TCO Reduction through Storage

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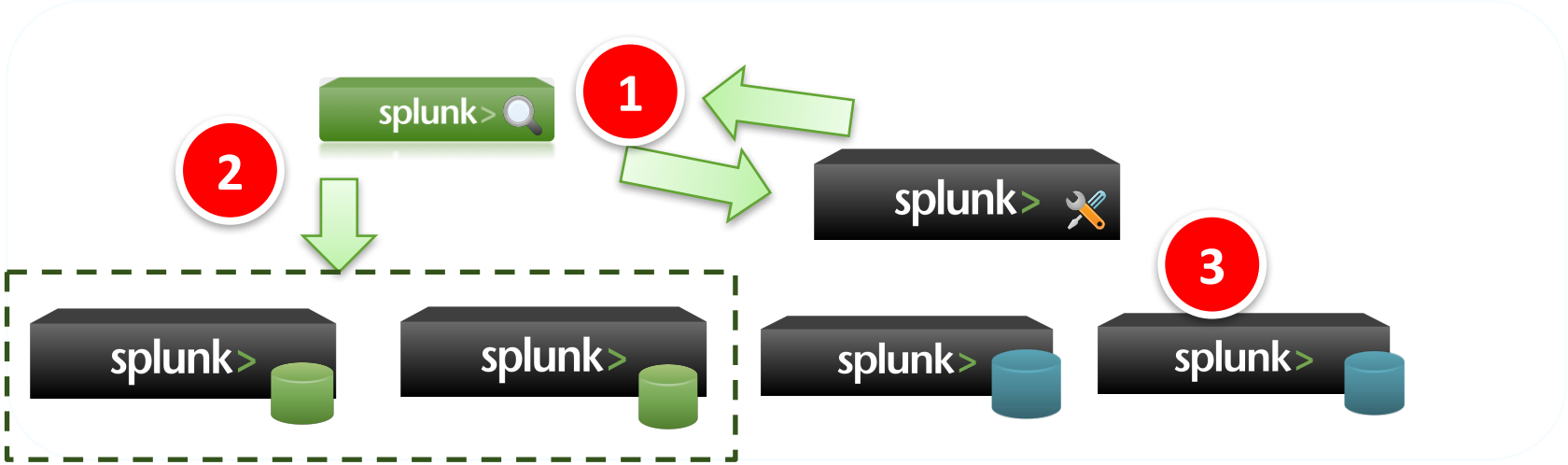
Agenda

- Introduction to data storage in Splunk
- TSIDX Reduction – Overview
- TSIDX Reduction – Set up
- Performance Comparisons
- Tips & Tricks

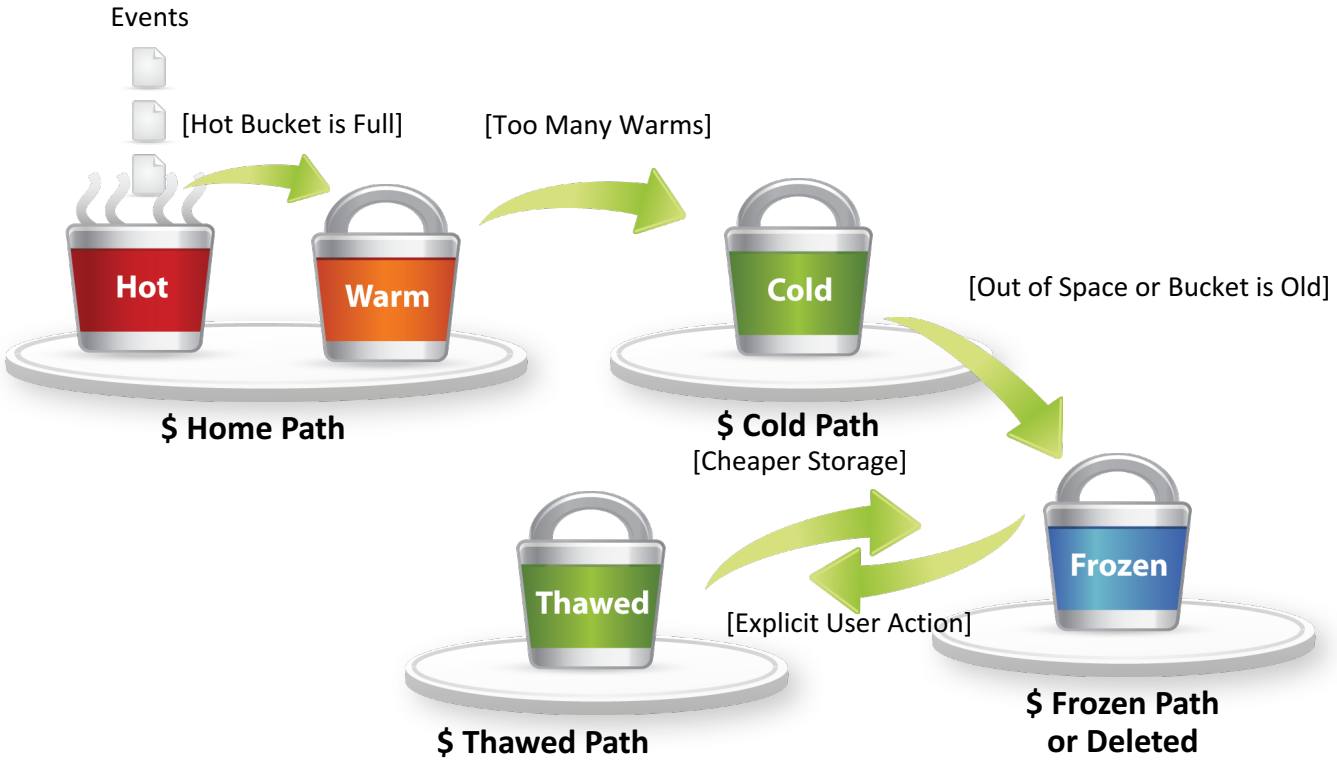
Introduction to data storage in Splunk

Splunk Architecture



1. Search Head gets the peer list from Cluster Master
2. Search Head sends the search queries to peers
3. Redundant copies of raw data are available

Bucket Lifecycle



Storage Requirements

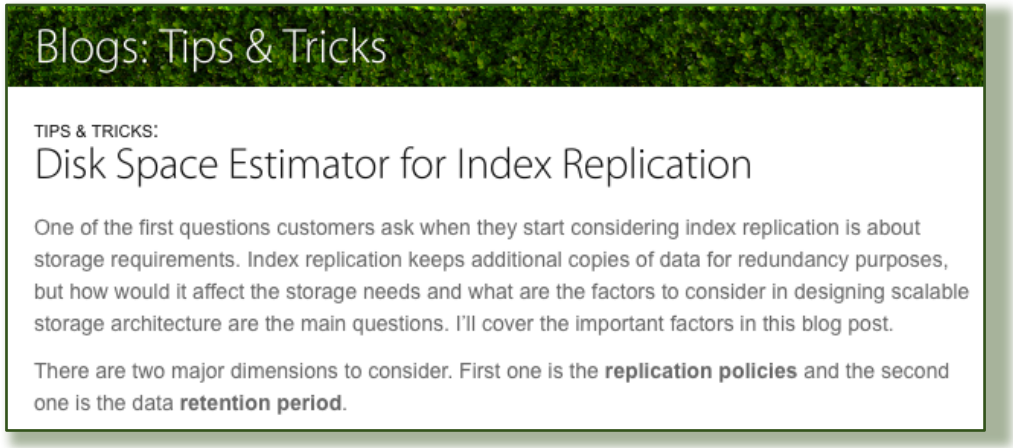
Raw data on disk = ~ 15% of indexed data
Index files on disk = ~35% of indexed data

Index data = 100GB, RF = 3, SF = 2

- Raw data = 15 * 3 = 45 GB
- Index files = 35 * 2 = 70 GB

Total size across cluster = 115 GB

Per peer storage = 38 GB

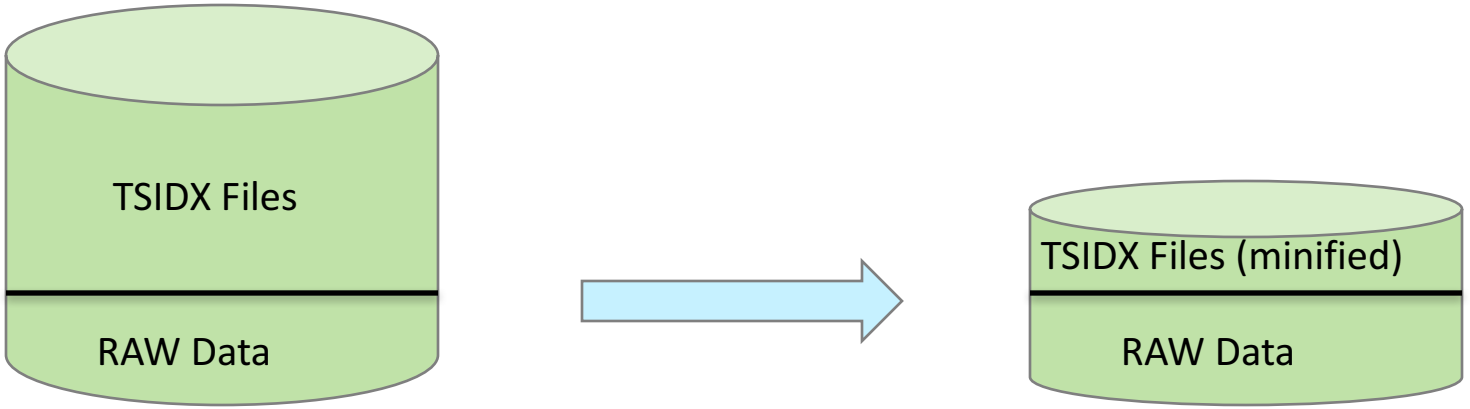


http://blogs.splunk.com/2013/01/31/disk-space-estimator-for-index-replication/

TSIDX Reduction Overview

TSIDX Retention Policy

Ability to remove TSIDX file contents for historical data to save disk space



Deep Dive

Reduce what ?

- Lexicon and Postings list

Raw data:

- Event 1: Happy kitty
- Event 2: Sad kitty

Lexicon:

- Happy: Term-id 1
- Kitty: Term-id 2
- Sad: Term-id 3

Postings List:

- Term-1:
  [Event-1]
- Term-2:
  [Event-1,Event-2]
- Term-3:
  [Event-2]

So how do we search ?

- Brute Force !
  - Read EVERYTHING from disk, filter raw in memory.

- Some optimizations by retaining the following
  - Bloom filters : Eliminate buckets that do not contain the terms.
  - Reduced TSIDX : Eliminate events that fall outside the time range.
  - *.data files : Eliminate events that don’t match host/source/sourcetype

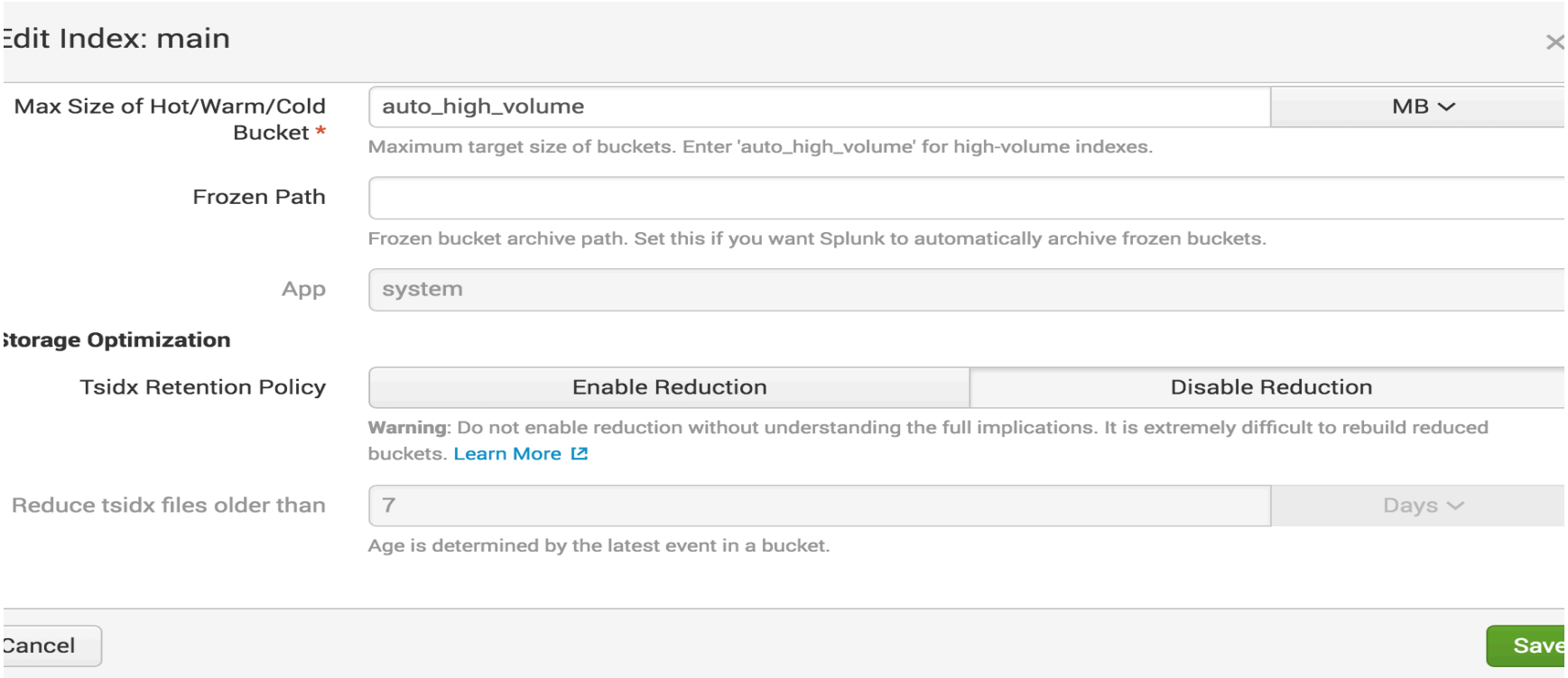
Configuration

Per-index settings in indexes.conf

REST/CLI/UI : No restart required

- enableTsidxResuction : true|false
  - Enable the feature. Off by default.
- timePeriodInSecBeforeTsidxReduction
  - Age at which bucket eligible for reduction
- tsidxReductionCheckPeriodInSec
  - Frequency of scans for eligible buckets.

UI


Edit Index: main
Max Size of Hot/Warm/Cold Bucket *
auto_high_volume
MB
Maximum target size of buckets. Enter 'auto_high_volume' for high-volume indexes.
Frozen Path
Frozen bucket archive path. Set this if you want Splunk to automatically archive frozen buckets.
App
system
Storage Optimization
Tsidx Retention Policy
Enable Reduction
Disable Reduction
Warning: Do not enable reduction without understanding the full implications. It is extremely difficult to rebuild reduced buckets. Learn More
Reduce tsidx files older than
7
Days
Age is determined by the latest event in a bucket.
Cancel
Save

Reduction Process

- Eligibility
  - Bucket is not HOT
  - No more splunk-optimize runs scheduled on the bucket
  - Bucket is the right age.

- Create reduced files in a tmp directory in the bucket
- Copy over reduced files, delete the full files.
- Ongoing searches uninterrupted
- **NOTE:** Marginal disk usage increase when first enabled

DANGER !

- Once a bucket is reduced going back is very expensive

- Two ways:
  - Disable reduction, then wait for the reduced buckets to be phased out
  - Stop Splunk and rebuild the bucket

Clustering

- indexes.conf is consistent across slaves.
- Reduction does not happen in lock step across all slaves.
- *Eventually* all copies of the bucket will have the same state across peers
- Bucket is *SEARCHABLE* if it has either full or mini-TSIDX files

Debug Options

- New field in dbinspect :
  - tsidxState : full | mini

- Log channels
  - Minification scheduler
    - category.OnlineFsck
  - New filtering layers in Search
    - category.ISearchOperator
    - category.FastSearchFilter
    - category.LispyPostFilter

Won’t searches be slow ?

- It Depends !!!
  - Dense searches not affected at all
  - Sparse searches affected significantly.

- Assumption : Old data is less searched.
- Before configuring determine a cutoff point.

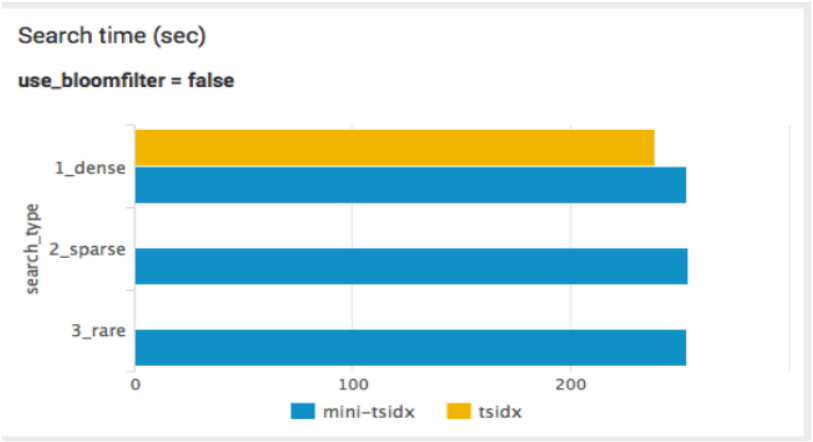
Numbers

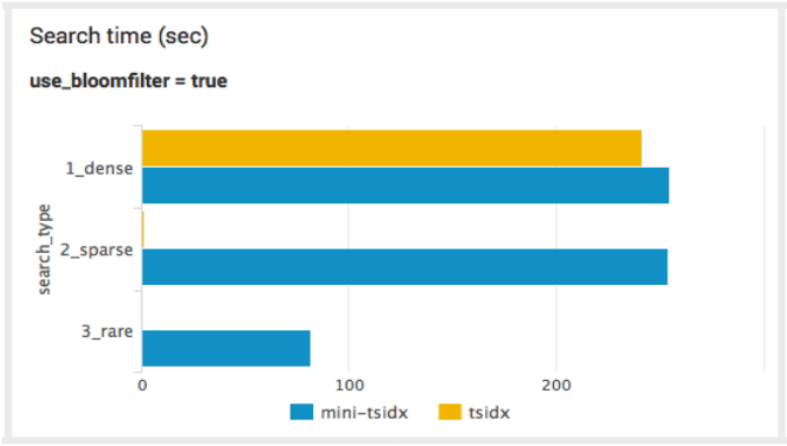
- Disk Savings : 60-70% on average
  - Better for numerical data
  - Better for larger lexicons

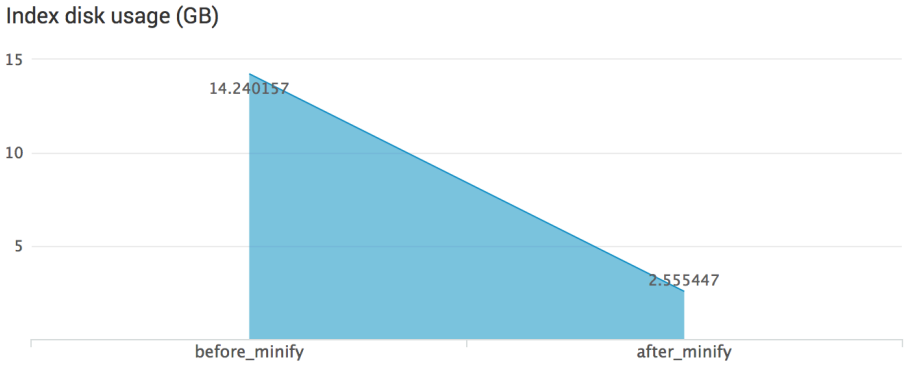
- Search Times:
  - Dense : Not affected
  - Sparse/Rare
    - Goes from seconds to minutes
    - Scales with data volume

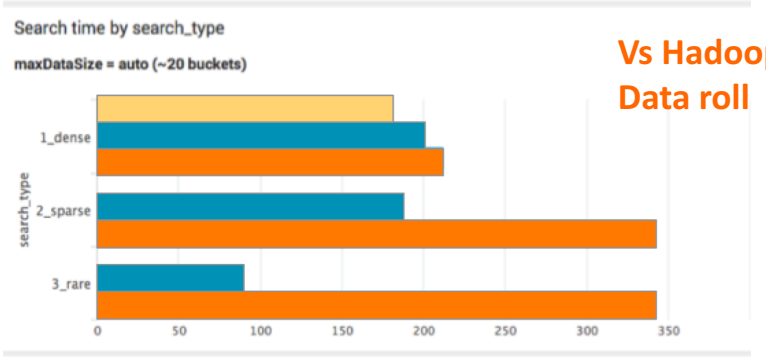
Performance Testing Results

Performance







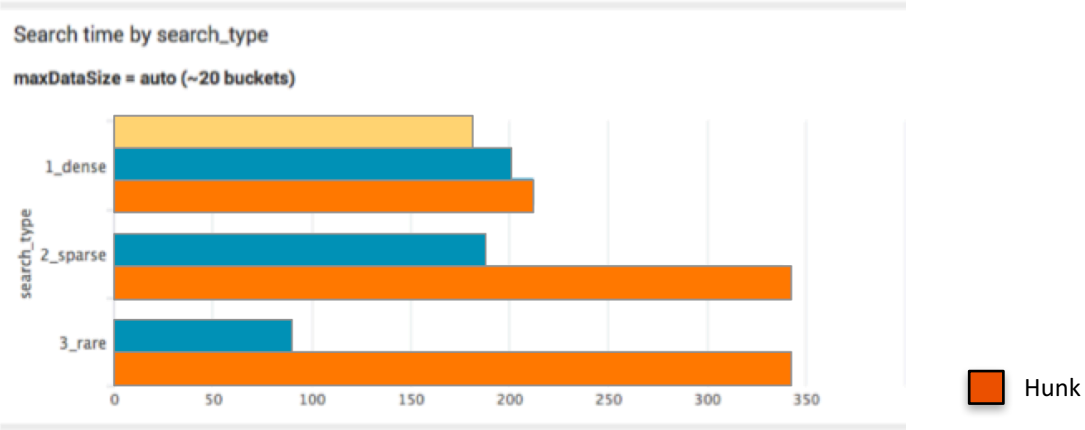


Vs Hadoop Data roll

Comparison to Hadoop Data Roll

Hadoop Data Roll

- Moves raw data from Splunk to Hadoop infrastructure
- Useful if you already have Hadoop in your env
- Performance wise TSIDX reduction is faster due to Bloom filters



Best Practice Recommendations

Key Details

- Per-index configuration
  - Can be enabled globally or per-index basis
- Cluster-aware
- Bloom filter
  - Always Use Bloom Filters
- Performance

THANK YOU

splunk>