Sonexion Monitoring/Metrics BoF

Matteo Chesi, Craig Flaskerud, Patti Langer

Overview

- **Purpose**
  - Share and discuss storage monitoring in complex environments, what Caribou does today, what it can do for you tomorrow

- **Benefit/Value**
  - Better, and improving, understanding of what's going on across your storage, fabric, and applications

Agenda

- Motivation for project Caribou
- Use cases with demonstration
- Open discussion

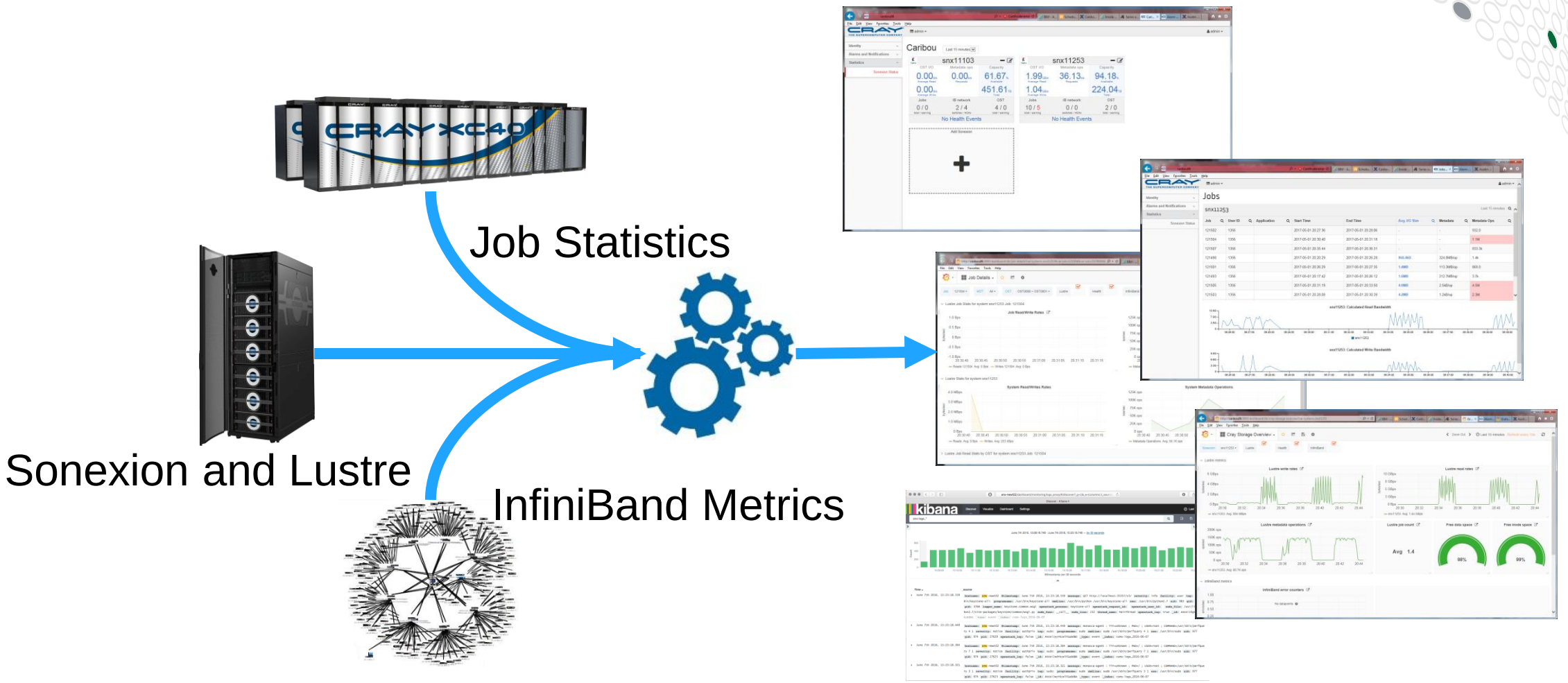
Motivation For Project Caribou

- **Provide visibility and insight**
  - Why did this application run the way it did (slow or fast)?
  - What metric information do I need and how do I get access to it?
  - How much storage do I really need for my users?
- **Enable understanding across a complex environment**
  - How do things impact each other across my environment?
  - How do I tie events together across the different entities?
  - What do I need to be better inform?

Project Caribou

- **Provide holistic approach to storage monitoring**
  - Job data…tied to storage and fabric...finally!
  - Collect, aggregate, and persist data from multiple data sources
  - Real-time and historical analysis
  - Visualization through graphs, and dashboards
  - Workflows for troubleshooting, administration, planning
- **Make your life easier**
  - Enable informed decisions from measured data
  - Reduce time to problem resolution
  - Data driven input for resource utilization and capacity planning

Project Caribou Components

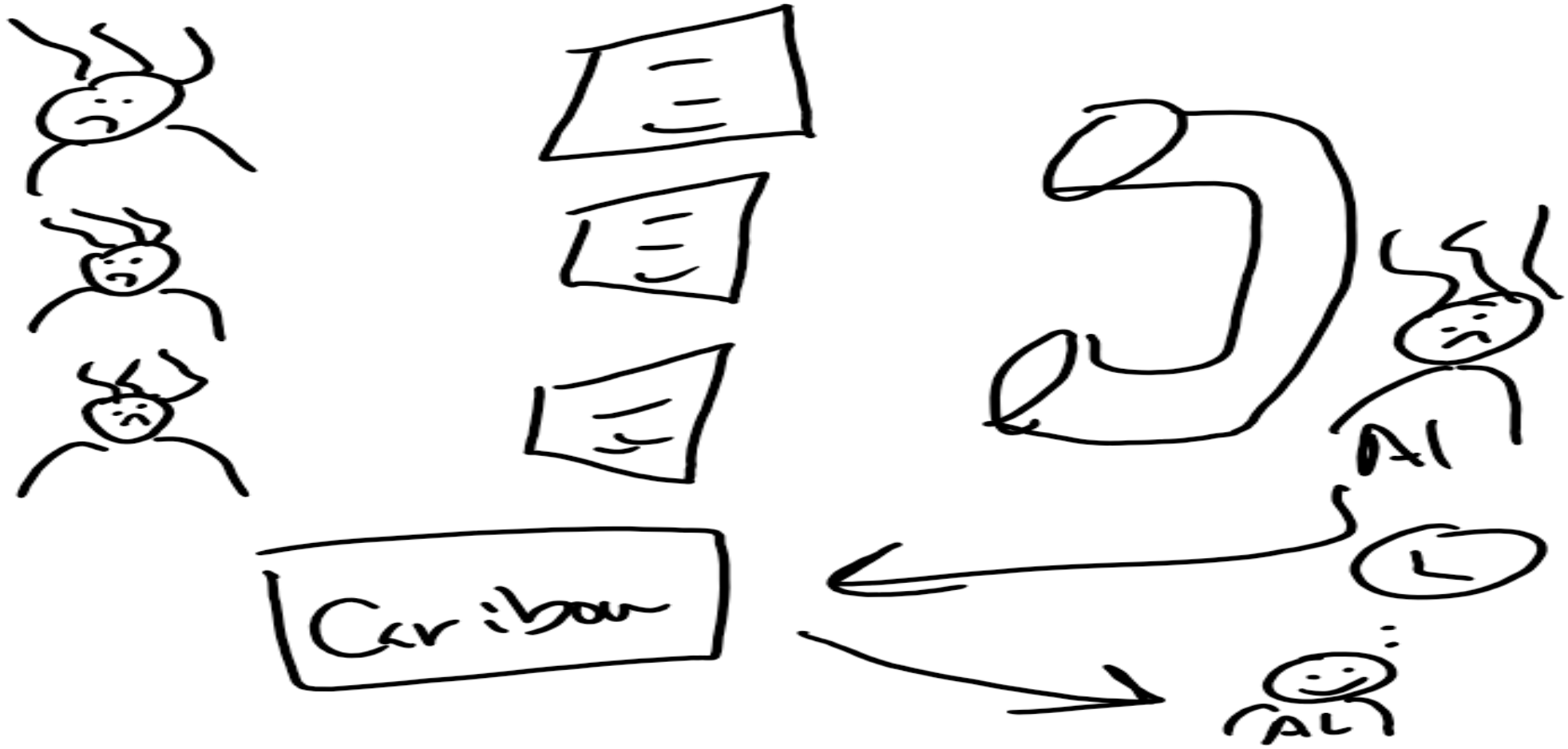


Exercise:

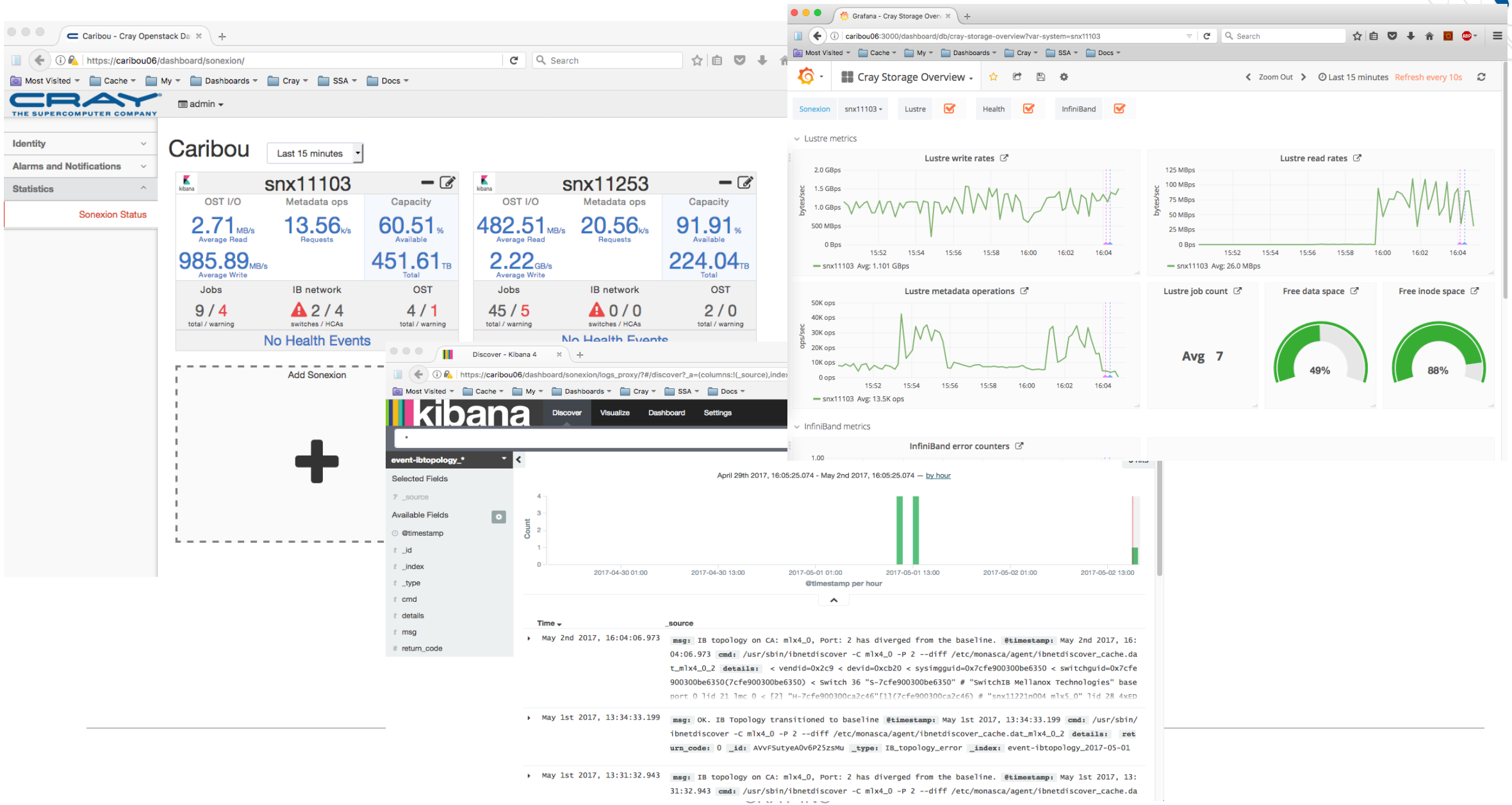
What do you do today and how can we make it easier?

Demonstration : Poor Performing Job

Demonstration: Sonexion Performance Issue



Demonstration : Events, Notifications, Logs



Open Discussion

- What tools do you use today?
- Does Project Caribou look interesting?
- What additional workflows are critical to you?
- What are the typical causes of performance issues?

Open Discussion

- Who are the consumers of performance data?
- What is the preferred method for problem alerts?
- How big is your site?
- User experience feedback

Summary

- **It's all about enabling understanding of application storage performance**
- **With Project Caribou we hope to make your life easier**
- **For more information, attend Caribou talk**
  - Project Caribou : Monitoring and Metrics for Sonexion
  - Thursday, May 11 at 10:30am
  - Technical Session 25B
  - Salon 2

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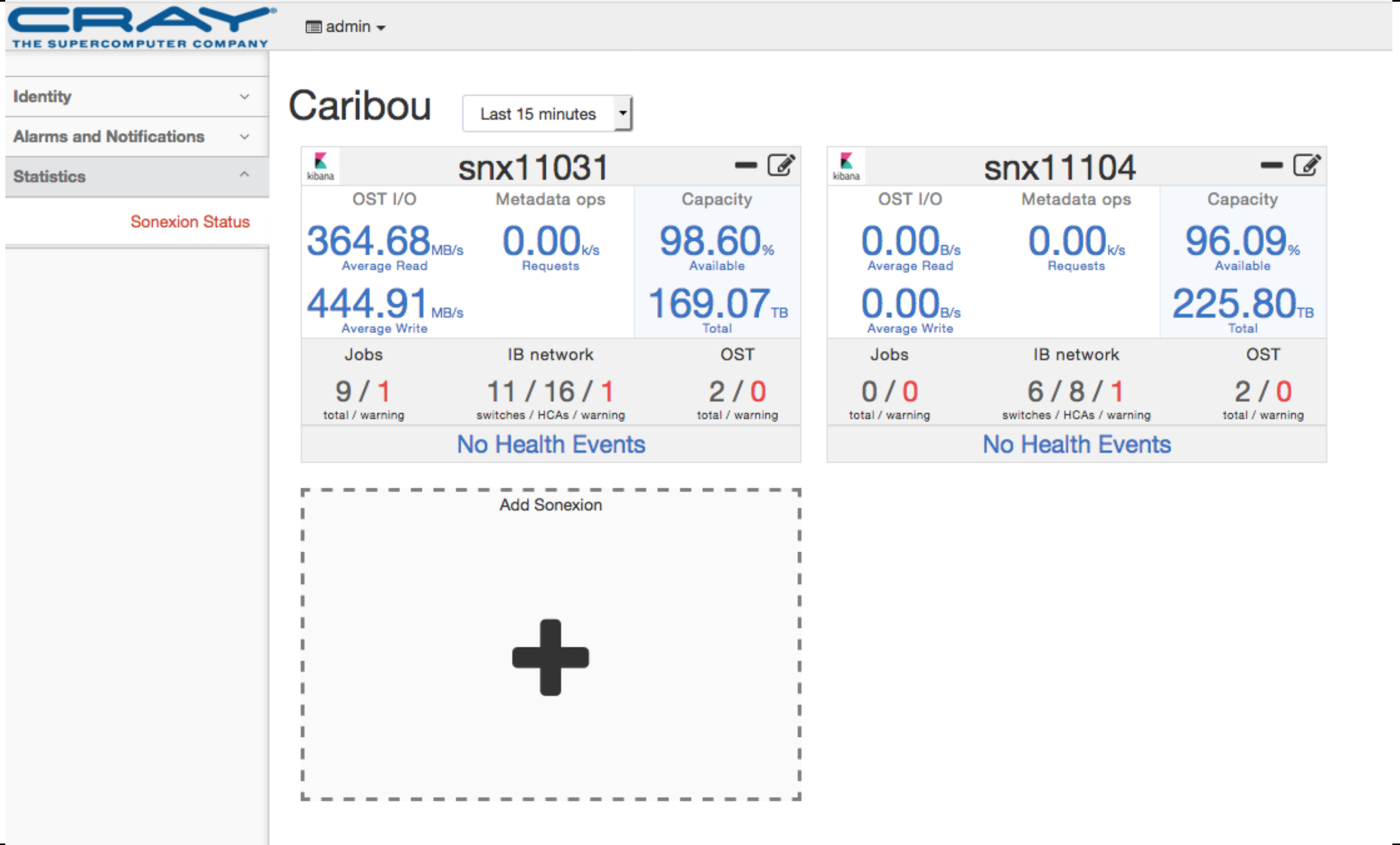
Q&A
CUG.2017.CAFFEINATED COMPUTING
Redmond, Washington May 7-11, 2017


CRAY
THE SUPERCOMPUTER COMPANY
admin
Identity
Alarms and Notifications
Statistics
Sonexion Status
Caribou
Last 15 minutes
snx11031
OST I/O
364.68 MB/s
Average Read
444.91 MB/s
Average Write
Metadata ops
0.00 k/s
Requests
Capacity
98.60 %
Available
169.07 TB
Total
Jobs
9 / 1
total / warning
IB network
11 / 16 / 1
switches / HCAs / warning
OST
2 / 0
total / warning
No Health Events
snx11104
OST I/O
0.00 B/s
Average Read
0.00 B/s
Average Write
Metadata ops
0.00 k/s
Requests
Capacity
96.09 %
Available
225.80 TB
Total
Jobs
0 / 0
total / warning
IB network
6 / 8 / 1
switches / HCAs / warning
OST
2 / 0
total / warning
No Health Events
Add Sonexion

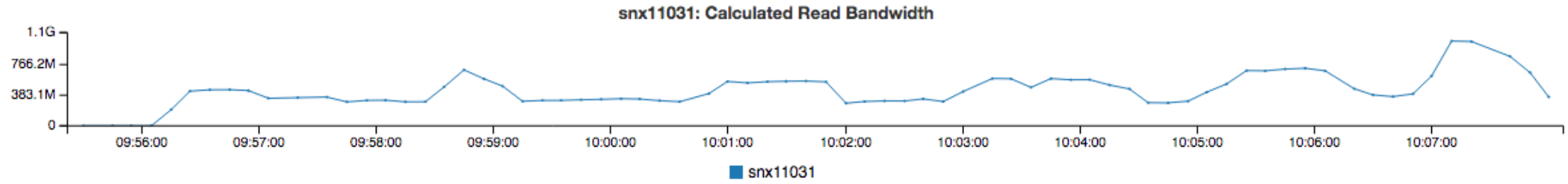
Identity
Alarms and Notifications
Statistics
Sonexion Status

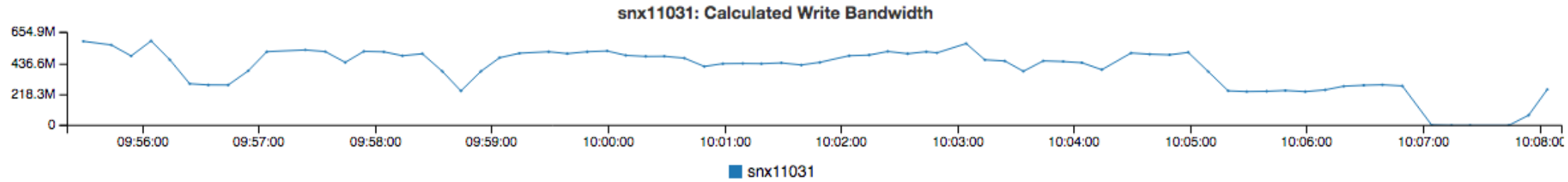
Jobs

snx11031

Last 30 minutes

Job	User ID	Application	Start Time	End Time	Avg. I/O Size	Metadata Ratio	Metadata Ops
6056184792581554675					-	-	13.0
6056184792581554677					-	-	13.0
6056184792581554678					-	-	13.0
657915	22459		2017-05-05 14:06:29		1.0kB	0.1B	17.0M
657914	22459		2017-05-05 14:02:46	2017-05-05 14:09:08	1.0MB	4.9GB	7.0
657912	22459		2017-05-05 13:58:46	2017-05-05 14:06:26	1.0MB	5.1GB	7.0
657907	22459		2017-05-05 13:52:59	2017-05-05 13:59:09	1.0MB	604.3MB	7.0
657909	22459		2017-05-05 13:54:47	2017-05-05 14:01:59	1.0MB	1.0GB	7.0





Identity
Alarms and Notifications
Statistics
Sonexion Status

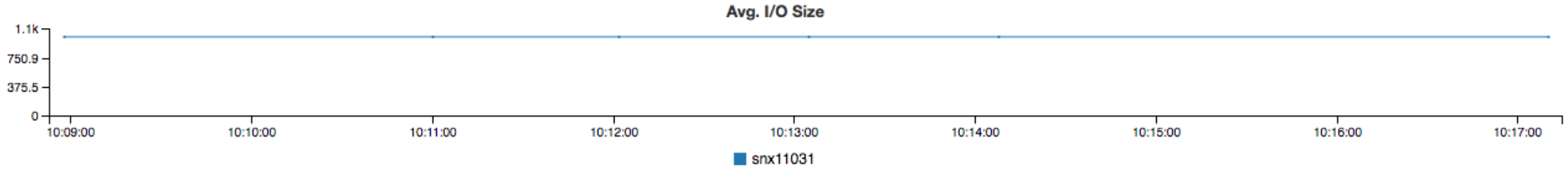
Jobs

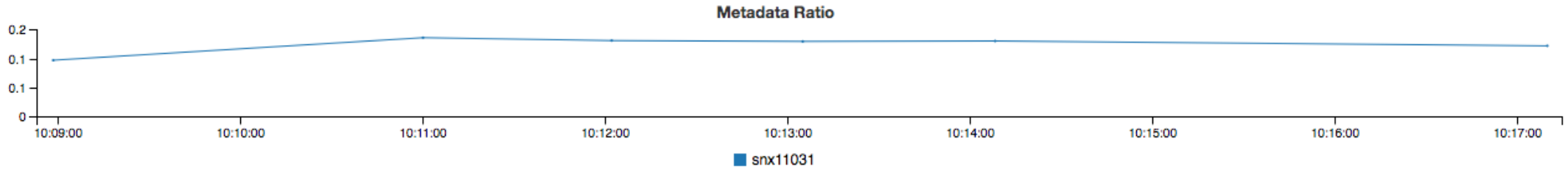
snx11031

Last 15 minutes

Job	User ID	Application	Start Time	End Time	Avg. I/O Size	Metadata Ratio	Metadata Ops
657915	22459		2017-05-05 14:06:29		1.0kB	0.1B	17.0M
657917	22459		2017-05-05 14:09:10	2017-05-05 14:14:57	1.0MB	2.6GB	7.0
657913	22459		2017-05-05 14:00:46	2017-05-05 14:07:47	1.0MB	5.3GB	12.0
657914	22459		2017-05-05 14:02:46	2017-05-05 14:09:08	1.0MB	4.9GB	7.0
657912	22459		2017-05-05 13:58:46	2017-05-05 14:06:26	1.0MB	8.3GB	12.0
657918	22459		2017-05-05 14:13:57		1.0MB	5.8GB	7.0
657916	22459		2017-05-05 14:07:50	2017-05-05 14:13:55	1.0MB	960.0MB	7.0
657919	22459		2017-05-05 14:14:59		1.0MB	3.2GB	7.0

Job 657915





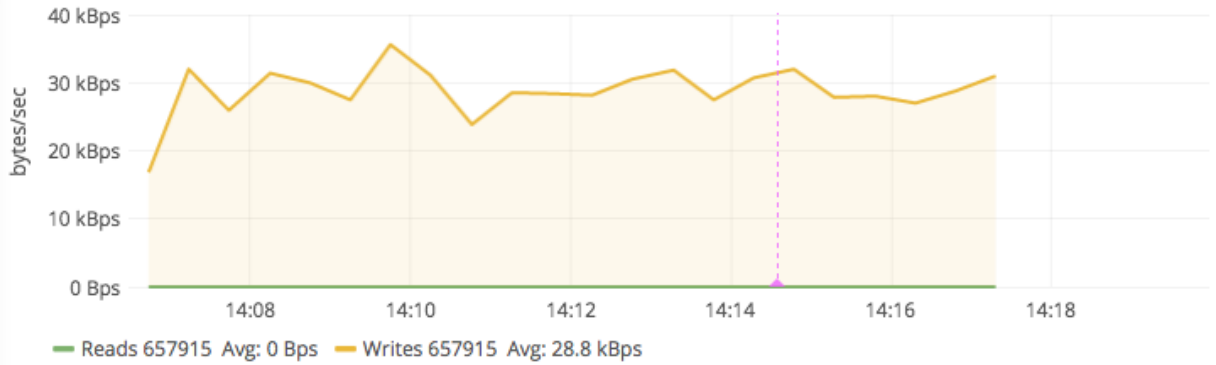
Job Details

Zoom Out | May 5, 2017 14:06:29 to a few seconds ago | Refresh every 10s

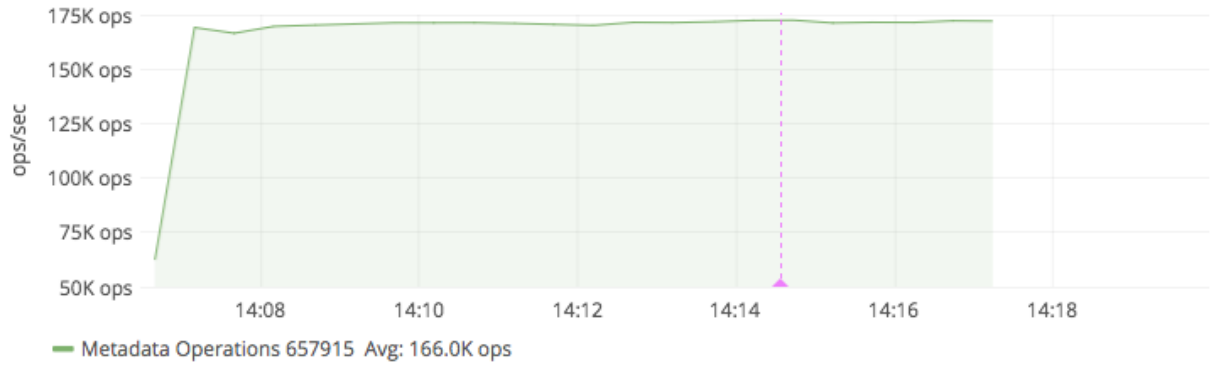
Job 657915 | MDT All | OST OST0001 | Lustre | Health | InfiniBand

Lustre Job Stats for system snx11031 Job: 657915

Job Read/Write Rates



Job Metadata Operations



Lustre Stats for system snx11031

Lustre Job Read Stats by OST for system snx11031 Job: 657915

Lustre Job Write Stats by OST for system snx11031 Job: 657915

Breakdown Metadata Operations for system snx11031 Job: 657915

Job Details

Zoom Out | May 5, 2017 14:06:29 to a few seconds ago | Refresh every 10s

Job 657915 | MDT All | OST OST0001 | Lustre | Health | InfiniBand

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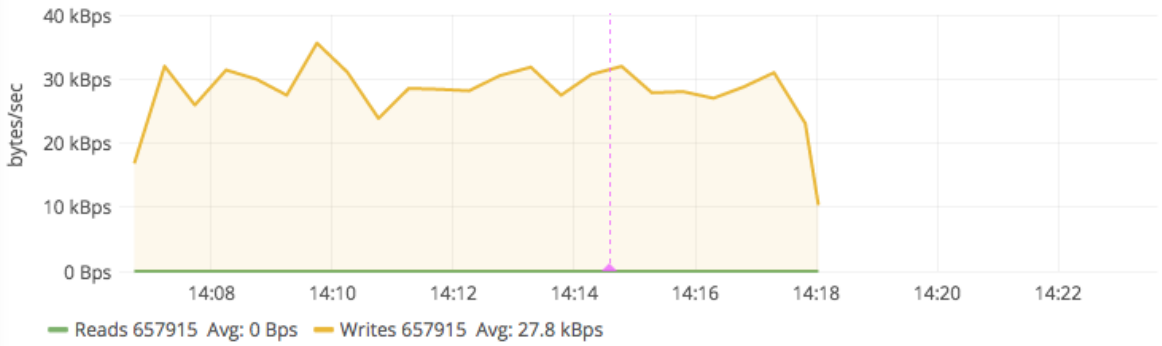
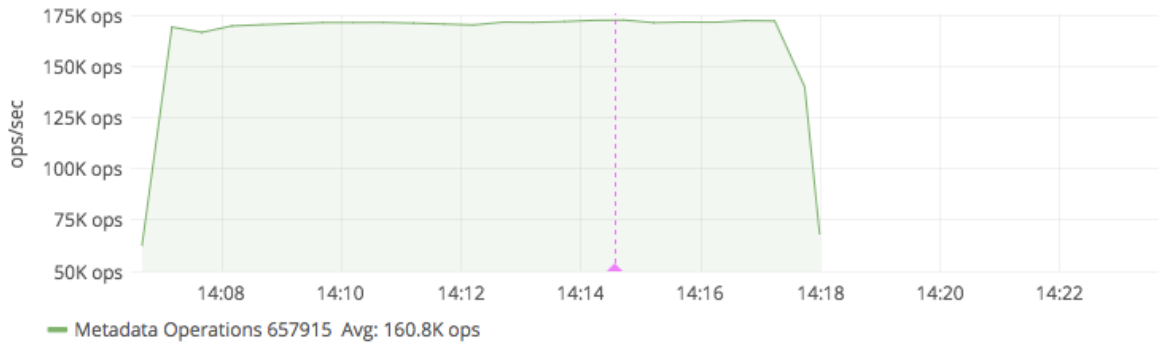
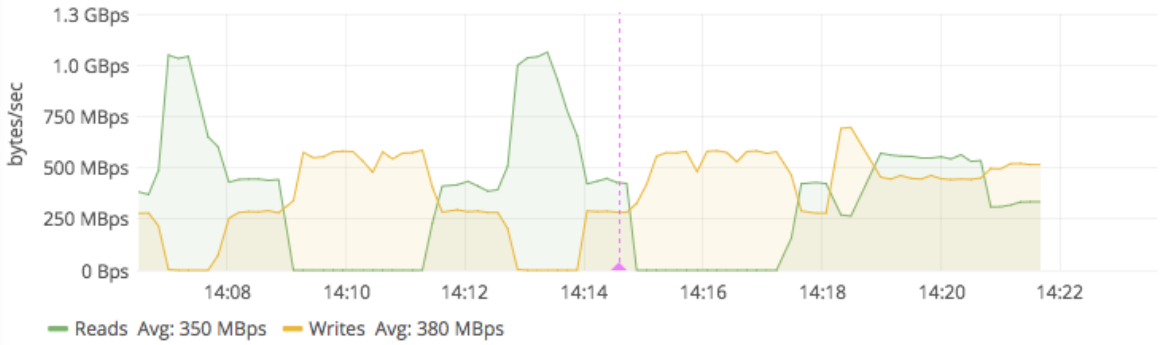


Job Metadata Operations

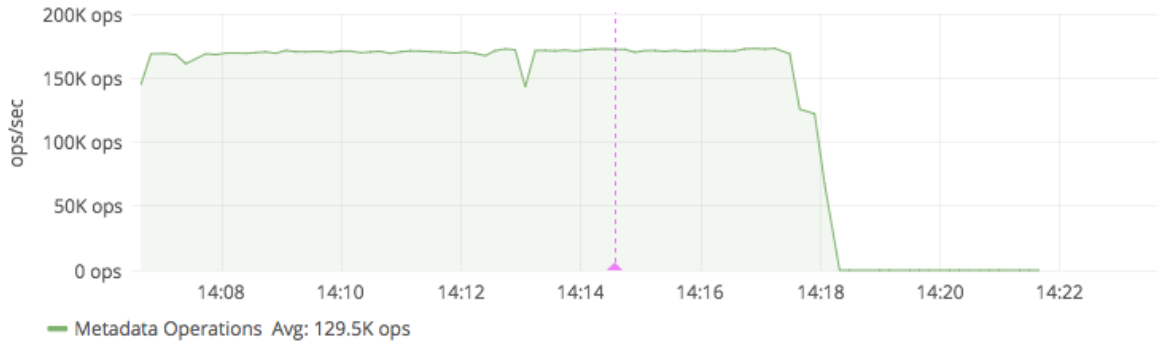


Lustre Stats for system snx11031

System Read/Writes Rates



System Metadata Operations



Lustre Job Read Stats by OST for system snx11031 Job: 657915

Lustre Job Write Stats by OST for system snx11031 Job: 657915

Breakdown Metadata Operations for system snx11031 Job: 657915

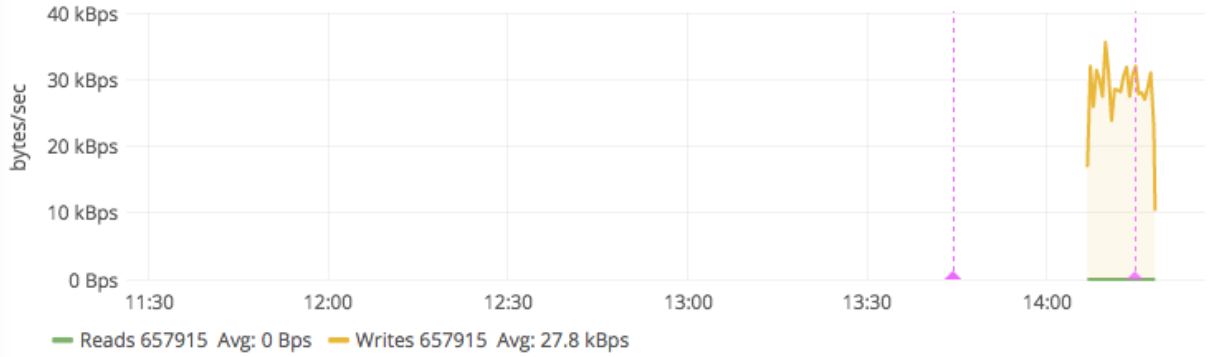
Job Details

Zoom Out | Last 3 hours | Refresh every 10s

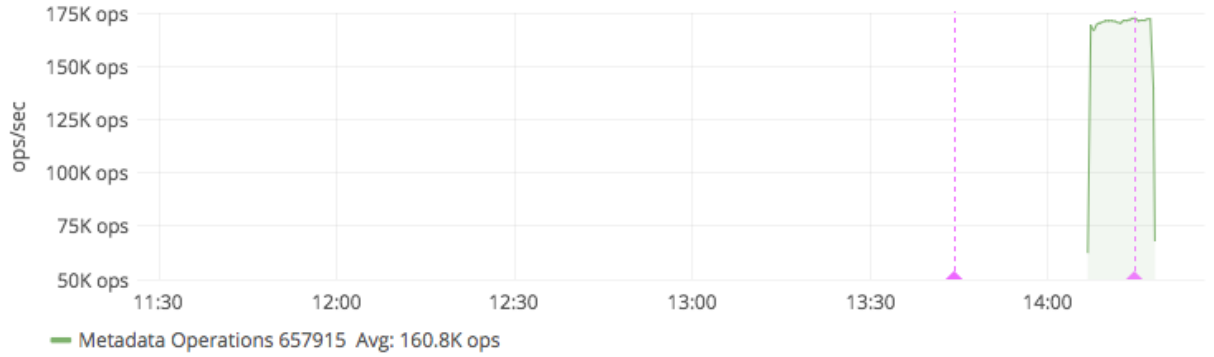
Job 657915 | MDT All | OST OST0001 | Lustre | Health | InfiniBand

Lustre Job Stats for system snx11031 Job: 657915

Job Read/Write Rates

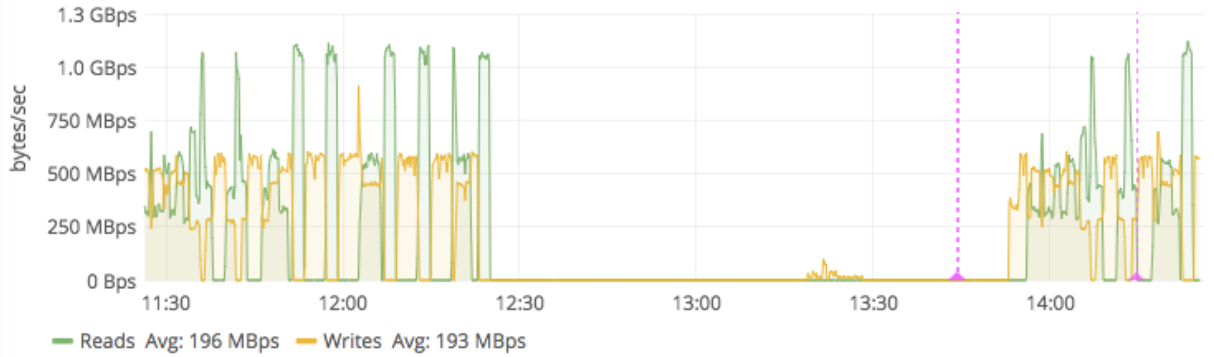


Job Metadata Operations



Lustre Stats for system snx11031

System Read/Writes Rates



System Metadata Operations

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Breakdown Metadata Operations for system snx11031 Job: 657915

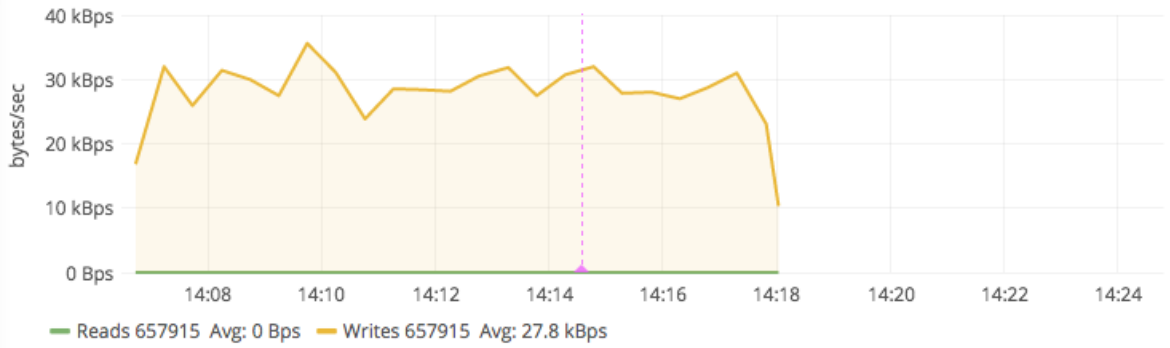
Job Details

Zoom Out | May 5, 2017 14:06:29 to a few seconds ago | Refresh every 10s

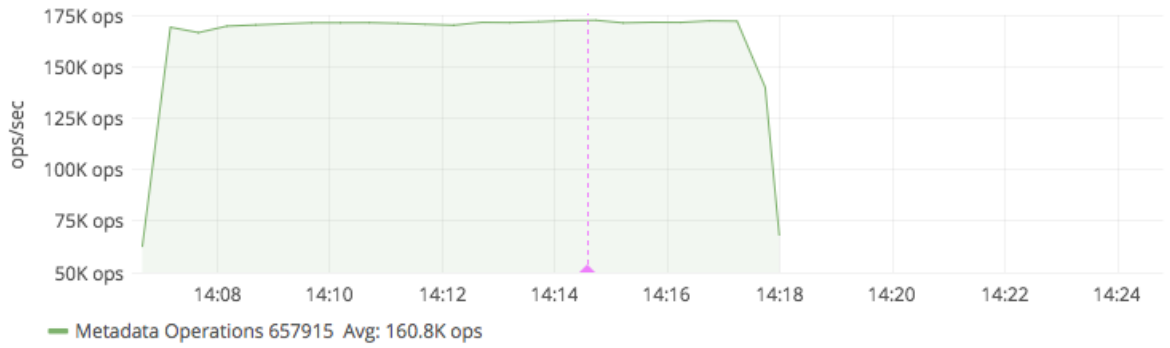
Job 657915 | MDT All | OST OST0001 | Lustre | Health | InfiniBand

Lustre Job Stats for system snx11031 Job: 657915

Job Read/Write Rates



Job Metadata Operations



Lustre Stats for system snx11031

Lustre Job Read Stats by OST for system snx11031 Job: 657915

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Job Details

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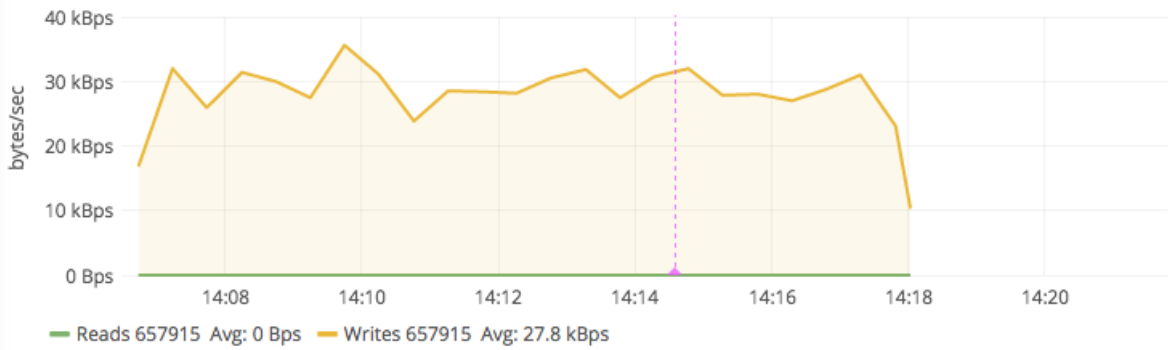
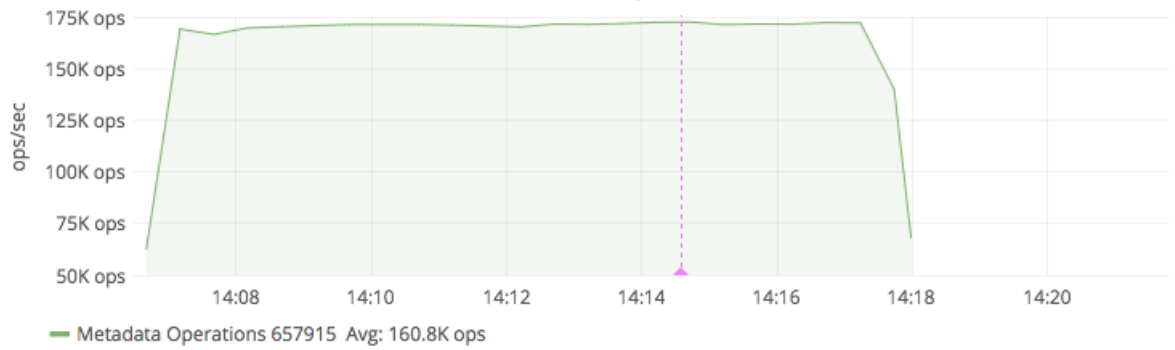
Lustre Job Stats for system snx11031 Job: 657915

Job Read/Write Rates



Job Metadata Operations



Lustre Stats for system snx11031

Lustre Job Read Stats by OST for system snx11031 Job: 657915

Lustre Job Write Stats by OST for system snx11031 Job: 657915

Breakdown Metadata Operations for system snx11031 Job: 657915

Identity

Alarms and Notifications

Statistics

Sonexion Status

Caribou

Last 15 minutes

snx11031

OST I/O	Metadata ops	Capacity
295.33 MB/s Average Read	120.16 k/s Requests	98.65 % Available
413.34 MB/s Average Write		169.07 TB Total

Jobs	IB network	OST
8 / 2	11 / 16 / 0	2 / 0
total / warning	switches / HCAs / warning	total / warning

No Health Events

snx11104

OST I/O	Metadata ops	Capacity
0.00 B/s Average Read	0.00 k/s Requests	96.09 % Available
0.00 B/s Average Write		225.80 TB Total

Jobs	IB network	OST
0 / 0	6 / 8 / 0	2 / 0
total / warning	switches / HCAs / warning	total / warning

No Health Events

Add Sonexion

Cray Storage Overview

Zoom Out | Last 15 minutes | Refresh every 10s

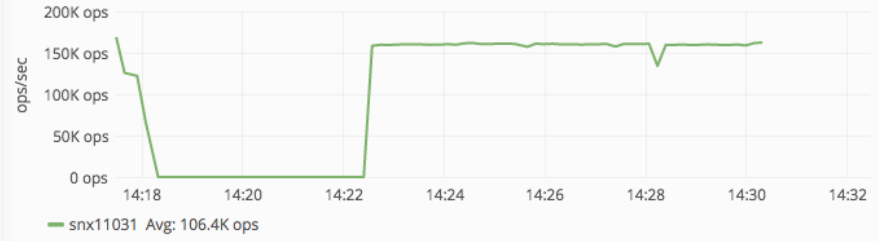
Sonexion | snx11031 | Lustre | Health | InfiniBand

Lustre metrics

Lustre write rates

Lustre read rates

Lustre metadata operations



Lustre job count

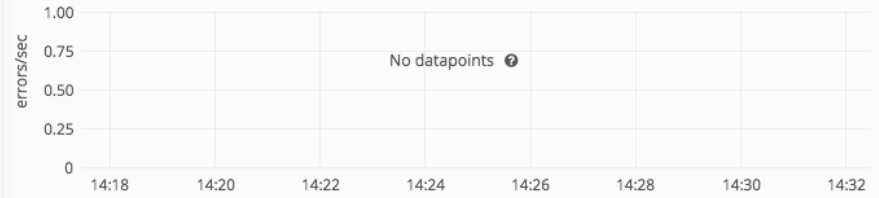
Avg 3

Free data space

Free inode space

InfiniBand metrics

InfiniBand error counters



Lustre metrics

- 1 vs X
- JG
- Lustre Disk Space/Inode Usage
- Lustre Metadata Metrics
- Lustre Write-Read Metrics

InfiniBand metrics

- InfiniBand Data Metrics
- InfiniBand Error Counters

Sonexion health

- Sonexion Server Metrics

Cray Storage Overview

Zoom Out | Last 15 minutes | Refresh every 10s

Sonexion | snx11031 | Lustre | Health | InfiniBand

Lustre metrics

Lustre write rates

Lustre read rates

Lustre metadata operations

Lustre job count

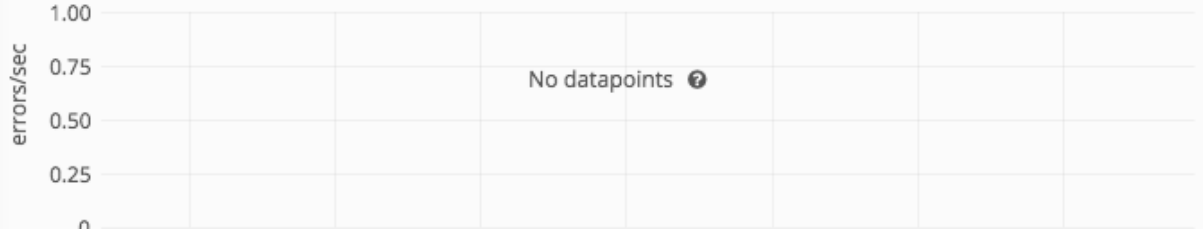
Avg 3

Free data space

Free inode space

InfiniBand metrics

InfiniBand error counters



Identity

Alarms and Notifications

Statistics

Sonexion Status

Caribou

Last 15 minutes

snx11031

OST I/O	Metadata ops	Capacity
295.33 MB/s Average Read	120.16 k/s Requests	98.65 % Available
413.34 MB/s Average Write		169.07 TB Total

Jobs	IB network	OST
8 / 2	11 / 16 / 0	2 / 0
total / warning	switches / HCAs / warning	total / warning

No Health Events

snx11104

OST I/O	Metadata ops	Capacity
0.00 B/s Average Read	0.00 k/s Requests	96.09 % Available
0.00 B/s Average Write		225.80 TB Total

Jobs	IB network	OST
0 / 0	6 / 8 / 0	2 / 0
total / warning	switches / HCAs / warning	total / warning

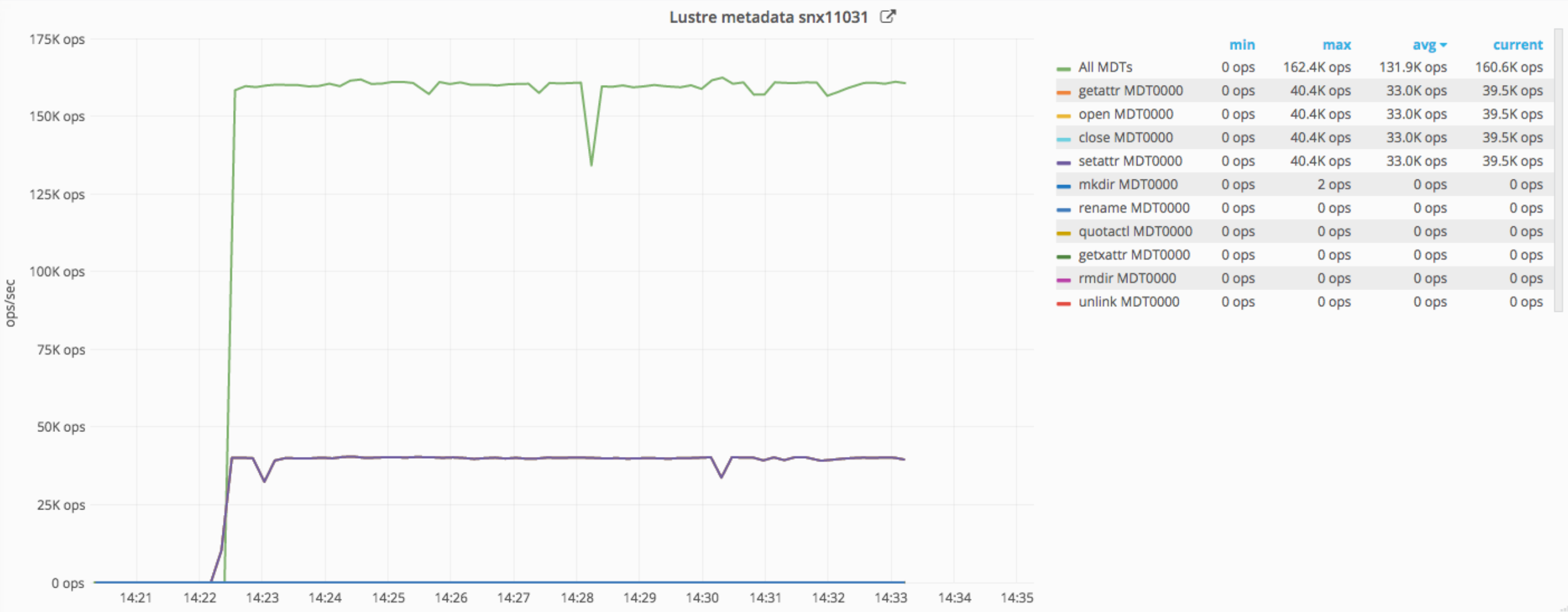
No Health Events

Add Sonexion

Lustre Metadata Metrics

Zoom Out | Last 15 minutes

Sonexion | snx11031 | MDT | All | Lustre | Health | InfiniBand



	min	max	avg	current
All MDTs	0 ops	162.4K ops	131.9K ops	160.6K ops
getattr MDT0000	0 ops	40.4K ops	33.0K ops	39.5K ops
open MDT0000	0 ops	40.4K ops	33.0K ops	39.5K ops
close MDT0000	0 ops	40.4K ops	33.0K ops	39.5K ops
setattr MDT0000	0 ops	40.4K ops	33.0K ops	39.5K ops
mkdir MDT0000	0 ops	2 ops	0 ops	0 ops
rename MDT0000	0 ops	0 ops	0 ops	0 ops
quotactl MDT0000	0 ops	0 ops	0 ops	0 ops
getxattr MDT0000	0 ops	0 ops	0 ops	0 ops
rmdir MDT0000	0 ops	0 ops	0 ops	0 ops
unlink MDT0000	0 ops	0 ops	0 ops	0 ops

+ ADD ROW

admin

admin

- Identity
- Alarms and Notifications
- Statistics
  - Sonexion Status

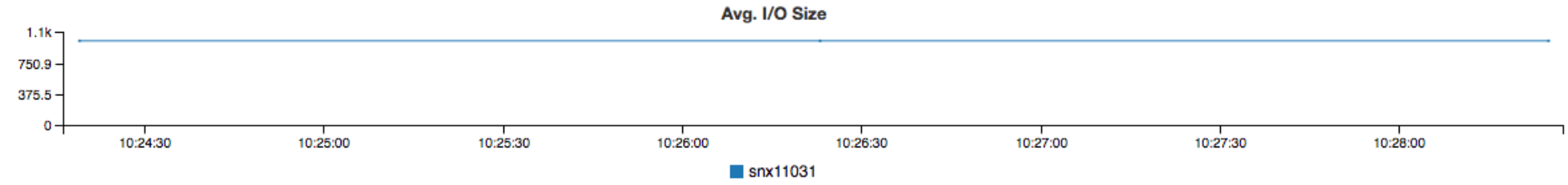
Jobs

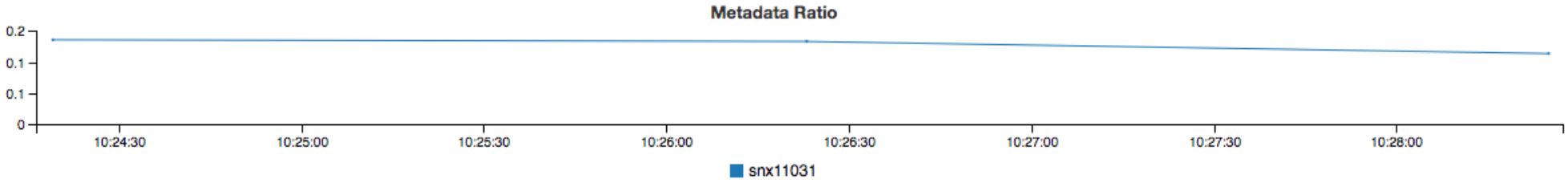
snx11031

Last 15 minutes

Job	User ID	Application	Start Time	End Time	Avg. I/O Size	Metadata Ratio	Metadata Ops
657922	22459		2017-05-05 14:22:20	2017-05-05 14:34:34	1.0kB	0.2B	13.7M
657924	22459		2017-05-05 14:24:30	2017-05-05 14:30:08	1.0MB	1.8GB	8.0
657921	22459		2017-05-05 14:18:06	2017-05-05 14:24:25	1.0MB	6.4GB	7.0
657919	22459		2017-05-05 14:14:59	2017-05-05 14:22:17	1.0MB	15.2GB	7.0
657920	22459		2017-05-05 14:18:06	2017-05-05 14:24:26	1.0MB	5.6GB	8.0
657923	22459		2017-05-05 14:24:30	2017-05-05 14:30:09	1.0MB	2.1GB	7.0

Job 657922





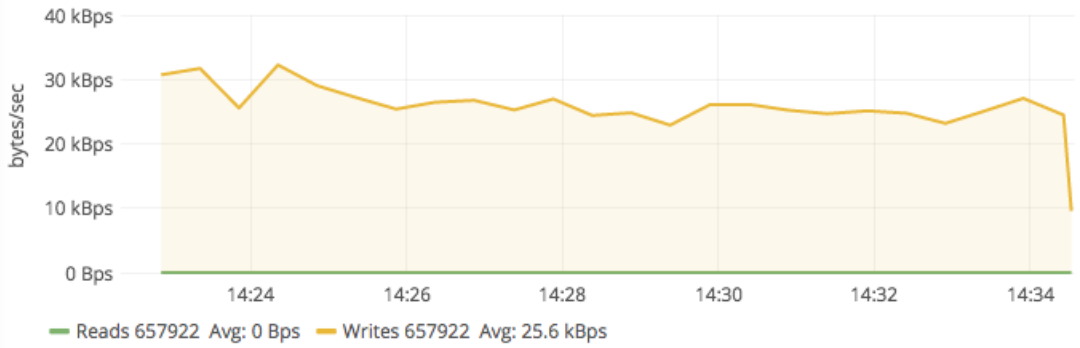
Job Details

Zoom Out | May 5, 2017 14:22:20 to May 5, 2017 14:34:34 | Refresh every 10s

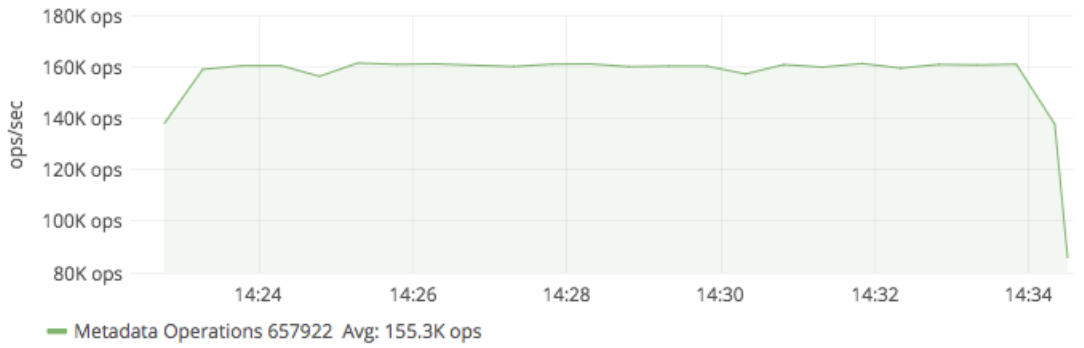
Job 657922 | MDT All | OST OST0001 | Lustre | Health | InfiniBand

Lustre Job Stats for system snx11031 Job: 657922

Job Read/Write Rates



Job Metadata Operations

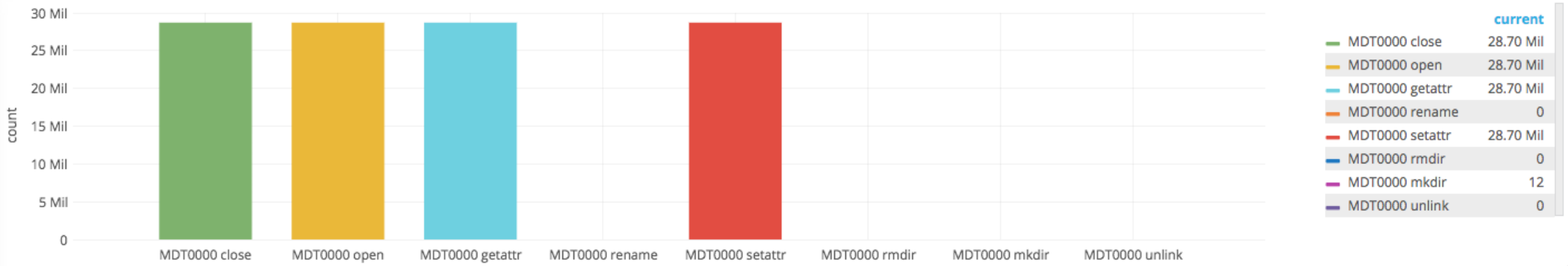


Lustre Stats for system snx11031

Lustre Job Read Stats by OST for system snx11031 Job: 657922

Lustre Job Write Stats by OST for system snx11031 Job: 657922

Breakdown Metadata Operations for system snx11031 Job: 657922



	current
MDT0000 close	28.70 Mil
MDT0000 open	28.70 Mil
MDT0000 getattr	28.70 Mil
MDT0000 rename	0
MDT0000 setattr	28.70 Mil
MDT0000 rmdir	0
MDT0000 mkdir	12
MDT0000 unlink	0

Identity

Alarms and Notifications

Alarm Definitions

Alarms

Notifications

Statistics

Alarm Definitions

Filter

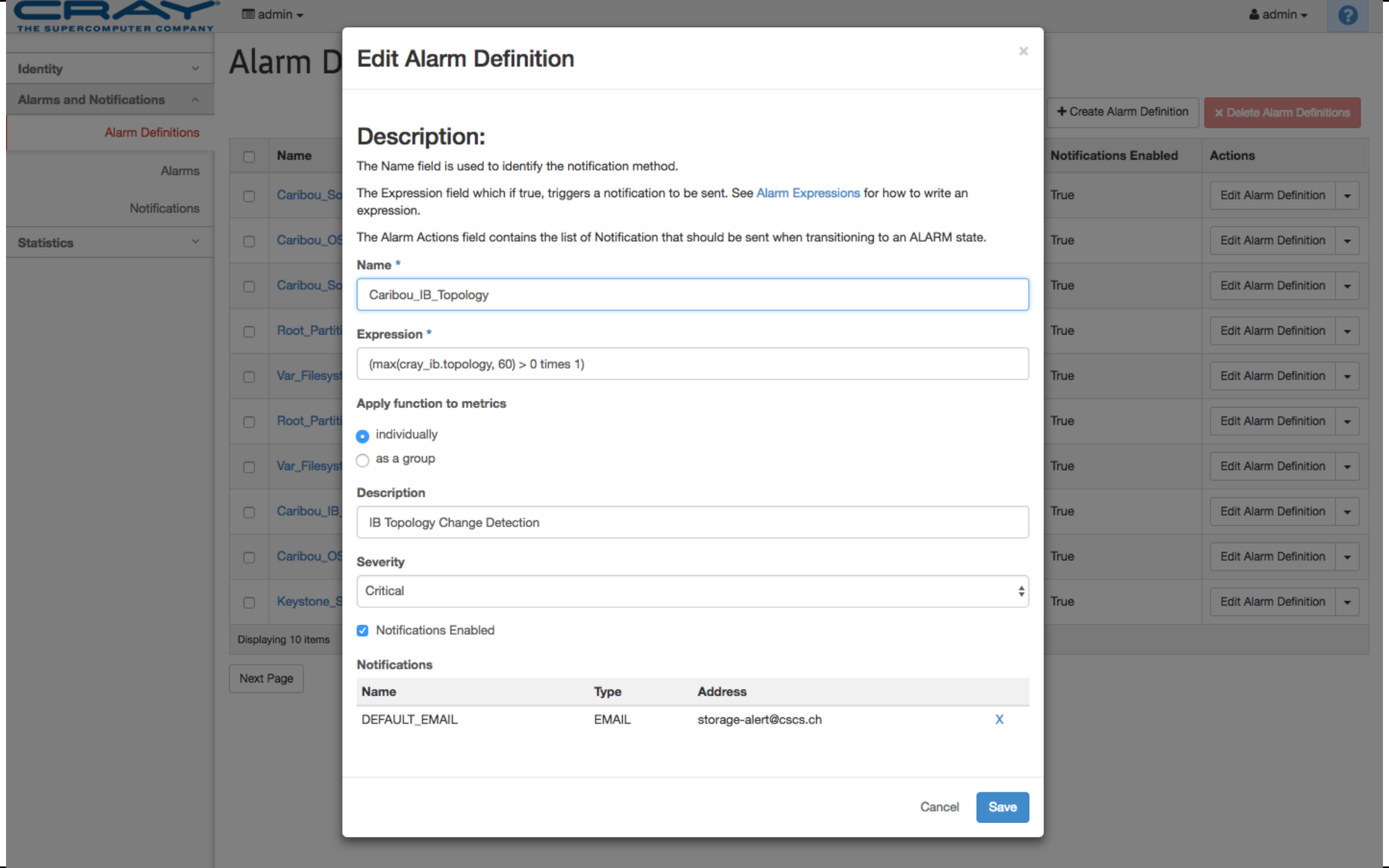
+ Create Alarm Definition

× Delete Alarm Definitions

Name	Description	Notifications Enabled	Actions
Caribou_Sonexion_Metric_Health	Check for Incoming metrics	True	Edit Alarm Definition
Caribou_OST_Free_Space	The free disk space of a specific OST is under 5%	True	Edit Alarm Definition
Caribou_Sonexion_snmpwalk_timeout	There is a timeout using SNMPwalk to a Sonexion	True	Edit Alarm Definition
Root_Partition_inode_Usage	The use of the configured inodes of the root partition is over 95%	True	Edit Alarm Definition
Var_Filesystem_Disk_Space_Usage	The disk space of the /var filesystem partition is over 95%	True	Edit Alarm Definition
Root_Partition_Disk_Space_Usage	The disk space of the root partition is over 95%	True	Edit Alarm Definition
Var_Filesystem_Disk_Partition_inode_Usage	The use of the configured inodes of the /var filesystem partition is over 95%	True	Edit Alarm Definition
Caribou_IB_Topology	IB Topology Change Detection	True	Edit Alarm Definition
Caribou_OST_Free_Files	The free inode space of a specific OST/MDT is under 5%	True	Edit Alarm Definition
Keystone_Services_are_down	All the Keystone services are not operating properly	True	Edit Alarm Definition

Displaying 10 items

Next Page


admin
admin
Identity
Alarms and Notifications
Alarm Definitions
Alarms
Notifications
Statistics
Alarm D
+ Create Alarm Definition
× Delete Alarm Definitions
Name
Notifications Enabled
Actions
Edit Alarm Definition
Displaying 10 items
Next Page
Edit Alarm Definition
Description:
The Name field is used to identify the notification method.
The Expression field which if true, triggers a notification to be sent. See Alarm Expressions for how to write an expression.
The Alarm Actions field contains the list of Notification that should be sent when transitioning to an ALARM state.
Name *
Caribou_IB_Topology
Expression *
(max(cray_ib.topology, 60) > 0 times 1)
Apply function to metrics
individually
as a group
Description
IB Topology Change Detection
Severity
Critical
Notifications Enabled
Notifications
Name
Type
Address
DEFAULT_EMAIL
EMAIL
storage-alert@cscs.ch
X
Cancel
Save

Identity

Alarms and Notifications

Statistics

Sonexion Status

Caribou

Last 15 minutes

snx11031

OST I/O	Metadata ops	Capacity
295.33 MB/s Average Read	120.16 k/s Requests	98.65 % Available
413.34 MB/s Average Write		169.07 TB Total

Jobs	IB network	OST
8 / 2	11 / 16 / 0	2 / 0
total / warning	switches / HCAs / warning	total / warning

No Health Events

snx11104

OST I/O	Metadata ops	Capacity
0.00 B/s Average Read	0.00 k/s Requests	96.09 % Available
0.00 B/s Average Write		225.80 TB Total

Jobs	IB network	OST
0 / 0	6 / 8 / 0	2 / 0
total / warning	switches / HCAs / warning	total / warning

No Health Events

Add Sonexion

kibana

Discover | Visualize | Dashboard | Settings | Last 7 days

(Lustre OR LustreError) AND programname: kernel

snx-logs_*

Selected Fields

- t hostname
- t message

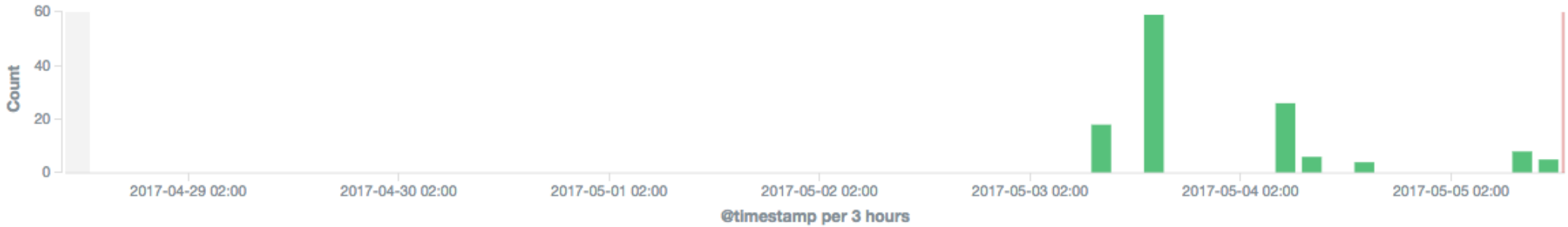
Available Fields

Popular

- t programname
- @timestamp
- t _id
- t _index
- t _type
- t cmdline
- t exe
- t facility
- t gid
- ? openstack_log
- t pid
- ? remote_log
- t severity
- t tag
- t uid

Lustre messages 126 hits

April 28th 2017, 14:47:04.904 - May 5th 2017, 14:47:04.904 — by 3 hours



Time	hostname	message
May 5th 2017, 13:30:46.000	snx11031n002	Lustre: MGS: haven't heard from client e22c841c-2bec-504c-52c2-b9965d39d905 (at 148.187.4.123@o2ib6002) in 682 seconds. I think it's dead, and I am evicting it. exp ffff8807da01b000, cur 1493983846 expire 1493983396 last 1493983164
May 5th 2017, 13:30:45.000	snx11031n004	Lustre: snx11031-OST0000: haven't heard from client 5c7228ff-5db5-167c-feb6-082924c5d296 (at 148.187.4.123@o2ib6002) in 681 seconds. I think it's dead, and I am evicting it. exp ffff8804ba1d6c00, cur 1493983845 expire 1493983395 last 1493983164
May 5th 2017, 13:30:45.000	snx11031n004	Lustre: Skipped 1 previous similar message
May 5th 2017, 13:30:45.000	snx11031n003	Lustre: snx11031-MDT0000: haven't heard from client 5c7228ff-5db5-167c-feb6-082924c5d296 (at 148.187.4.109@o2ib6001) in 681 seconds. I think it's dead, and I am evicting it. exp ffff88102f1fec00, cur 1493983845 expire 1493983395 last 1493983164
May 5th 2017, 13:30:42.000	snx11031n005	Lustre: snx11031-OST0001: haven't heard from client 5c7228ff-5db5-167c-feb6-082924c5d296 (at 148.187.4.109@o2ib6001) in 678 seconds. I think it's dead, and I am evicting it. exp ffff8807e6647c00, cur 1493983842 expire 1493983392 last 1493983164
May 5th 2017, 09:05:00.000	snx11031n002	Lustre: MGS: Connection restored to 84d68edb-d49a-7036-67e1-bd73e72f45ea (at 148.187.6.103@o2ib2)
May 5th 2017, 09:05:00.000	snx11104n004	Lustre: snx11104-OST0000: Connection restored to 16a1cf0a-030c-41eb-b47b-4b29c2e8d82c (at 148.187.6.103@o2ib2)