integer	Number of records.
partial_response_reason	<a href="#">partial_response_reason</a>	Indicates that the metric report provides partial data.
records	array[ <a href="#">top_metrics_client</a> ]	

## Example response

```
{  
  "_links": {  
    "next": {  
      "href": "/api/resourcelink"  
    },  
    "self": {  
      "href": "/api/resourcelink"  
    }  
  },  
  "incomplete_response_reason": {  
    "code": "111411207",  
    "message": "Partial data has been returned for this metric report.  
Reason: The activity tracking report for this volume is not available  
because the system is busy collecting tracking data."  
  },  
  "notice": {  
    "code": "111411207",  
    "message": "No read/write traffic on volume"  
  },  
  "num_records": 1,  
  "partial_response_reason": {  
    "code": "124518424",  
    "message": "The top metrics report contains partial data for read  
operations because NFSv4 reads using Multi-Processor I/O (MPIO) are not  
tracked."  
  },  
  "records": [  
    {  
      "client_ip": "192.168.185.170",  
      "iops": {  
        "error": {  
          "lower_bound": 34,  
          "upper_bound": 54  
        },  
        "read": 5,  
        "write": 10  
      },  
      "svm": {  
        "_links": {  
          "self": {  
            "href": "/api/resourcelink"  
          }  
        },  
        "name": "svml1",  
        "svm_type": "NFS  
      }  
    }  
  ]  
}
```

```

    "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
  },
  "throughput": {
    "error": {
      "lower_bound": 34,
      "upper_bound": 54
    },
    "read": 12,
    "write": 2
  },
  "volume": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    },
    "name": "volume1",
    "uuid": "028baa66-41bd-11e9-81d5-00a0986138f7"
  }
}
]
}
}

```

## Error

Status: Default

### ONTAP Error Response Codes

Error Code	Description
124518405	Volume activity tracking is not supported on volumes that contain LUNs.
124518407	Volume activity tracking is not supported on FlexCache volumes.
124518408	Volume activity tracking is not supported on audit staging volumes.
124518409	Volume activity tracking is not supported on object store server volumes.
124518410	Volume activity tracking is not supported on SnapMirror destination volumes.
124518411	Enabling or disabling volume activity tracking is not supported on individual FlexGroup constituents.

Error Code	Description
124518412	Volume activity tracking is not supported on SnapLock volumes.
124518414	Volume activity tracking is not supported on volumes that contain NVMe namespaces.
124518415	Failed to get the volume activity tracking report on volume volume.name in SVM svm.name.
124518416	Internal error. Volume activity tracking report timed out for volume volume.name in SVM svm.name.
124518417	Volume wildcard queries are not supported for activity tracking reports.
124518418	The activity tracking report for volume volume.name in SVM svm.name returned zero records. Check whether the volume has read/write traffic. Refer to the REST API documentation for more information.
124518422	Volume activity tracking is not supported on All SAN Array clusters.
124518423	Volume activity tracking is not supported on the volume.
124519411	Volume activity tracking is not enabled on the volume.

Also see the table of common errors in the [Response body](#) overview section of this documentation.

Name	Type	Description
error	returned_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	<a href="#">href</a>	
self	<a href="#">href</a>	

incomplete\_response\_reason

Indicates that the metric report provides incomplete data.

Name	Type	Description
code	string	Warning code indicating why partial data was reported.
message	string	A message describing the reason for partial data.

notice

Optional field that indicates why no records are returned by the volume activity tracking REST API.

Name	Type	Description
code	string	Warning code indicating why no records are returned.
message	string	Details why no records are returned.

partial\_response\_reason

Indicates that the metric report provides partial data.

Name	Type	Description
code	string	Warning code indicating why partial data was reported.
message	string	A message describing the reason for partial data.

## top\_metric\_value\_error\_bounds

Name	Type	Description
lower_bound	integer	Lower bound of the nominal value of a metric.
upper_bound	integer	Upper bound of the nominal value of a metric.

## iops

Name	Type	Description
error	<a href="#">top_metric_value_error_bounds</a>	
read	integer	Average number of read operations per second.
write	integer	Average number of write operations per second.

## \_links

Name	Type	Description
self	<a href="#">href</a>	

## svm

SVM, applies only to SVM-scoped objects.

Name	Type	Description
_links	<a href="#">_links</a>	
name	string	The name of the SVM. This field cannot be specified in a PATCH method.
uuid	string	The unique identifier of the SVM. This field cannot be specified in a PATCH method.

## throughput

Name	Type	Description
error	<a href="#">top_metric_value_error_bounds</a>	

Name	Type	Description
read	integer	Average number of read bytes received per second.
write	integer	Average number of write bytes received per second.

volume

Name	Type	Description
_links	<a href="#">_links</a>	
name	string	The name of the volume. This field cannot be specified in a PATCH method.
uuid	string	Unique identifier for the volume. This corresponds to the instance-uuid that is exposed in the CLI and ONTAPI. It does not change due to a volume move. <ul style="list-style-type: none"> <li>example: 028baa66-41bd-11e9-81d5-00a0986138f7</li> <li>Introduced in: 9.6</li> <li>x-nullable: true</li> </ul>

top\_metrics\_client

Information about a client's IO activity.

Name	Type	Description
client_ip	string	IP address of the client. Both IPv4 and IPv6 IP addresses are supported.
iops	<a href="#">iops</a>	
svm	<a href="#">svm</a>	SVM, applies only to SVM-scoped objects.
throughput	<a href="#">throughput</a>	
volume	<a href="#">volume</a>	

error\_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

returned\_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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