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Indexer Clustering Fixups

Cluster recovery process

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Clustering Fixup Cycle

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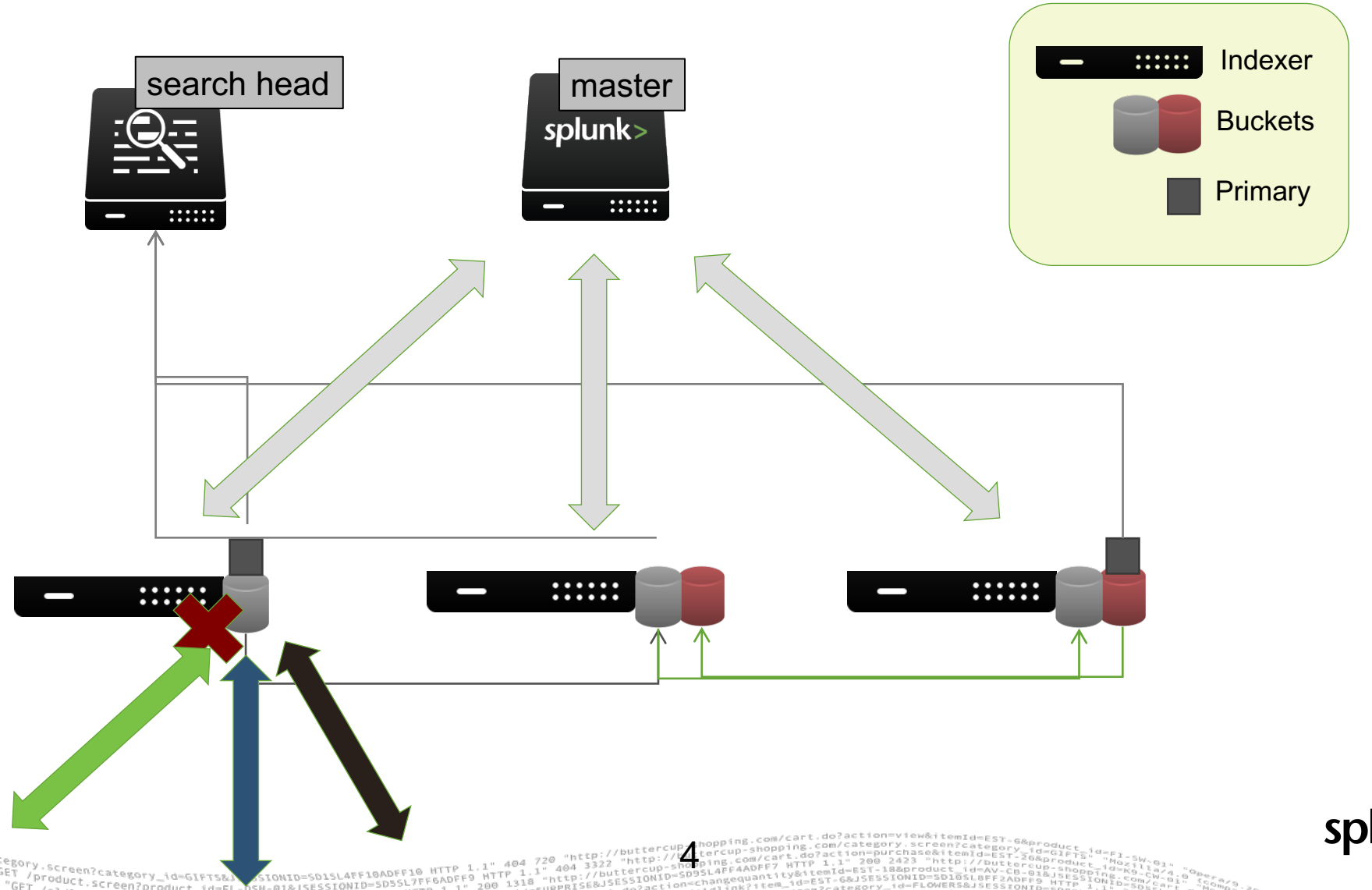
Clustering Overview - Indexer Failure



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Fixup Lifecycle – to_fix lists

#1 bucket added to to_fix list

- The Cluster Master (CM) remembers a list of buckets it needs to fix.
- Every time a bucket is modified, the CM will add the bucket into any to_fix lists that are needed
- There are multiple to_fix lists, each corresponding to a different fixup
  - Generation, Replication Factor, Search Factor, Excess Buckets, Summary, etc.
- These lists are an internal list of all the buckets that **POTENTIALLY** need fixing
  - Very possible that nothing needs to be done - in which case they'll be removed on the service() call (part 2)

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var/log/splunk/metrics.log

```
08-25-2017 15:02:37.915 -0700 INFO  Metrics - group=subtask_counts, name=cmmaster_service, to_fix_streaming=100, to_fix_data_safety=2, to_fix_gen=4, to_fix_rep_factor=104, to_fix_search_factor=57, to_fix_summary=0, to_fix_rebalance=0, to_fix_excess=0, to_fix_sync=0, to_fix_added=7, to_fix_removed=7, to_fix_total=104, count=31

08-25-2017 15:02:06.915 -0700 INFO  Metrics - group=subtask_counts, name=cmmaster_service, to_fix_streaming=101, to_fix_data_safety=2, to_fix_gen=4, to_fix_rep_factor=104, to_fix_search_factor=57, to_fix_summary=2, to_fix_rebalance=0, to_fix_excess=0, to_fix_sync=0, to_fix_added=4, to_fix_removed=0, to_fix_total=104, count=31

08-25-2017 14:30:04.917 -0700 INFO  Metrics - group=subtask_counts, name=cmmaster_service, to_fix_streaming=102, to_fix_data_safety=2, to_fix_gen=2, to_fix_rep_factor=102, to_fix_search_factor=55, to_fix_summary=2, to_fix_rebalance=0, to_fix_excess=0, to_fix_sync=0, to_fix_added=154, to_fix_removed=156, to_fix_total=102, count=31

08-25-2017 14:29:33.916 -0700 INFO  Metrics - group=subtask_counts, name=cmmaster_service, to_fix_streaming=102, to_fix_data_safety=2, to_fix_gen=3, to_fix_rep_factor=103, to_fix_search_factor=55, to_fix_summary=2, to_fix_rebalance=0, to_fix_excess=0, to_fix_sync=0, to_fix_added=116084, to_fix_removed=116160, to_fix_total=104, count=22
```

- to_fix_rep_factor=104
  - buckets to check if we need/can schedule replications
- to_fix_added=116k to_fix_removed=116k
  - likely a re-add operation – a peer resynced its buckets (restart) and most buckets were added/removed from the to_fix list with little jobs scheduled

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Fixup Lifecycle – service

#1 bucket added to to_fix list

#2 service() schedules Jobs

- Periodically, the CM will run through its service() loop
  - Defaults to every second, see the setting of “service_interval”
- During the service() loop, the CM will iterate through ALL the bucket on all the to_fix lists, and schedule any jobs that it needs to for repairs.

```
function service()
{
   for bucket in to_fix_lists:
     schedule_jobs_to_fix(bucket) // maybe schedule a job?
}
```

  - (not actually taken from splunk/clustering.cpp)
- If the bucket does’t need any jobs OR we’ve scheduled all jobs to fix a bucket, its removed from the to_fix list

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Fixup Lifecycle – jobs

- Once service() schedules jobs, the CM has a threadpool running and picking up all the scheduled jobs.
- These jobs are generally REST POSTs to the cluster Indexers, telling them to run some command

Job name	Function
CMRepJob	Replicate a bucket (includes recipient info)
CMChangeBucketJob_build	Make bucket searchable (RF copy -> SF copy)
CMChangeMasks	Change bucket primaries (batch job, can change maybe buckets)
CMRollHotBucket	Roll a bucket from hot->warm
CMTruncJob	Truncate a bucket's size (remove bucket will use this with size=0)

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var/log/splunk/metrics.log

```
INFO  Metrics - group=jobs, name=cmmaster, CMChangeMasksJob=57, CMPeerJob=14, CMRepJob=1, CMRollHotBucketJob=2
INFO  Metrics - group=jobs, name=cmmaster, CMChangeBucketJob=8, CMChangeBucketJob_build=3, CMChangeMasksJob=71, CMPeerJob=5, CMRepJob=25, CMRollHotBucketJob=23
INFO  Metrics - group=jobs, name=cmmaster, CMChangeBucketJob_build=32, CMChangeBucketJob_removePrimary=1, CMChangeMasksJob=16, CMRepJob=40, CMRollHotBucketJob=1
INFO  Metrics - group=jobs, name=cmmaster, CMRepJob=1
INFO  Metrics - group=jobs, name=cmmaster, CMChangeBucketJob_build=1, CMRepJob=1
INFO  Metrics - group=jobs, name=cmmaster, CMRepJob=2, CMTruncJob=2
INFO  Metrics - group=jobs, name=cmmaster, CMChangeBucketJob_build=1, CMRepJob=1
INFO  Metrics - group=jobs, name=cmmaster, CMChangeBucketJob_build=3, CMChangeMasksJob=5, CMPeerJob=4, CMRepJob=7
INFO  Metrics - group=jobs, name=cmmaster, CMChangeBucketJob_build=1, CMRepJob=2
```

- CMChangeMasksJob=57
  - The CM ran 57 jobs to change bucket primaries amongst the indexers
- CMRepJob=40
  - The CM ran 40 jobs to start bucket replication jobs amongst the indexers (fixup RF)

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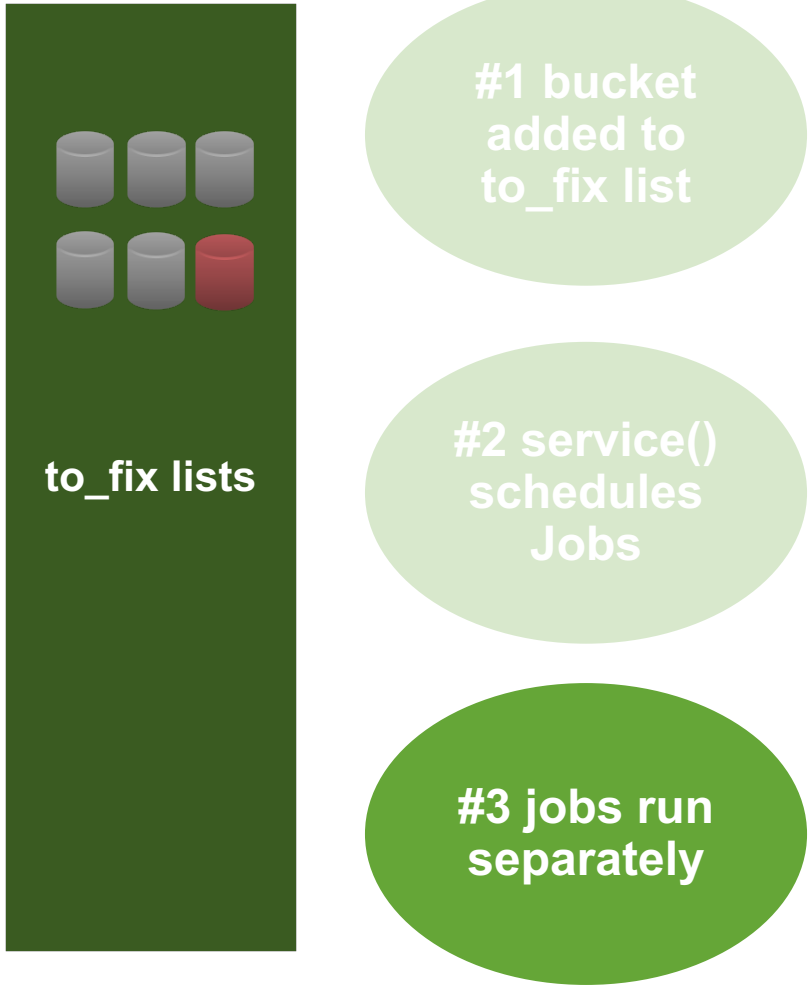
Fixup Lifecycle – jobs



- All the jobs are ran asynchronously on separate threads
  - ”executor_workers” specifies how many separate threads run these jobs (defaults to 10)
- These jobs generally POST to a specific Peer endpoint
  - ex : indexer01:8089/services/cluster/slave/buckets/main~1~…/replicate
- If the job runs successfully
  - All is well! The bucket replicated, or got its primary changed, or etc.
- If the job encounters an error
  - The bucket is placed BACK into the to_fix list, so that we can fix it up again on the next service loop!

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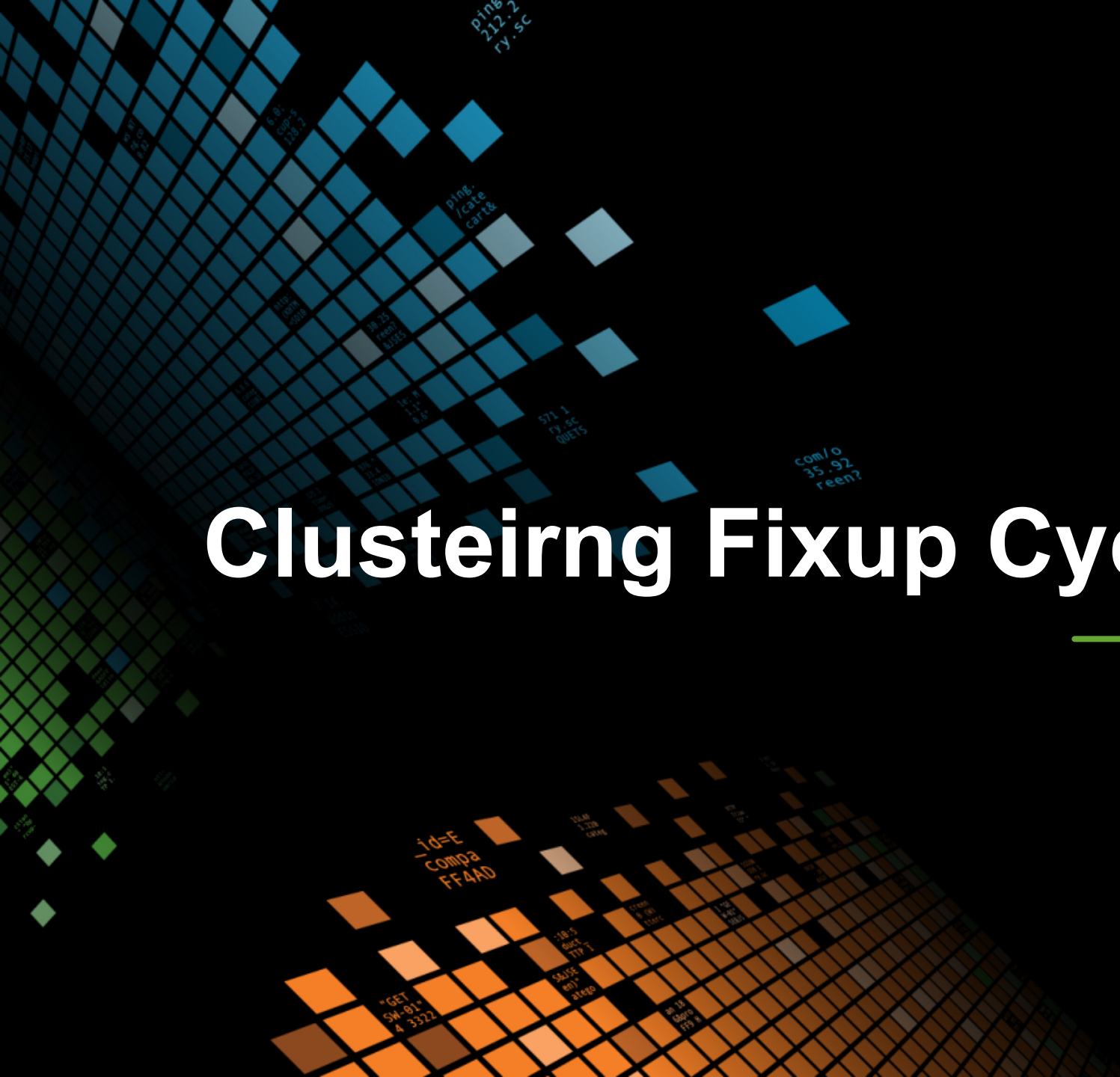

Clusteirng Fixup Cycle - examples

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to_fix lists metrics

New Search

Save As Close

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

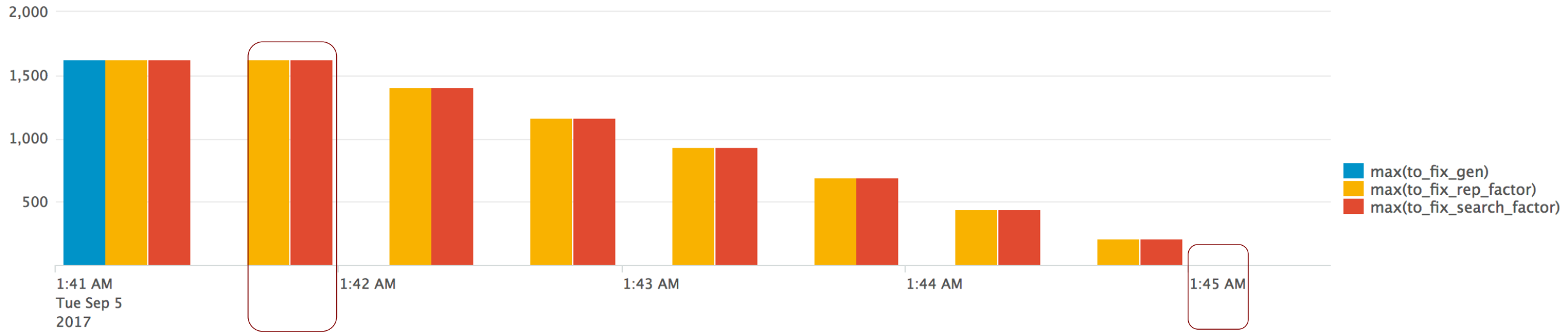
Date time range

✓ 18 events (9/5/17 1:41:00.000 AM to 9/5/17 1:45:30.000 AM) No Event Sampling

Job Smart Mode

Events Patterns Statistics (9) Visualization

Column Chart Format



Searchable

RF+SF Met

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jobs metrics

New Search

Save As Close

```
index=_internal source=*metrics.log group=jobs name=cmmaster | timechart max(*Job*) span=10s
```

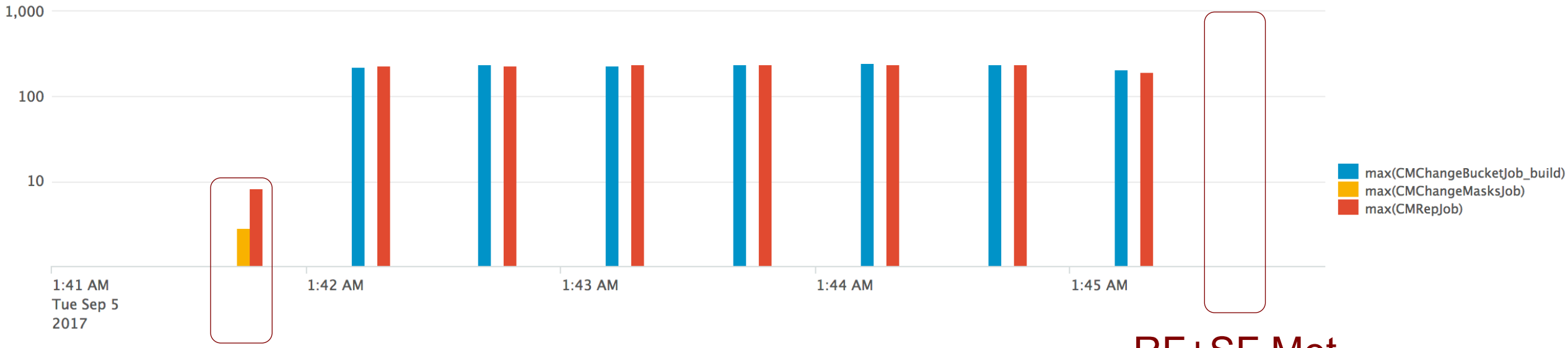
Date time range

✓ 8 events (9/5/17 1:41:00.000 AM to 9/5/17 1:46:00.000 AM) No Event Sampling

Job Smart Mode

Events Patterns Statistics (30) Visualization

Column Chart Format



searchable

RF+SF Met

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jobs by time

New Search

Save As Close

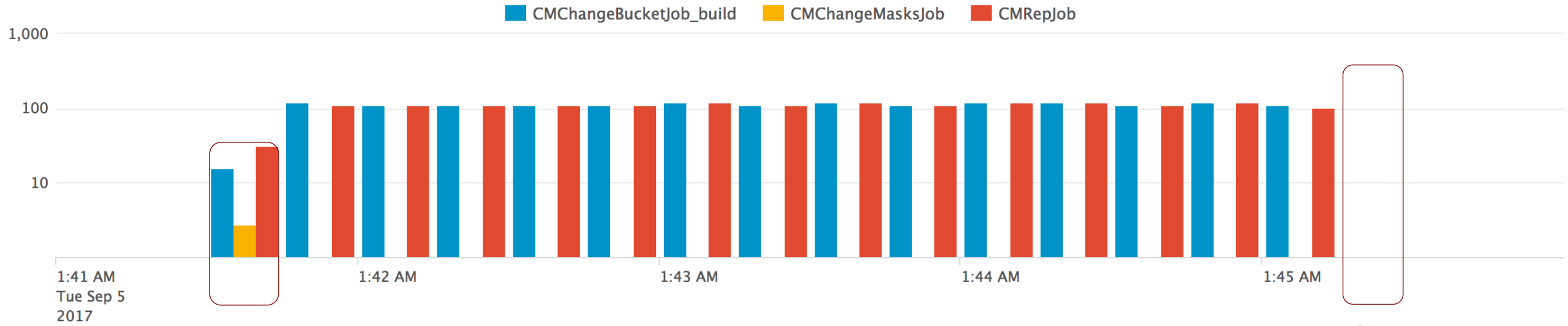
```
index=_internal source=*master*splunkd.log CMRepJob | timechart span=15s count by job
```

Date time range

✓ 3,264 events (9/5/17 1:41:00.000 AM to 9/5/17 1:46:00.000 AM) No Event Sampling Job Smart Mode

Events Patterns Statistics (20) Visualization

Column Chart Format



searchable

RF+SF Met

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Thanks - Q&A

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APPENDIX Searches

1. index=_internal host=MASTER source=*splunkd.log* CMRepJob running job | timechart count by job
   - Master jobs ran
2. index=_internal source=*metrics.log* name=cmmaster group=jobs | timechart max(CM*)
   - Master jobs metrics
3. index=_internal source=*metrics.log* *fix* host=MASTER | timechart max(to_fix_*)
   - to_fix list sizes
4. index=_internal source=*metrics.log* group=subtask_seconds name=cmmaster | timechart max(service)
   - Master time spent calling service() in between previous log to metrics.log (every 30s)