

# SmartStore

Next-Gen Architecture to reduce TCO

# Agenda

- Why we built it
- How it works
- Getting data in
- Searching data

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130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=SD1SL4FF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FL-SW-01" "Opera/9.80.20131026.120111 Mozilla/5.0 (Macintosh; Intel Mac OS X 10_9_5; rv:35.0) Gecko/20100101 Firefox/35.0"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=SD5SL7FF6ADFF9 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=K9-CU-01" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322) "
317 27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5SL9FF1ADFF3 HTTP 1.1" 200 1316 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=SD10SLBF2ADFF9 HTTP 1.1" 200 2423 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-1"
10.2.2.10 - - [07/Jan 18:10:55:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=SD5SL8FF1ADFF6 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/oldlink?item_id=EST-26&JSESSIONID=SD5SL9FF1ADFF3 HTTP 1.1" 200 1316 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=SD10SLBF2ADFF9 HTTP 1.1" 200 2423 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-1"
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## Existing deployments

- Use multiple Splunk Indexers with clustering
- Each Indexer has Compute and fixed Storage
  - Compute : Necessary for indexing and searching data
  - Storage : Necessary for storing indexed data
- Prune older data to free storage for newer data

# Why we built it

## Want to increase storage?

- Add additional Indexers
  - Higher operational complexity
  - Underutilized compute
  - Higher TCO
  - Need to rebalance data - expensive

# Why we built it

## Introducing SmartStore

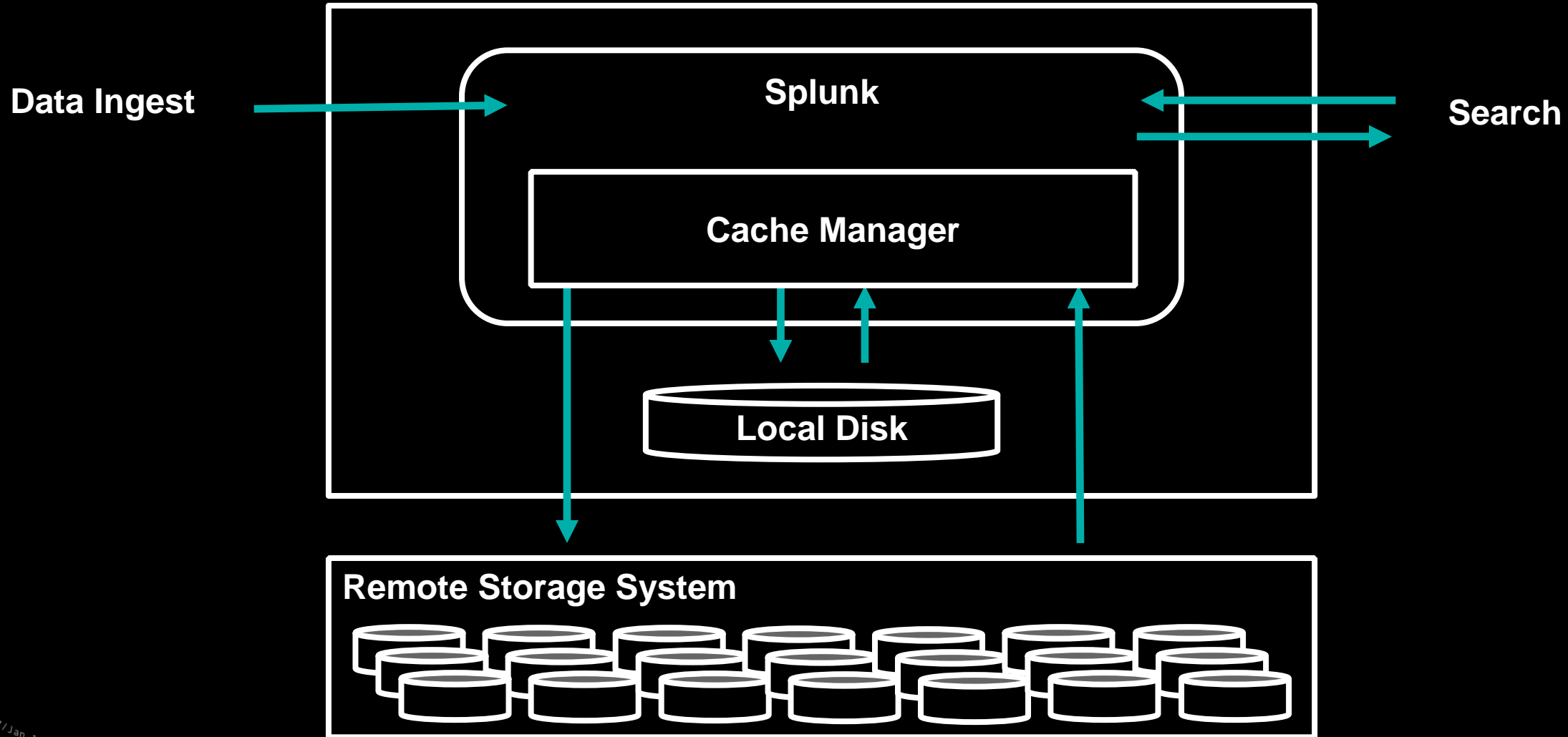
- Decouples Compute and Storage
- Stores data on Highly Available (HA) Elastic Remote Storage
- Caches data on Indexer's Disk Storage



## Benefits

- Independently scale Compute and Storage
  - Provision Indexers based on compute requirements
  - Scale Storage without additional Indexers
    - Lower operational complexity
    - HA Remote Storage cheaper compared to Indexer's Disk Storage

# How it works



# How it works

# Cache Manager

- Pulls data on-demand
- Relies on a reliable Remote Storage (such as Amazon S3)
  - High availability
  - High elasticity
- Is what makes SmartStore “smart”
- Works like magic 😊



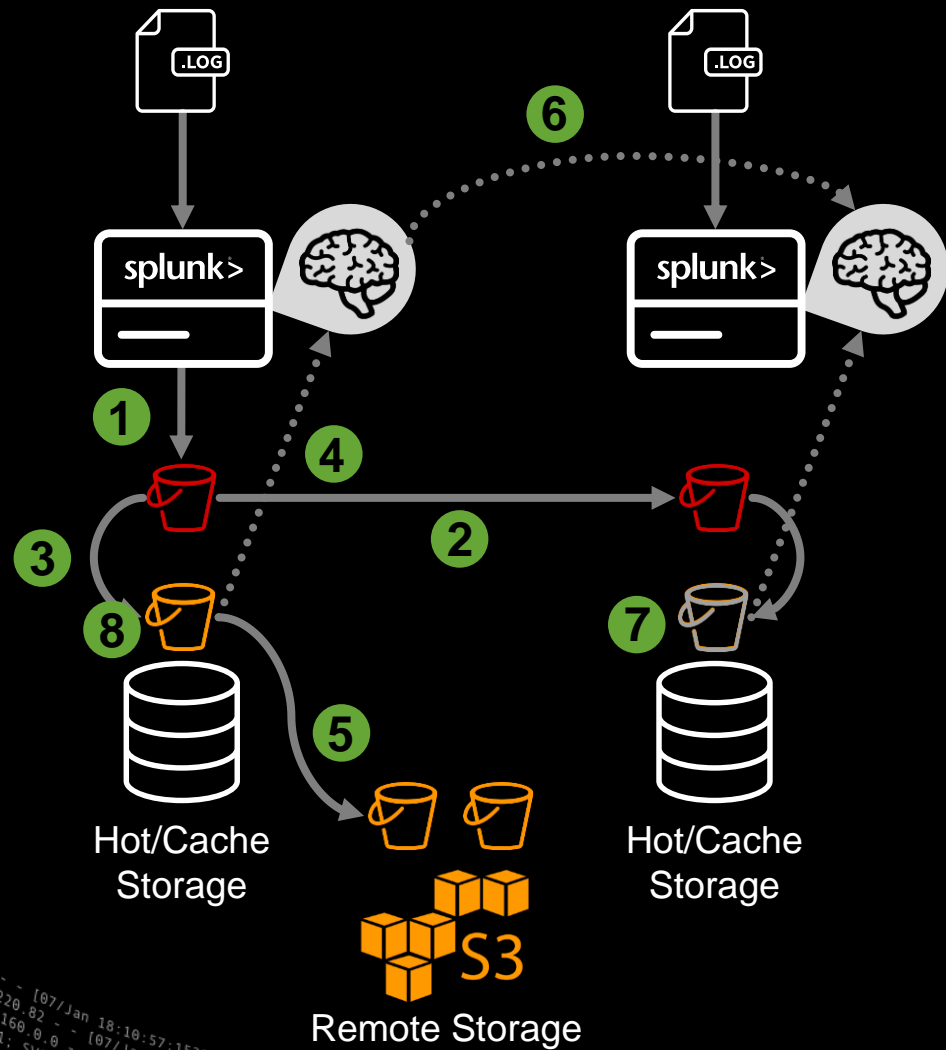
# How it works

## Cache Manager

- Majority of searches happen over recent data
- Majority of searches use same data
- Uses above observations to cache data efficiently

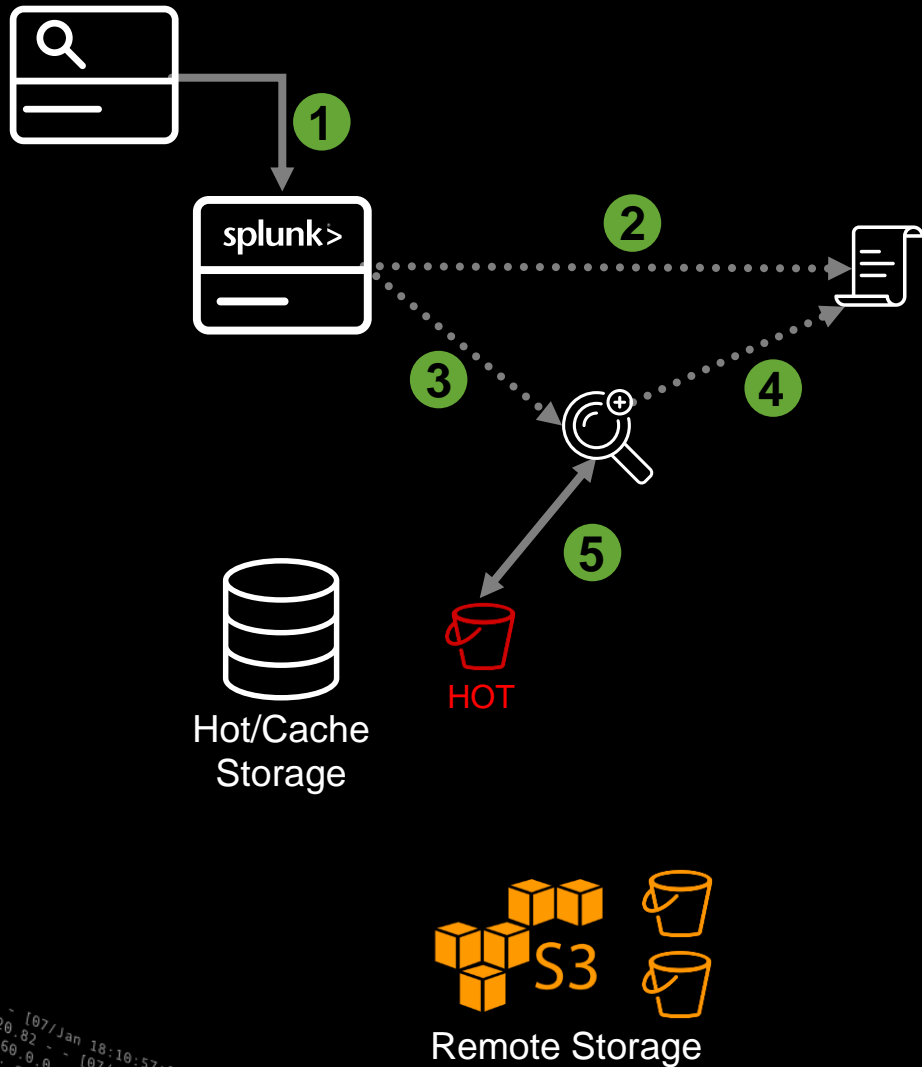
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317 27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5SL9FF1ADFF3 HTTP/1.1" 200 189 "GET /category.screen?category_id=FLOWERS&JSESSIONID=SD5SL8FF1ADFF3 HTTP/1.1" 200 1316 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=SD10SL8FF2ADFF9 HTTP/1.1" 200 2423 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-11&product_id=K9-CU-01" "Opera/9.80.20
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```

# Getting data In



1. Data is written to a hot bucket on source indexer
2. Hot bucket streamed to target indexer
3. Replication completes - buckets roll to warm
4. Buckets are registered with their cache managers
5. Cache manager on source uploads the bucket
6. Source notifies target about the upload
7. Target deletes local contents of the bucket
8. Local contents remain on the source until evicted

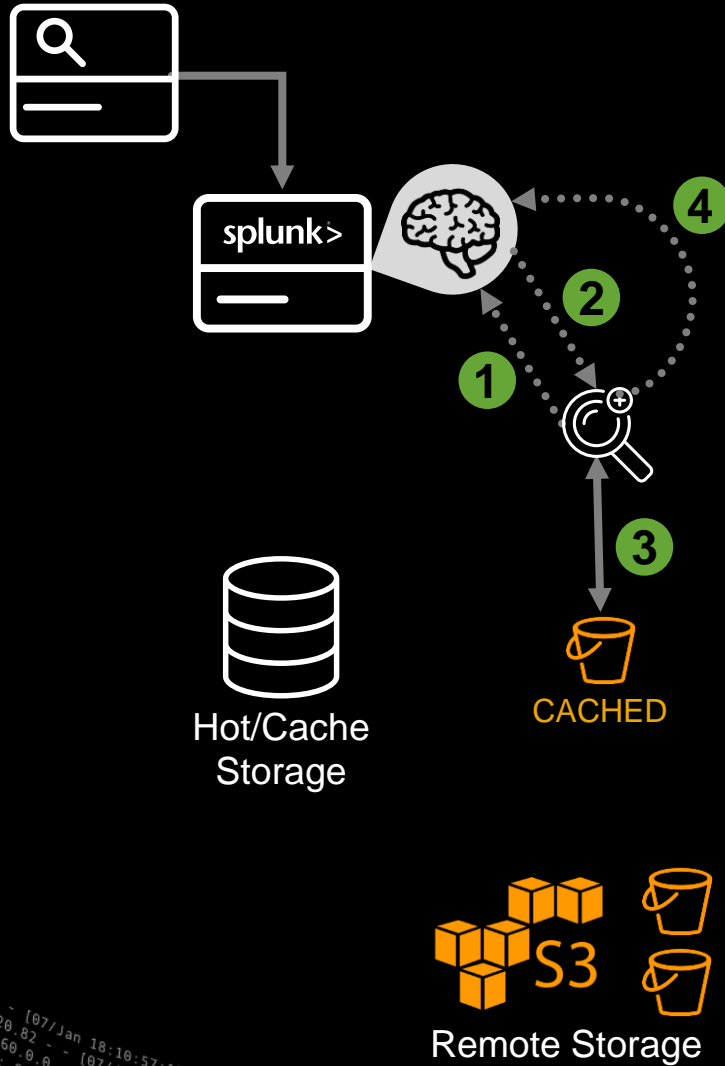
## Hot buckets



1. Search request is received
2. Indexer generates a list of relevant buckets to be searched
3. Search process is spawned
4. Spawned process reads the bucket list
5. Hot buckets are searched in the same manner as “classic” search

# Searching data

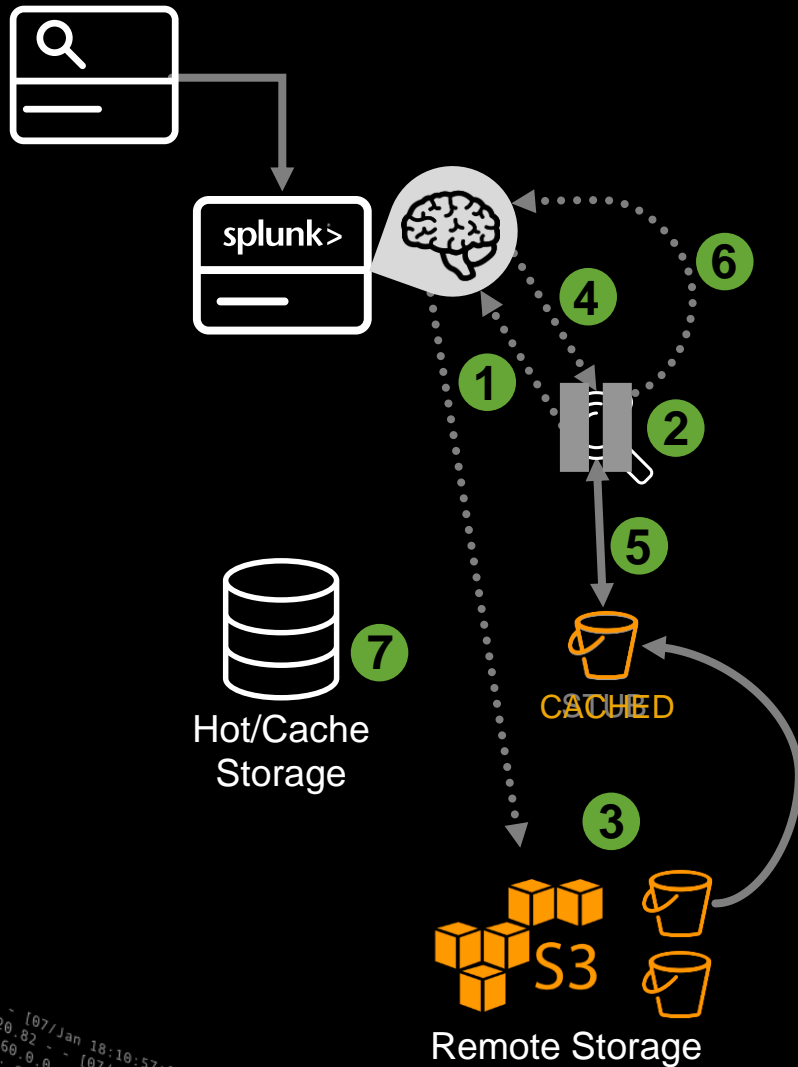
## Cached buckets



1. Search process requests Cache manager to open the bucket
2. Cache manager tells the search process that the bucket is local and available for search
3. Search process searches the bucket
4. Search process requests Cache manager to close the bucket

# Searching data

## Remote buckets



1. Search process requests Cache manager to open the bucket
2. Search process waits
3. Cache manager downloads the bucket from the remote storage
4. Cache manager tells the search process that the bucket is local
5. Search process searches the bucket
6. Search process requests Cache manager to close the bucket
7. Bucket remains in cache until evicted by the Cache manager

# Observations

- Majority of buckets are present on Remote Storage
- Entire bucket does not need to be replicated
- Bucket metadata replication is enough
- Indexer can download bucket contents on demand

splunk> .conf18

- # Observations
- Majority of buckets are present on Remote Storage
  - Entire bucket does not need to be replicated
  - Bucket metadata replication is enough
  - Indexer can download bucket contents on demand
- 
- The slide features a dark blue background with a faint world map centered behind the title. A large, light blue number '10' is positioned in the bottom right corner. The Splunk logo is located at the bottom left.



## Failed indexers < Replication factor

- Need to send entire data today
- Data is present on Remote Storage
- Bucket metadata is enough with Remote Storage
- Recovery is fast - 10000 buckets in 10 secs

## Failed indexers >= Replication factor

- Recovering data was not possible before today
- Always have access to data with Remote Storage
- Can rediscover and recover data

# ... and one last thing

## Bootstrapping

- Re-using data from one cluster on another was not possible before today
- Can point new cluster to same Remote Storage
- New cluster rediscovers data
- Super fast – 20000 buckets in a minute on a 4 node cluster

# Summary

- Enables scaling of storage independently
- Lower TCO
- Faster Cluster recovery time
- Better data resilience from node failures
- Seamless data introduction

```
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```

# Thank You

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in the **.conf18** mobile app

**.conf18**

**splunk>**