.conf2015

Indexer Clustering – Tips & Tricks

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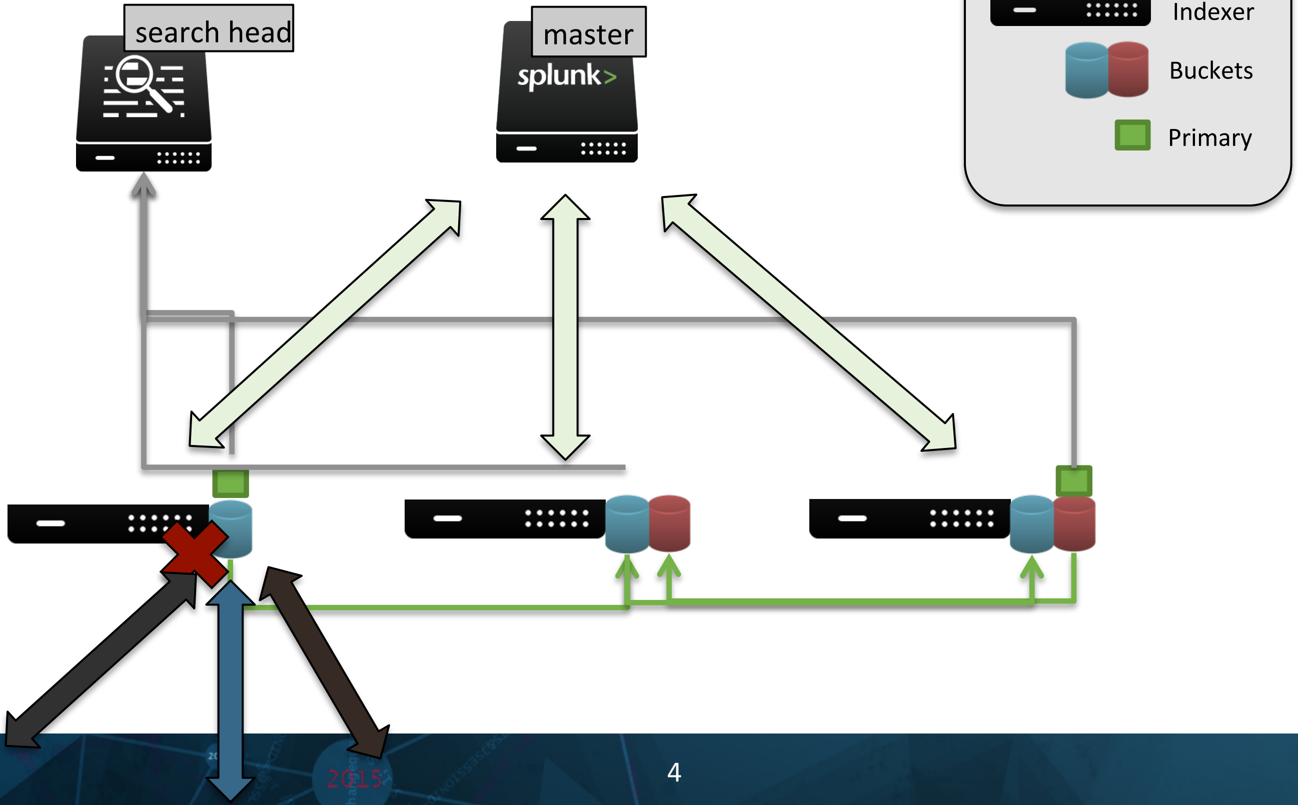
Indexer Clustering Overview

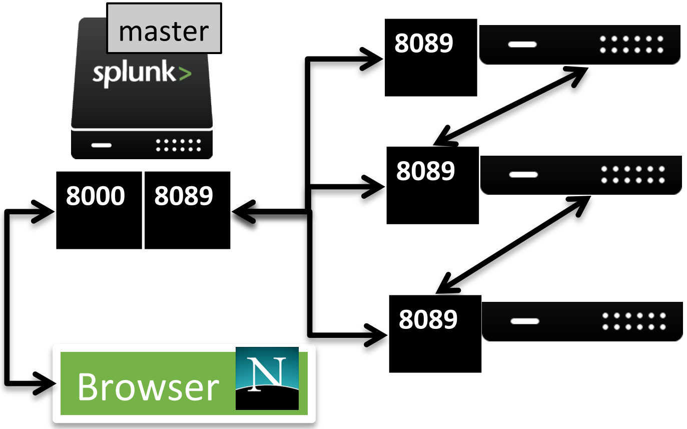
Cluster!



Communication Through Endpoints

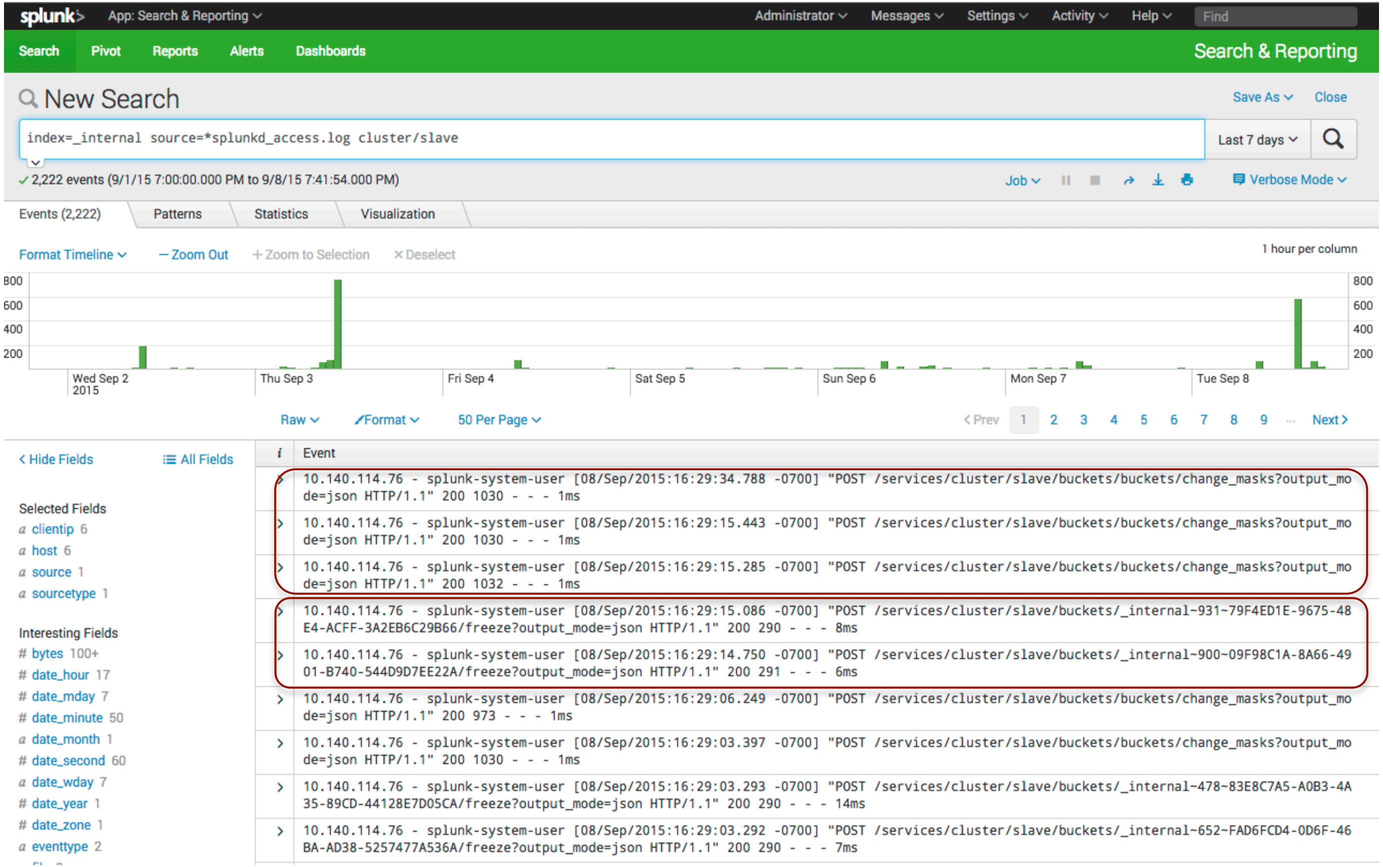
The cluster master and peers communicate amongst themselves through the clustering endpoints on the management ports. Some examples:

- Peers->Master:
    - /services/cluster/master/peers
        - Add Peer to cluster
        - Heartbeat to master
    - /services/cluster/master/buckets
        - Alert master there is a new bucket
        - Alert master a bucket changes (hot -> warm, warm -> frozen)
- Master->Peers
    - /services/cluster/slave/buckets
        - Change primaries
        - Become searchable / unsearchable



What’s my cluster doing?

Endpoints Are Logged!



```
index=_internal source=*splunkd_access.log cluster/slave
```

✓ 2,222 events (9/1/15 7:00:00.000 PM to 9/8/15 7:41:54.000 PM)

Selected Fields
- a clientip 6
- a host 6
- a source 1
- a sourcetype 1

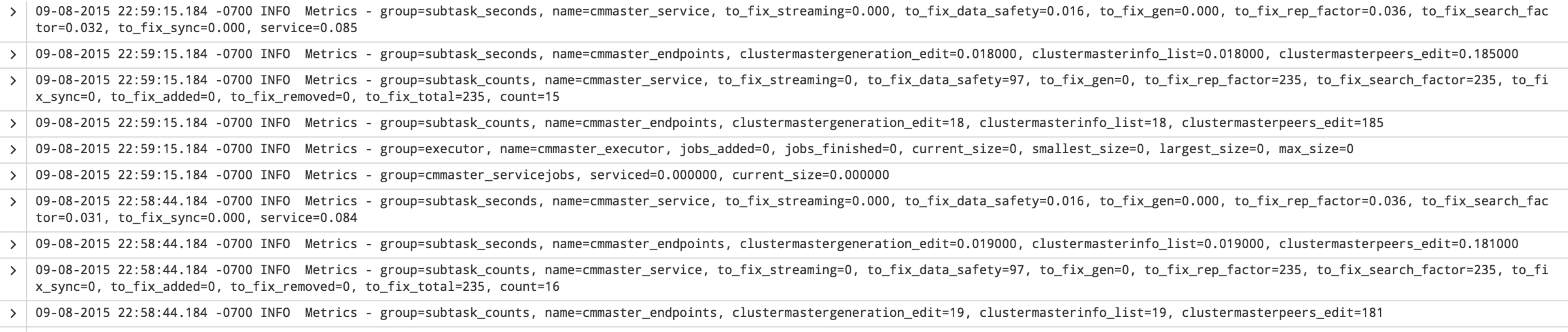
Interesting Fields
- # bytes 100+
- # date_hour 17
- # date_mday 7
- # date_minute 50
- a date_month 1
- # date_second 60
- a date_wday 7
- # date_year 1
- # date_zone 1
- a eventtype 2

```
10.140.114.76 - splunk-system-user [08/Sep/2015:16:29:34.788 -0700] "POST /services/cluster/slave/buckets/buckets/change_masks?output_mo
de=json HTTP/1.1" 200 1030 - - - 1ms
10.140.114.76 - splunk-system-user [08/Sep/2015:16:29:15.443 -0700] "POST /services/cluster/slave/buckets/buckets/change_masks?output_mo
de=json HTTP/1.1" 200 1030 - - - 1ms
10.140.114.76 - splunk-system-user [08/Sep/2015:16:29:15.285 -0700] "POST /services/cluster/slave/buckets/buckets/change_masks?output_mo
de=json HTTP/1.1" 200 1032 - - - 1ms
10.140.114.76 - splunk-system-user [08/Sep/2015:16:29:15.086 -0700] "POST /services/cluster/slave/buckets/_internal~931~79F4ED1E-9675-48
E4-ACFF-3A2EB6C29B66/freeze?output_mode=json HTTP/1.1" 200 290 - - - 8ms
10.140.114.76 - splunk-system-user [08/Sep/2015:16:29:14.750 -0700] "POST /services/cluster/slave/buckets/_internal~900~09F98C1A-8A66-49
01-B740-544D9D7EE22A/freeze?output_mode=json HTTP/1.1" 200 291 - - - 6ms
10.140.114.76 - splunk-system-user [08/Sep/2015:16:29:06.249 -0700] "POST /services/cluster/slave/buckets/buckets/change_masks?output_mo
de=json HTTP/1.1" 200 973 - - - 1ms
10.140.114.76 - splunk-system-user [08/Sep/2015:16:29:03.397 -0700] "POST /services/cluster/slave/buckets/buckets/change_masks?output_mo
de=json HTTP/1.1" 200 1030 - - - 1ms
10.140.114.76 - splunk-system-user [08/Sep/2015:16:29:03.293 -0700] "POST /services/cluster/slave/buckets/_internal~478~83E8C7A5-A0B3-4A
35-89CD-44128E7D05CA/freeze?output_mode=json HTTP/1.1" 200 290 - - - 14ms
10.140.114.76 - splunk-system-user [08/Sep/2015:16:29:03.292 -0700] "POST /services/cluster/slave/buckets/_internal~652~FAD6FCD4-0D6F-46
BA-AD38-5257477A536A/freeze?output_mode=json HTTP/1.1" 200 290 - - - 7ms
```

Bucket primary changes!

Buckets being frozen!

Metrics.log



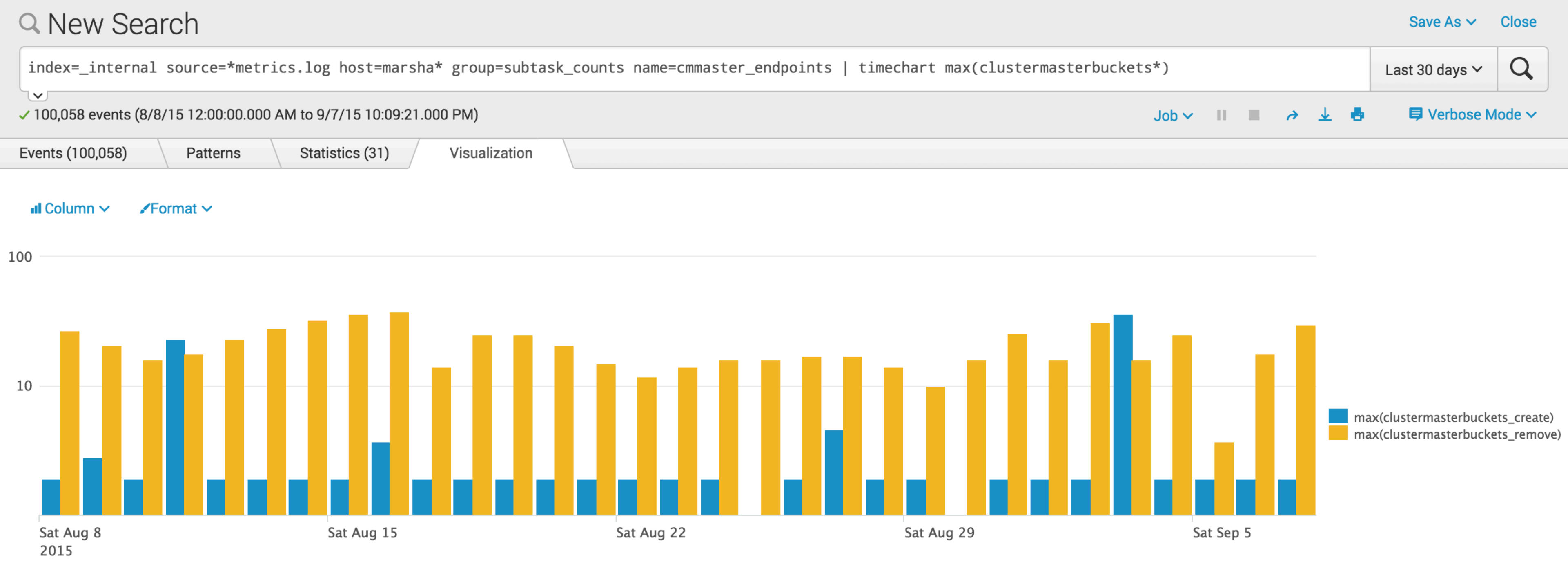
```
09-08-2015 22:59:15.184 -0700 INFO  Metrics - group=subtask_seconds, name=cmmaster_service, to_fix_streaming=0.000, to_fix_data_safety=0.016, to_fix_gen=0.000, to_fix_rep_factor=0.036, to_fix_search_fac
tor=0.032, to_fix_sync=0.000, service=0.085
09-08-2015 22:59:15.184 -0700 INFO  Metrics - group=subtask_seconds, name=cmmaster_endpoints, clustermastergeneration_edit=0.018000, clustermasterinfo_list=0.018000, clustermasterpeers_edit=0.185000
09-08-2015 22:59:15.184 -0700 INFO  Metrics - group=subtask_counts, name=cmmaster_service, to_fix_streaming=0, to_fix_data_safety=97, to_fix_gen=0, to_fix_rep_factor=235, to_fix_search_factor=235, to_fi
x_sync=0, to_fix_added=0, to_fix_removed=0, to_fix_total=235, count=15
09-08-2015 22:59:15.184 -0700 INFO  Metrics - group=subtask_counts, name=cmmaster_endpoints, clustermastergeneration_edit=18, clustermasterinfo_list=18, clustermasterpeers_edit=185
09-08-2015 22:59:15.184 -0700 INFO  Metrics - group=executor, name=cmmaster_executor, jobs_added=0, jobs_finished=0, current_size=0, smallest_size=0, largest_size=0, max_size=0
09-08-2015 22:59:15.184 -0700 INFO  Metrics - group=cmmaster_servicejobs, serviced=0.000000, current_size=0.000000
09-08-2015 22:58:44.184 -0700 INFO  Metrics - group=subtask_seconds, name=cmmaster_service, to_fix_streaming=0.000, to_fix_data_safety=0.016, to_fix_gen=0.000, to_fix_rep_factor=0.036, to_fix_search_fac
tor=0.031, to_fix_sync=0.000, service=0.084
09-08-2015 22:58:44.184 -0700 INFO  Metrics - group=subtask_seconds, name=cmmaster_endpoints, clustermastergeneration_edit=0.019000, clustermasterinfo_list=0.019000, clustermasterpeers_edit=0.181000
09-08-2015 22:58:44.184 -0700 INFO  Metrics - group=subtask_counts, name=cmmaster_service, to_fix_streaming=0, to_fix_data_safety=97, to_fix_gen=0, to_fix_rep_factor=235, to_fix_search_factor=235, to_fi
x_sync=0, to_fix_added=0, to_fix_removed=0, to_fix_total=235, count=16
09-08-2015 22:58:44.184 -0700 INFO  Metrics - group=subtask_counts, name=cmmaster_endpoints, clustermastergeneration_edit=19, clustermasterinfo_list=19, clustermasterpeers_edit=181
```

- Cluster master/slave activity can be found under cmmaster* or cmslave* groupings/names
- Metrics about cluster endpoints
  - How many times each endpoint was hit
  - How long we spent in those endpoints
- Metrics about jobs (rep fixup jobs, searchable fixup jobs, freeze jobs, etc)
  - How many jobs remain?
- How many # of buckets do we still need to fix?

Clustering Logs/Activity

splunkd_access.log	metrics.log
• Each individual endpoint access • (master-side) services/cluster/master/… • (indexer-side) services/cluster/slave/… • How long we've spend at the endpoint (ms) • Higher times indicate the CM/Indexer is swamped with work (>50ms? >100ms?) • The response (200 = success, non 200 = failure)	Metric information with regards to Clustering Activity, recorded every 30 seconds. • name=cmmaster_endpoints • group=subtask_count total number of accesses • group=subtask_seconds time Splunk spent responding to these endpoints • name=cmmaster_executor • "Jobs" the CM has scheduled, finished, and current size of jobs to complete • Jobs are responsible for hitting the endpoints and performing the action (move-primary, freeze, etc) • group=jobs, name=cmmaster • Actual counts of the jobs and their jobnames Indexers have their own corresponding jobs (cmslave)

Cluster Activity



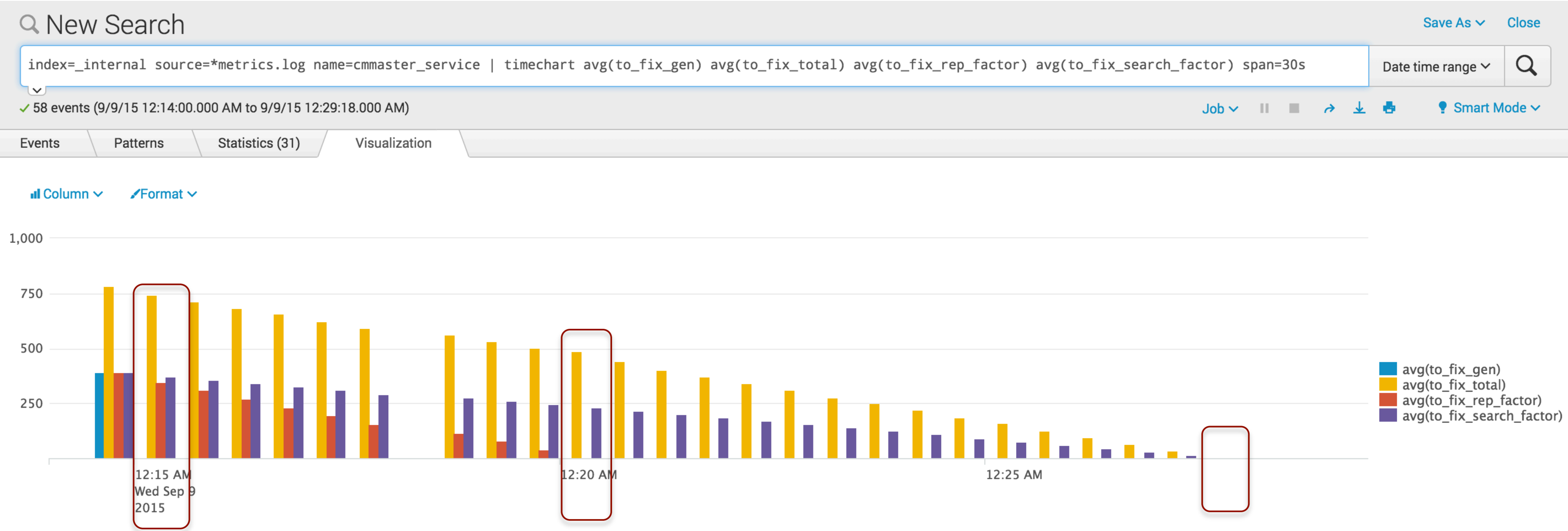
New Search

```
index=_internal source=*metrics.log host=marsha* group=subtask_counts name=cmmaster_endpoints | timechart max(clustermasterbuckets*)
```

Last 30 days

✓ 100,058 events (8/8/15 12:00:00.000 AM to 9/7/15 10:09:21.000 PM)

Cluster Activity



New Search

```
index=_internal source=*metrics.log name=cmmaster_service | timechart avg(to_fix_gen) avg(to_fix_total) avg(to_fix_rep_factor) avg(to_fix_search_factor) span=30s
```

✓ 58 events (9/9/15 12:14:00.000 AM to 9/9/15 12:29:18.000 AM)

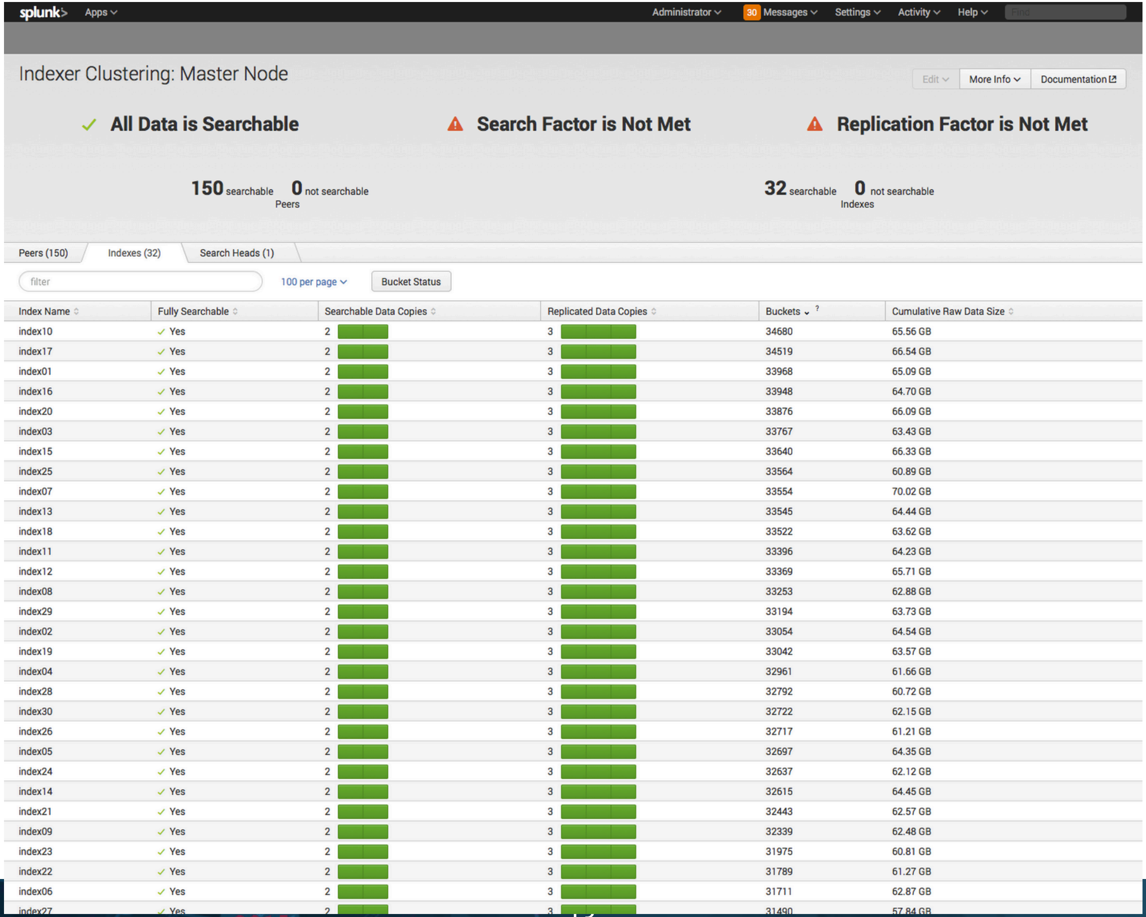
Searchable

RF Met

SF Met

Buckets

More Buckets More Problems



Indexer Clustering: Master Node

✓ All Data is Searchable

⚠ Search Factor is Not Met

⚠ Replication Factor is Not Met

150 searchable **0** not searchable
Peers

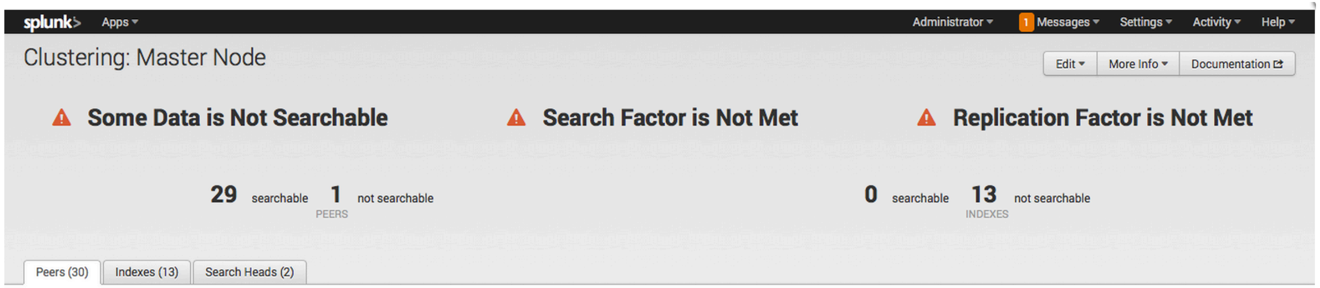
32 searchable **0** not searchable
Indexes

Peers (150) | Indexes (32) | Search Heads (1)

filter | 100 per page | Bucket Status

Index Name	Fully Searchable	Searchable Data Copies	Replicated Data Copies	Buckets	Cumulative Raw Data Size
index10	✓ Yes	2 🟩🟩	3 🟩🟩🟩	34680	65.56 GB
index17	✓ Yes	2 🟩🟩	3 🟩🟩🟩	34519	66.54 GB
index01	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33968	65.09 GB
index16	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33948	64.70 GB
index20	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33876	66.09 GB
index03	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33767	63.43 GB
index15	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33640	66.33 GB
index25	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33564	60.89 GB
index07	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33554	70.02 GB
index13	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33545	64.44 GB
index18	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33522	63.62 GB
index11	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33396	64.23 GB
index12	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33369	65.71 GB
index08	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33253	62.88 GB
index29	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33194	63.73 GB
index02	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33054	64.54 GB
index19	✓ Yes	2 🟩🟩	3 🟩🟩🟩	33042	63.57 GB
index04	✓ Yes	2 🟩🟩	3 🟩🟩🟩	32961	61.66 GB
index28	✓ Yes	2 🟩🟩	3 🟩🟩🟩	32792	60.72 GB
index30	✓ Yes	2 🟩🟩	3 🟩🟩🟩	32722	62.15 GB
index26	✓ Yes	2 🟩🟩	3 🟩🟩🟩	32717	61.21 GB
index05	✓ Yes	2 🟩🟩	3 🟩🟩🟩	32697	64.35 GB
index24	✓ Yes	2 🟩🟩	3 🟩🟩🟩	32637	62.12 GB
index14	✓ Yes	2 🟩🟩	3 🟩🟩🟩	32615	64.45 GB
index21	✓ Yes	2 🟩🟩	3 🟩🟩🟩	32443	62.57 GB
index09	✓ Yes	2 🟩🟩	3 🟩🟩🟩	32339	62.48 GB
index23	✓ Yes	2 🟩🟩	3 🟩🟩🟩	31975	60.81 GB
index22	✓ Yes	2 🟩🟩	3 🟩🟩🟩	31789	61.27 GB
index06	✓ Yes	2 🟩🟩	3 🟩🟩🟩	31711	62.87 GB
index27	✓ Yes	2 🟩🟩	3 🟩🟩🟩	31490	57.84 GB

More Buckets More Problems



Clustering: Master Node

Some Data is Not Searchable

Search Factor is Not Met

Replication Factor is Not Met

29 searchable 1 not searchable
PEERS

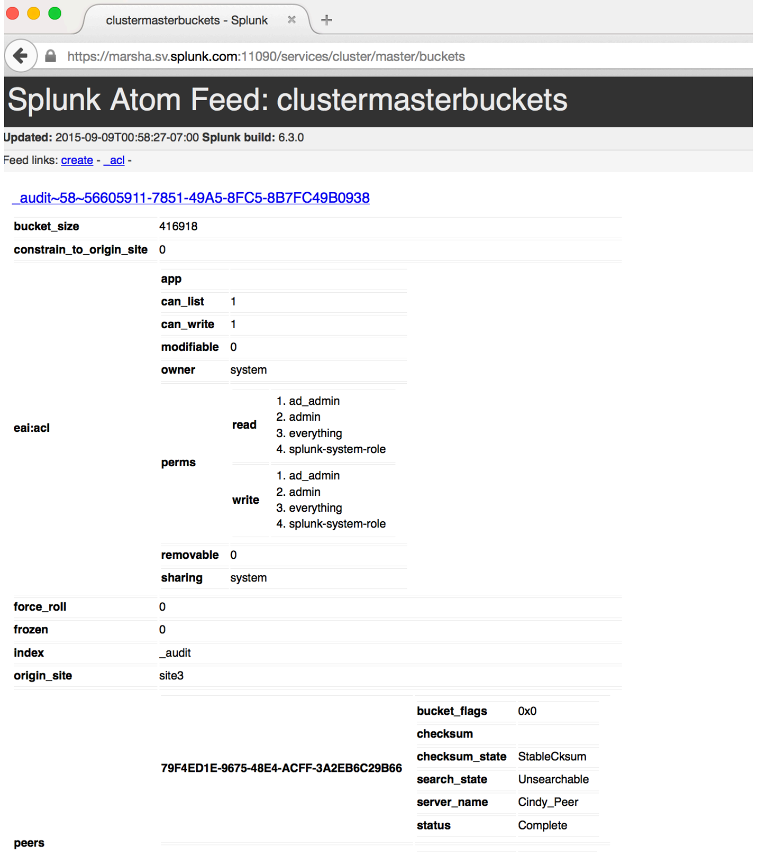
0 searchable 13 not searchable
INDEXES

- More buckets (and more peers) means the CM has to do more work
  - Iterates through each bucket, checking whether it needs to queue up any fixup jobs
    - Replication Jobs (to meet RF)
    - Search Jobs (to meet SF)
    - Primary Jobs (all buckets need to have a primary copy per site)
    - Other jobs (freezing, checksum, rolling, etc)
- As the number of buckets grows, CM responsiveness goes down

More Buckets More Settings

server.conf	
service_interval (CM)	Specifies how often the CM should look through the buckets, scheduling jobs as necessary. Default = 1. • Adjust to 1 sec for every 50k buckets.
heartbeat_period (Indexer)	Specifies how often the Indexers contact the CM. Defaults to every 1 second. • For lots of peers (>50) or lots of buckets (>100k), we can increase this value to 5-30.
heartbeat_timeout (CM)	Specifies how long before an Indexer is considered 'Down' when no heartbeats comes in. • Multiple of heartbeat_period, anywhere from 20x – 60x
cxn_timeout (CM+Indexer) rcv_timeout (CM+Indexer) send_timeout (CM+Indexer)	Specifies how long before an intra-cluster connection will terminate. Default = 60. • If a cluster indexer times out, it will re-add itself to the CM, which itself is a busy operation (it needs to resync the state of all its buckets), which can lead to negative feedback loops… • These can be bumped up for busier clusters (300s).
indexes.conf	
rotatePeriodInSecs (Indexer)	Specifies how often to check through all the buckets – rolling them from hot->warm->cold as necessary. Default = 60 • 10min=600

Inspecting Buckets


clustermasterbuckets - Splunk
https://marsha.sv.splunk.com:11090/services/cluster/master/buckets

Splunk Atom Feed: clustermasterbuckets

Updated: 2015-09-09T00:58:27-07:00 **Splunk build:** 6.3.0

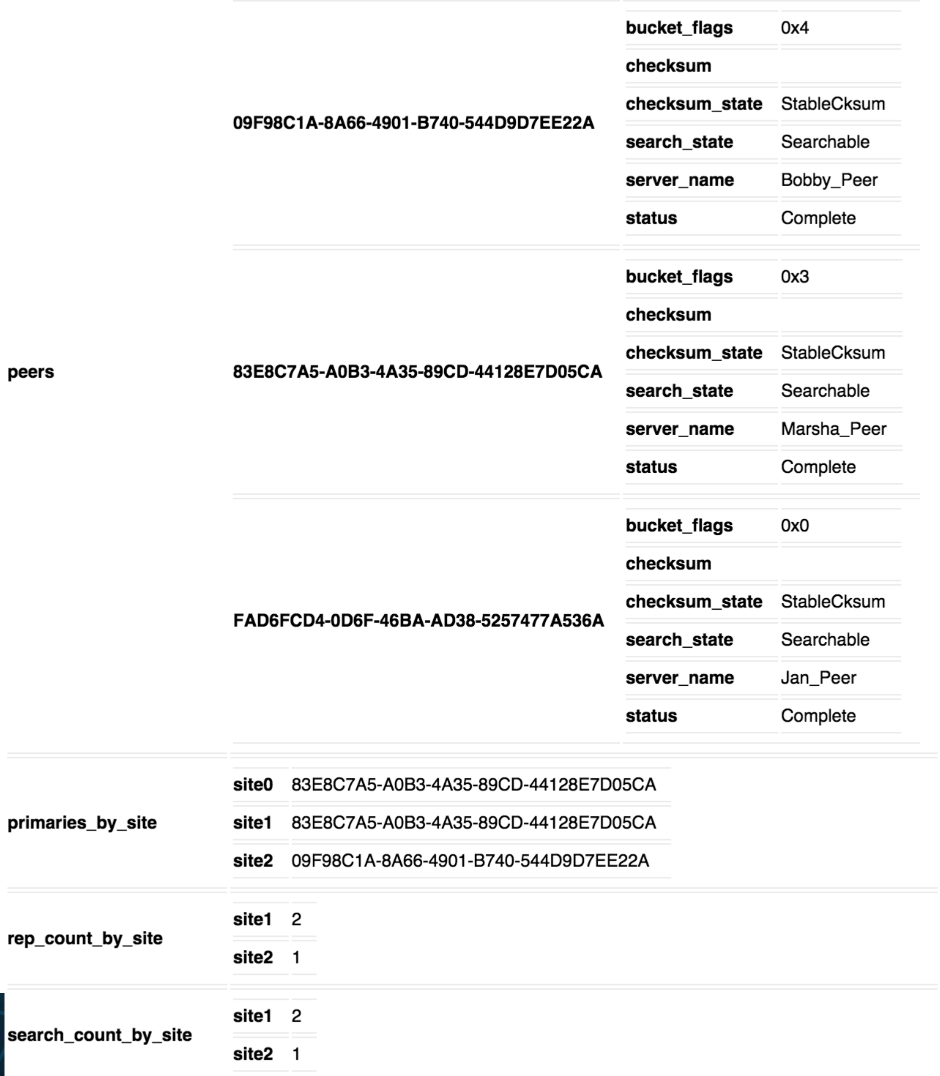
Feed links: create - _acl -

_audit~58~56605911-7851-49A5-8FC5-8B7FC49B0938

bucket_size	416918		
constrain_to_origin_site	0		
eai:acl	**app**		
	can_list	1	
	can_write	1	
	modifiable	0	
	owner	system	
	perms	**read**	1. ad_admin 2. admin 3. everything 4. splunk-system-role
		write	1. ad_admin 2. admin 3. everything 4. splunk-system-role
	removable	0	
	sharing	system	
force_roll	0		
frozen	0		
index	_audit		
origin_site	site3		
peers	**79F4ED1E-9675-48E4-ACFF-3A2EB6C29B66**	**bucket_flags**	0x0
		checksum	
		checksum_state	StableCksum
		search_state	Unsearchable
		server_name	Cindy_Peer
		status	Complete

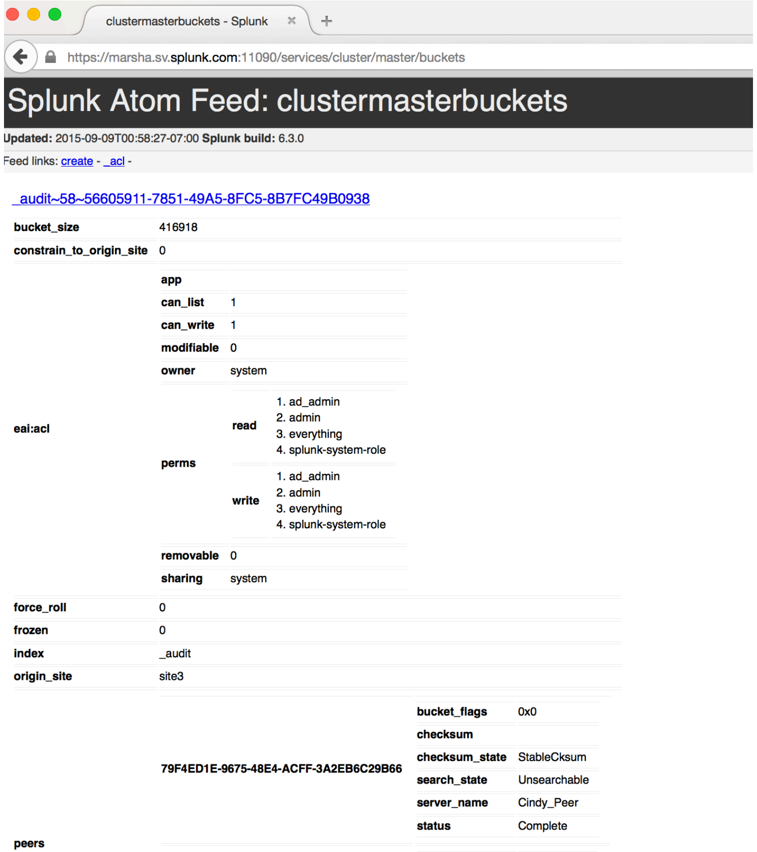
services/cluster/master/buckets

- Which peers does the bucket exist on?
- Which peers is the bucket primary?
- Is the bucket searchable/unsearchable/ pending-searchable?



peers	09F98C1A-8A66-4901-B740-544D9D7EE22A	bucket_flags	0x4
		checksum	
		checksum_state	StableCksum
		search_state	Searchable
		server_name	Bobby_Peer
		status	Complete
	83E8C7A5-A0B3-4A35-89CD-44128E7D05CA	bucket_flags	0x3
		checksum	
		checksum_state	StableCksum
		search_state	Searchable
		server_name	Marsha_Peer
		status	Complete
	FAD6FCD4-0D6F-46BA-AD38-5257477A536A	bucket_flags	0x0
		checksum	
		checksum_state	StableCksum
		search_state	Searchable
		server_name	Jan_Peer
		status	Complete
primaries_by_site	site0	83E8C7A5-A0B3-4A35-89CD-44128E7D05CA	
	site1	83E8C7A5-A0B3-4A35-89CD-44128E7D05CA	
	site2	09F98C1A-8A66-4901-B740-544D9D7EE22A	
rep_count_by_site	site1	2	
	site2	1	
search_count_by_site	site1	2	
	site2	1	

Inspecting Buckets



clustermasterbuckets - Splunk
https://marsha.sv.splunk.com:11090/services/cluster/master/buckets

Splunk Atom Feed: clustermasterbuckets

Updated: 2015-09-09T00:58:27-07:00 **Splunk build:** 6.3.0

Feed links: create - _acl -

_audit~58~56605911-7851-49A5-8FC5-8B7FC49B0938

bucket_size	416918		
constrain_to_origin_site	0		
eai:acl	**app**		
	can_list	1	
	can_write	1	
	modifiable	0	
	owner	system	
	perms	**read**	1. ad_admin 2. admin 3. everything 4. splunk-system-role
		write	1. ad_admin 2. admin 3. everything 4. splunk-system-role
	removable	0	
	sharing	system	
force_roll	0		
frozen	0		
index	_audit		
origin_site	site3		
peers	79F4ED1E-9675-48E4-ACFF-3A2EB6C29B66	**bucket_flags**	0x0
		checksum	
		checksum_state	StableCksum
		search_state	Unsearchable
		server_name	Cindy_Peer
		status	Complete

There's so many buckets! How do I find one that I care about? Why would I care?

Filters! services/cluster/master/buckets?filter=

- Which buckets do not have primaries?
  - buckets?filter=has_primary=false
- Which buckets do not meet my RF=3?
  - buckets?filter=replication_count<3
- Which buckets are frozen?
  - buckets?filter=frozen=true
- Standalone?
  - buckets?filter=standalone=true
- Standalone and frozen?
  - buckets?filter=standalone=true&filter=frozen=true
  - (don't think this is a thing)
- Don't meet RF=3 and index=main?
  - buckets?filter=replication_count>3&filter=index=main

Modifying Buckets

⚠ ⚠

Endpoints!

- Freeze a bucket:

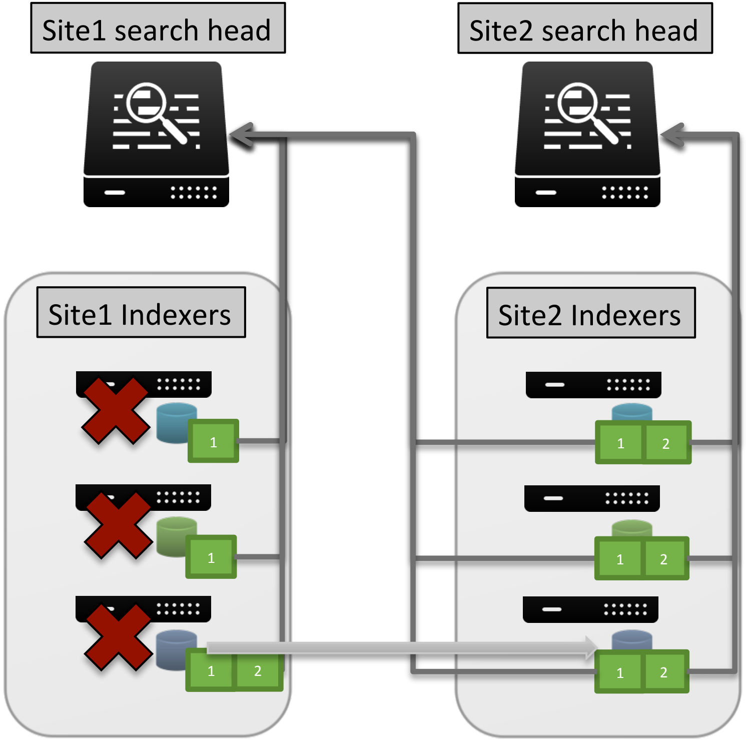
  -
    ```
    curl -k -u admin:changeme https://{indexer}:{mgmt}/services/data/indexes/{INDEX}/freeze-buckets -d bucket_ids=46_11115C7A-E2F0-4225-A740-4ED6BD2D9CE5 -X POST
    ```
- Remove a copy of a bucket:

  -
    ```
    curl -k -u admin:changeme "https://{master}:{mgmt}/services/cluster/master/buckets/main~1490~D4A07A5D-3C3C-4D36-BD70-D610B432466F/remove_from_peer" -d peer={PEER_GUID}
    ```
- Remove all copies of a bucket:

  -
    ```
    curl -k -u admin:changeme "https://{master}:{mgmt}/services/cluster/master/buckets/main~1490~D4A07A5D-3C3C-4D36-BD70-D610B432466F/remove_all" -d peer={PEER_GUID
    ```

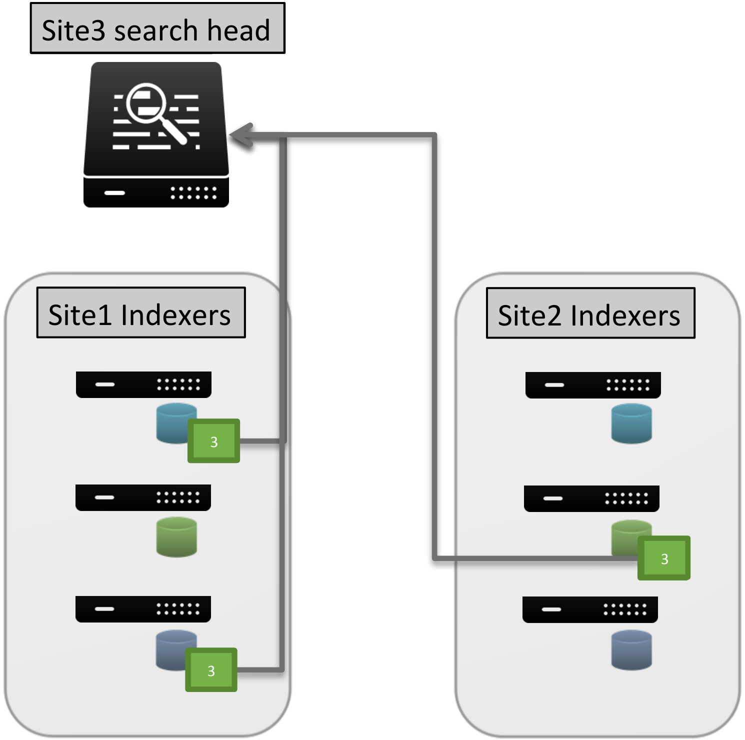
Other Useful Knowledge

Multisite Search Affinity



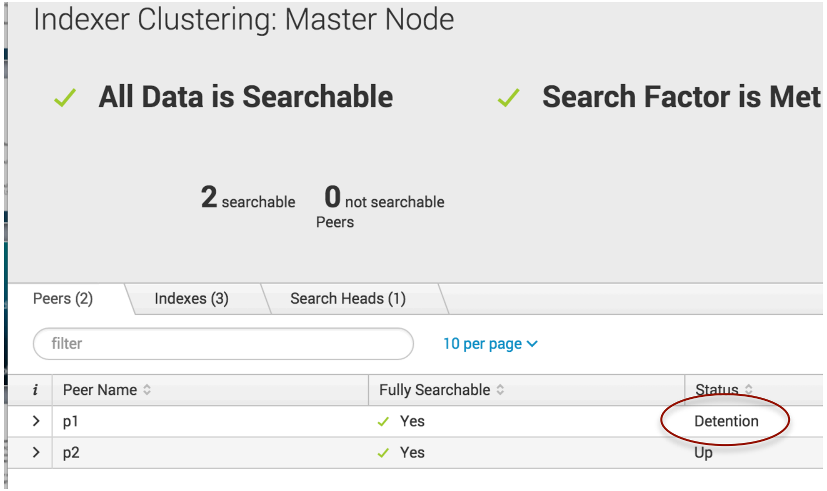
- When a searchable copy becomes available on a site, splunk will move the primary for that site to its local copy
- Buckets on a site will return events to a searchhead with the same site.
- If a peer goes down, the master will move the primaries that peer had to another copy
- If the entire site goes down, the other site(s) will become primaries

Multisite ~~Search Affinity~~



- Splunk 6.3 – site0
  - Primaries behave just like non-multisite, without any regards to site!
- Pre 6.3
  - Workaround!
  - Add another site to available_sites
  - Set SH (no indexers) to new site
  - Make sure to call "splunk set indexing-ready" on every CM restart
  - (wont work if your excess 'total' sites is greater than the # of non-specified sites… ie origin:1 total:3 in our illustration will not work, because then the CM will try to put the 2 non-origin copies into a site each, and there are no indexers in site3!)

Stop Indexing on a Cluster-Indexer



Indexer Clustering: Master Node

✓ All Data is Searchable

✓ Search Factor is Met

2 searchable 0 not searchable
Peers

i	Peer Name	Fully Searchable	Status
>	p1	✓ Yes	Detention
>	p2	✓ Yes	Up

- Detention Peer stops indexing data and doesn’t accept any input, but still serves search queries
- 6.3 – turn on/off detention with an endpoint!
  - curl -k -u admin:changeme https://{INDEXER}:{MGMT}/services/cluster/slave/control/control/set_detention_override -d value=true -X POST
- Pre 6.3 – server.conf
  - [diskUsage] minFreeSpace=5000 (default)
    - Set to 50000000
    - (Requires a restart)

Miscellaneous

Q&A

.conf2015

THANK YOU

splunk>