



Architecting Splunk For High Availability And Disaster Recovery

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About Me

- ▶ Principal Field Architect
- ▶ 6+ Years at Splunk
- ▶ Large scale deployments
- ▶ 8th .conf

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L9FF10ADFF3 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-SW-01"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L9FF10ADFF3 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/category.screen?category_id=GIFTS"
317.27.160.0 - - [07/Jan 18:10:57:153] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D55L7FF6ADFF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CW-01"
... [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L9FF10ADFF3 HTTP 1.1" 200 2423 "http://buttercup-shopping.com/product_id=K9-CW-01"
... [07/Jan 18:10:57:156] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D55L7FF6ADFF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CW-01"
... [07/Jan 18:10:57:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 468 125.17 14...srreen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CW-01"
... [07/Jan 18:10:57:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CW-01"
... [07/Jan 18:10:57:188] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CW-01"

Agenda

Disaster Recovery

Recover in the event of a disaster

High Availability

- Data Collection
- Indexing & Searching

Maintain an acceptable level of continuous service

Top Takeaways



Disaster Recovery (DR)

DR

What Is Disaster Recovery?

Set of processes necessary to ensure recovery of service after a disaster

```
130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D1SLAFF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03"
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ows NT 5.1; SV1; .NET CLR 1.1.4322) "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L7FF6ADFF0"
:/buttercup-shopping_id=RP-LI-02" 468 125.17 14.1.1.1:8080 "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268"
action=purchase&itemId=EST-268" 468 125.17 14.1.1.1:8080 "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-1"
http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-1" 468 125.17 14.1.1.1:8080 "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-1"
```

DR

Disaster Recovery Steps

1

Backup Necessary Data

Backup to a medium at least as resilient as source
Local Backup vs. Remote

2

Restore

Ensure this works
Backup is worthless without restore

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=SD1SLAFF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=SD355L7FF6ADFF0 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=KQ-CW-01"
10.5.1: SV1: - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=SD55L9FF1ADFF3"
10.55:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=HTTP 1.1" 200 3865 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-148"
10.55:189] "GET /category.screen?category_id=FLOWERS&JSESSIONID=HTTP 1.1" 200 3865 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-148"

DR

Backup

1

a

Configurations

`$SPLUNK_HOME/etc/*`

b

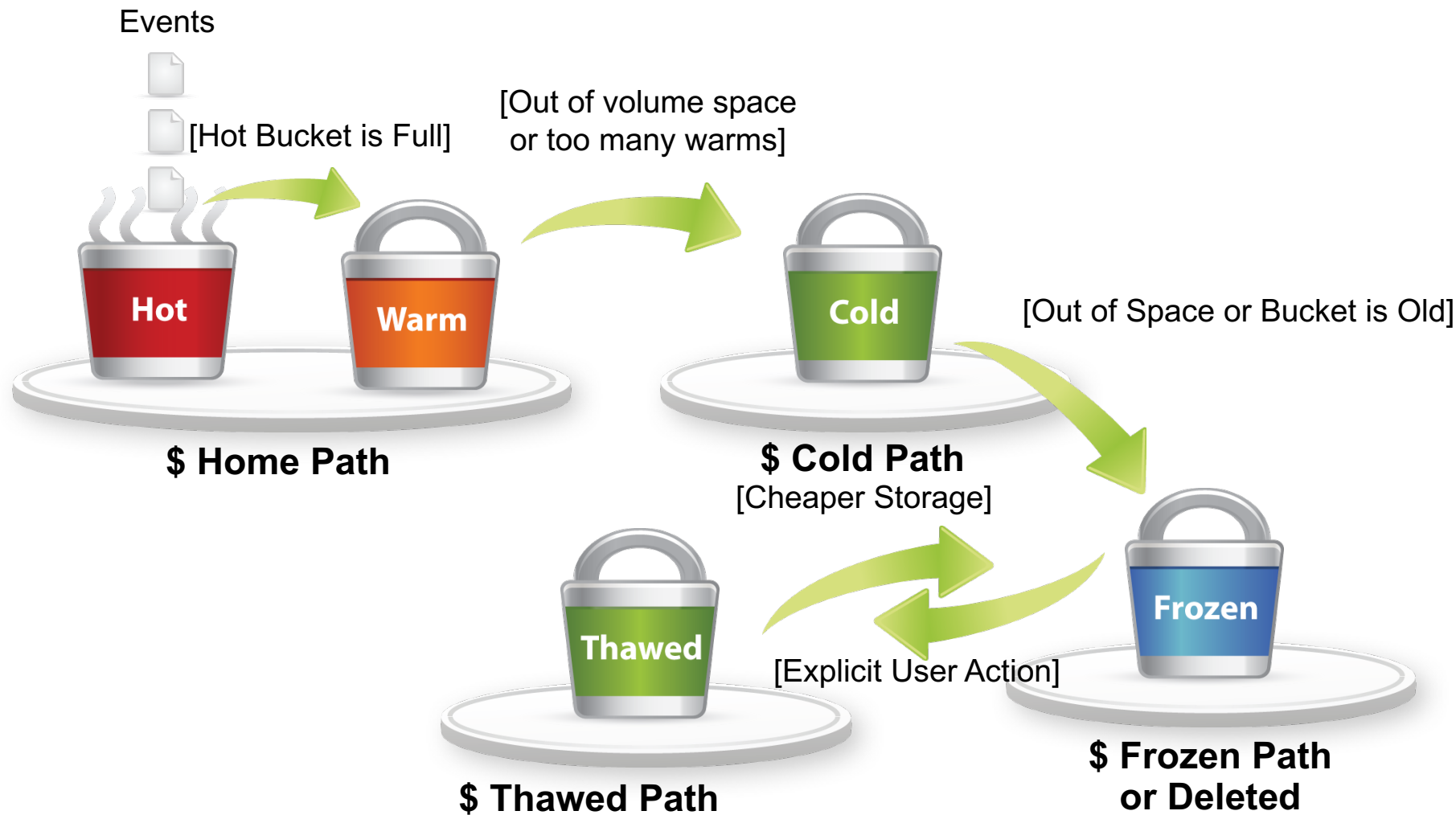
Indexes

Buckets: Hot*, Warm, Cold, Frozen

```
130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-SW-03" Mozillaz0  
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FF6ADFF0 HTTP 1.1" 404 3322 "http://shopping.com/cart.do?action=purchase&itemId=EST-268product_id=KQ-CW-01" Compz0  
317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L9FF1ADFF3" Compz0  
://buttercup-shopping.com/oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://shopping.com/cart.do?action=purchase&itemId=EST-268product_id=KQ-CW-01" Compz0  
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```


DR

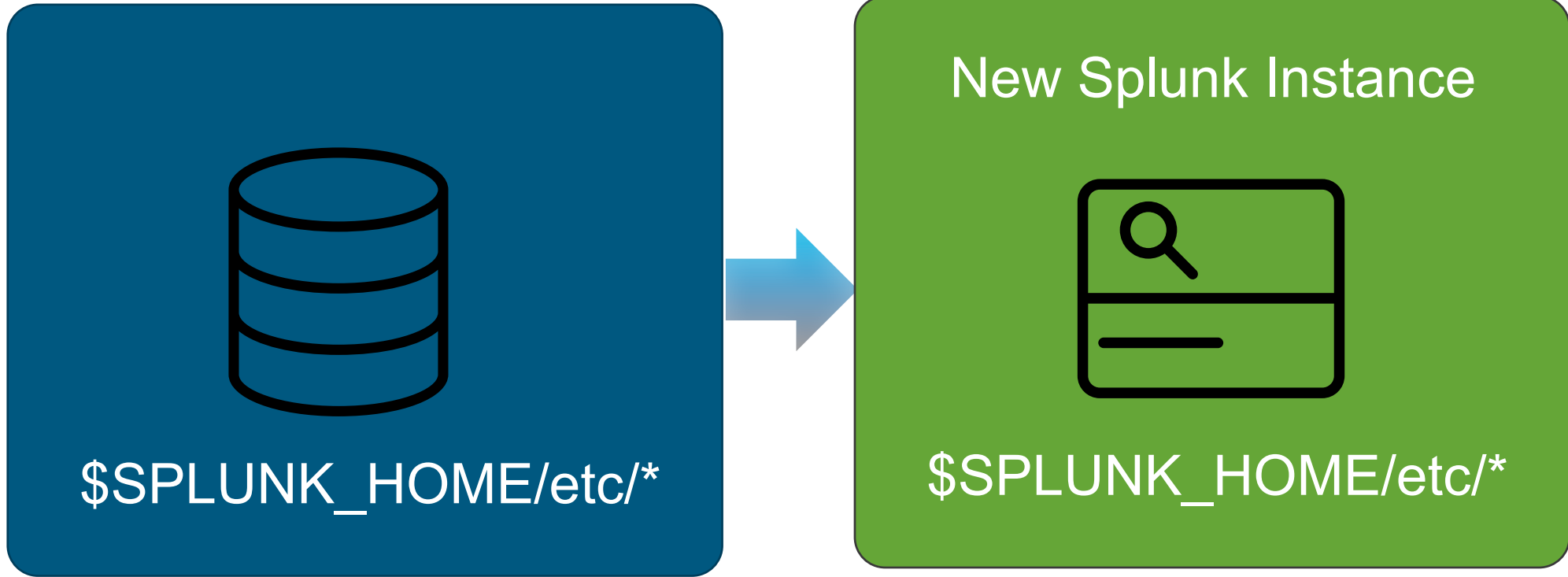
Backup: Bucket Lifecycle



130.60.4... [07/Jan 18:10:57:123] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15LAF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FF0ADFF0 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=KQ-CB-01"
317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55LFFADFF0 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
10... [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15LAF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03"
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DR

Restore Configurations



130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" "00000000-0000-0000-0000-000000000000"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=AV-CB-01&JSESSIONID=5D55L9FF1ADFF3" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" "00000000-0000-0000-0000-000000000000"
137.27.160.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L9FF1ADFF3" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" "00000000-0000-0000-0000-000000000000"
125.17.14.1 - - [07/Jan 18:10:56:189] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-1&product_id=AV-CB-01&JSESSIONID=5D55L9FF1ADFF3" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" "00000000-0000-0000-0000-000000000000"

DR

Backup Clustered Data

- ▶ **Option 1:** Backup all data on each node
 - Will also result in backups of duplicate data
- ▶ **Option 2:** Identify one copy of each bucket on the cluster and backup only those (requires scripting)
 - Decide whether or not you need to also backup index files

Bucket naming conventions

Non-clustered buckets: **db_<newest_time>_<oldest_time>_<localid>**

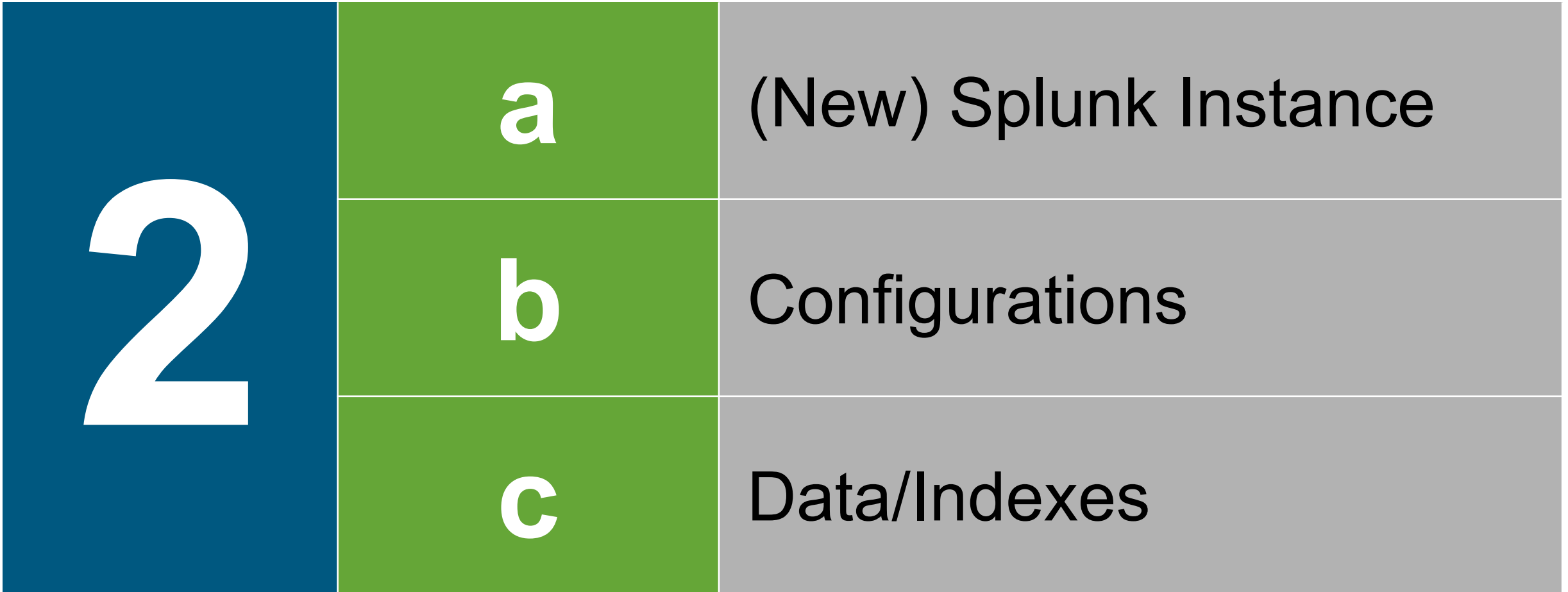
★ Clustered original bucket: **db_<newest_time>_<oldest_time>_<localid>_<guid>**

Clustered replicated bucket copies:

rb_<newest_time>_<oldest_time>_<localid>_<guid>

DR

Putting Restore Together



130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" 468 125.17 14.1.108

Other Elements In Your Environment

- ▶ Job Artifacts, DM, Collections etc.
- ▶ Utility/Management Instances:
 - Deployment Server
 - License Master
 - Cluster Master
 - Deployer

High Availability (HA)

HA

What Is High Availability?

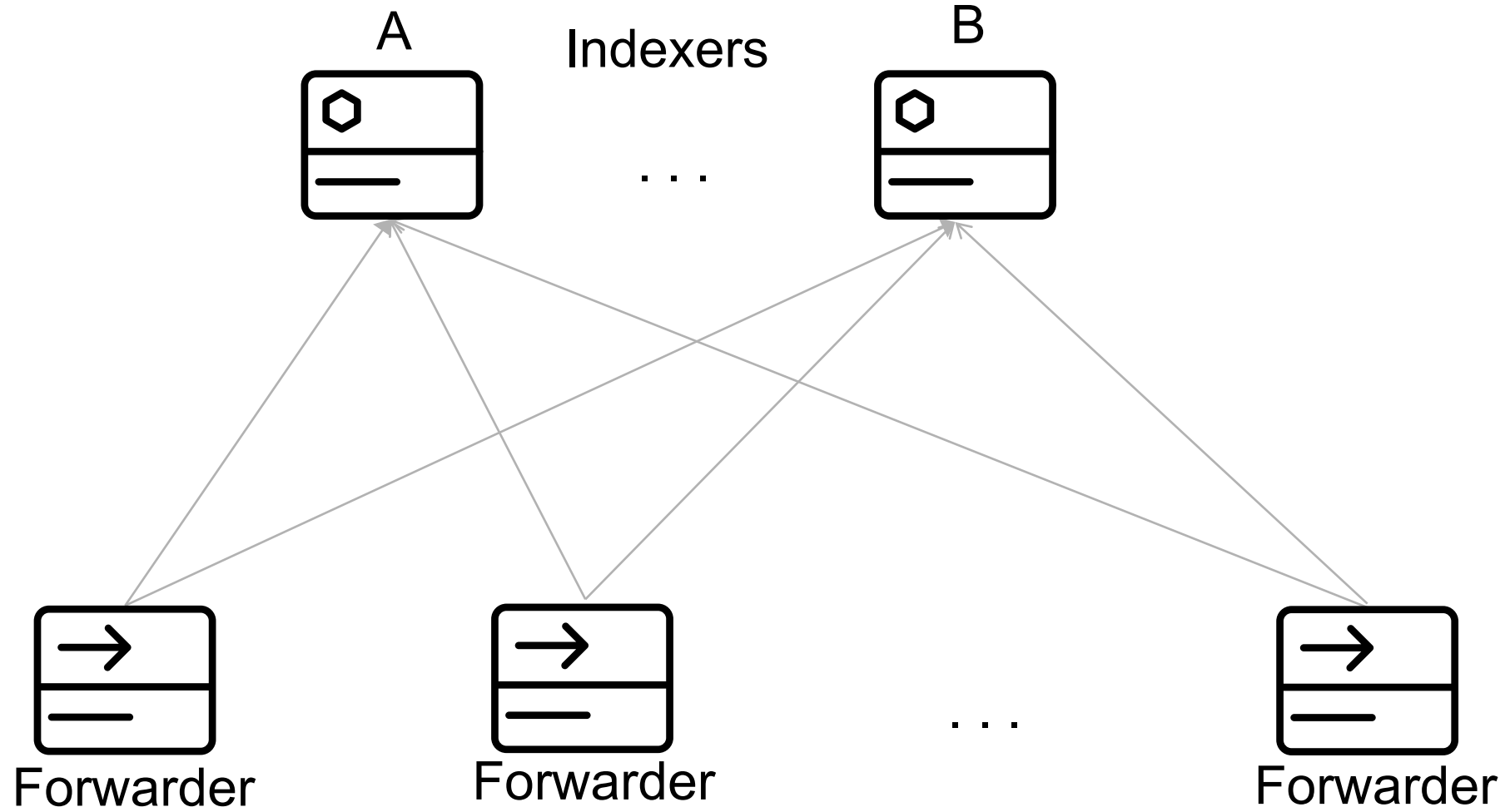
A design methodology whereby a system is continuously operational, bounded by a set of predetermined tolerances.

Note: “high availability” != “complete availability”

```
130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-01" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" 468 125.17 14.1.1
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FF6ADFF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 200 3855 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-1"
317 27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 200 3855 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-1"
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317 27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 200 3855 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-1"
```


HA

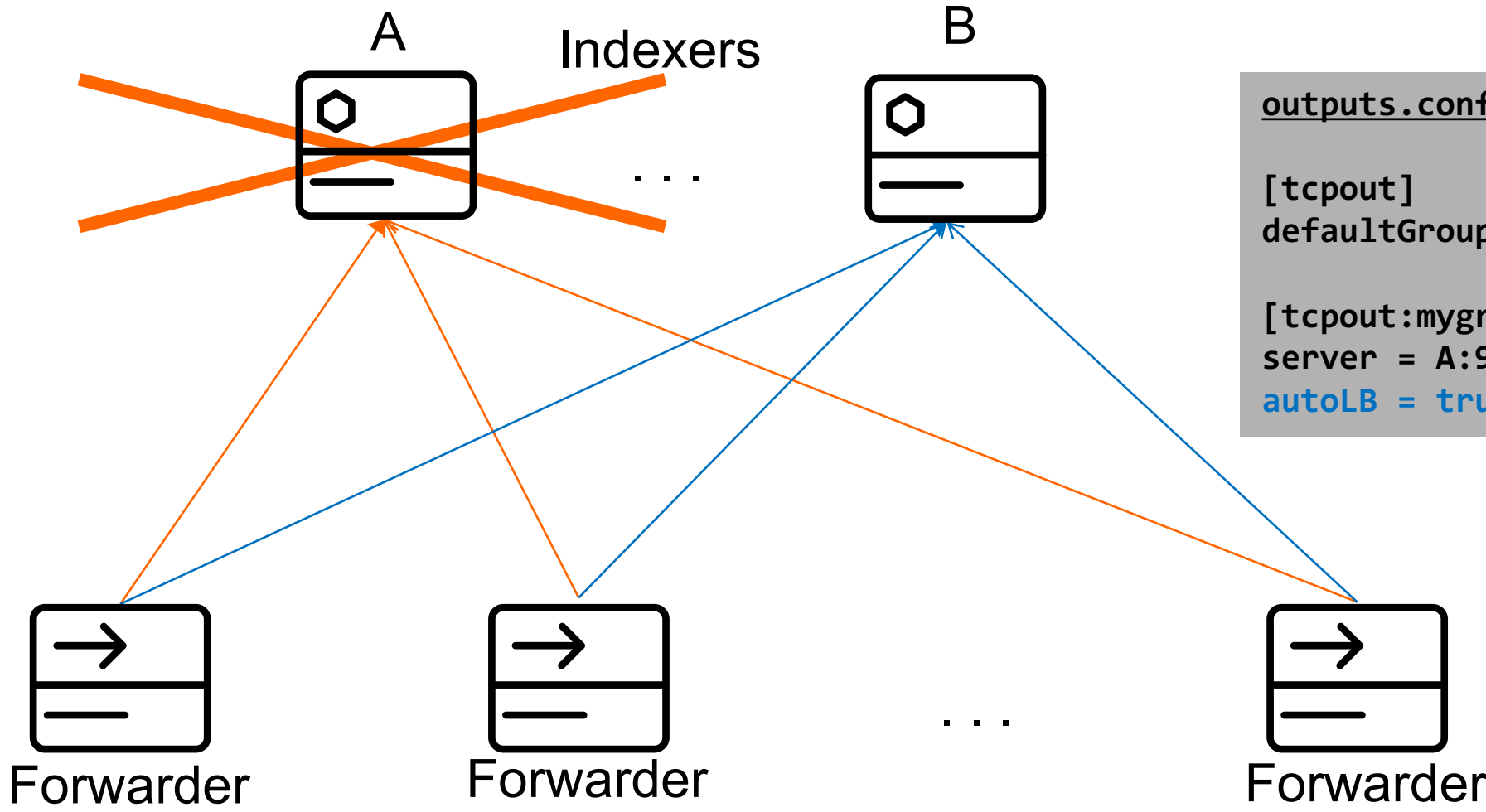
Data Collection



```
130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D1SLAFF10ADFF10 HTTP/1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-01" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" "0-0000000-20"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FF0ADFF0 HTTP/1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=KO-CW-01" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" "0-0000000-20"
137.27.160.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5$L9FF1ADFF3 HTTP/1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55LFF1ADFF3" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" "0-0000000-20"
125.17.14 - - [07/Jan 18:10:55:187] "GET /cart.do?action=remove&itemId=EST-14&product_id=FL-SW-01" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" "0-0000000-20"
125.17.14 - - [07/Jan 18:10:55:187] "GET /category.screen?category_id=SURPRISE&JSESSIONID=5D55L9FF1ADFF3 HTTP/1.1" 200 3865 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-14&product_id=FL-SW-01" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" "0-0000000-20"
```

HA

Data Collection



```

outputs.conf:

[tcput]
defaultGroup = mygroup

[tcput:mygroup]
server = A:9997, B:9997
autoLB = true
  
```

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03"
 128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=KQ-CW-01"
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HA

Searching



**Search Head Clustering
(SHC)**

**Search Head Pooling
(SHP)**

[Faded background text showing logs from a Buttercup Shopping website, including IP addresses, timestamps, and URLs]

HA

Searching

2

Search Head Clustering (SHC)

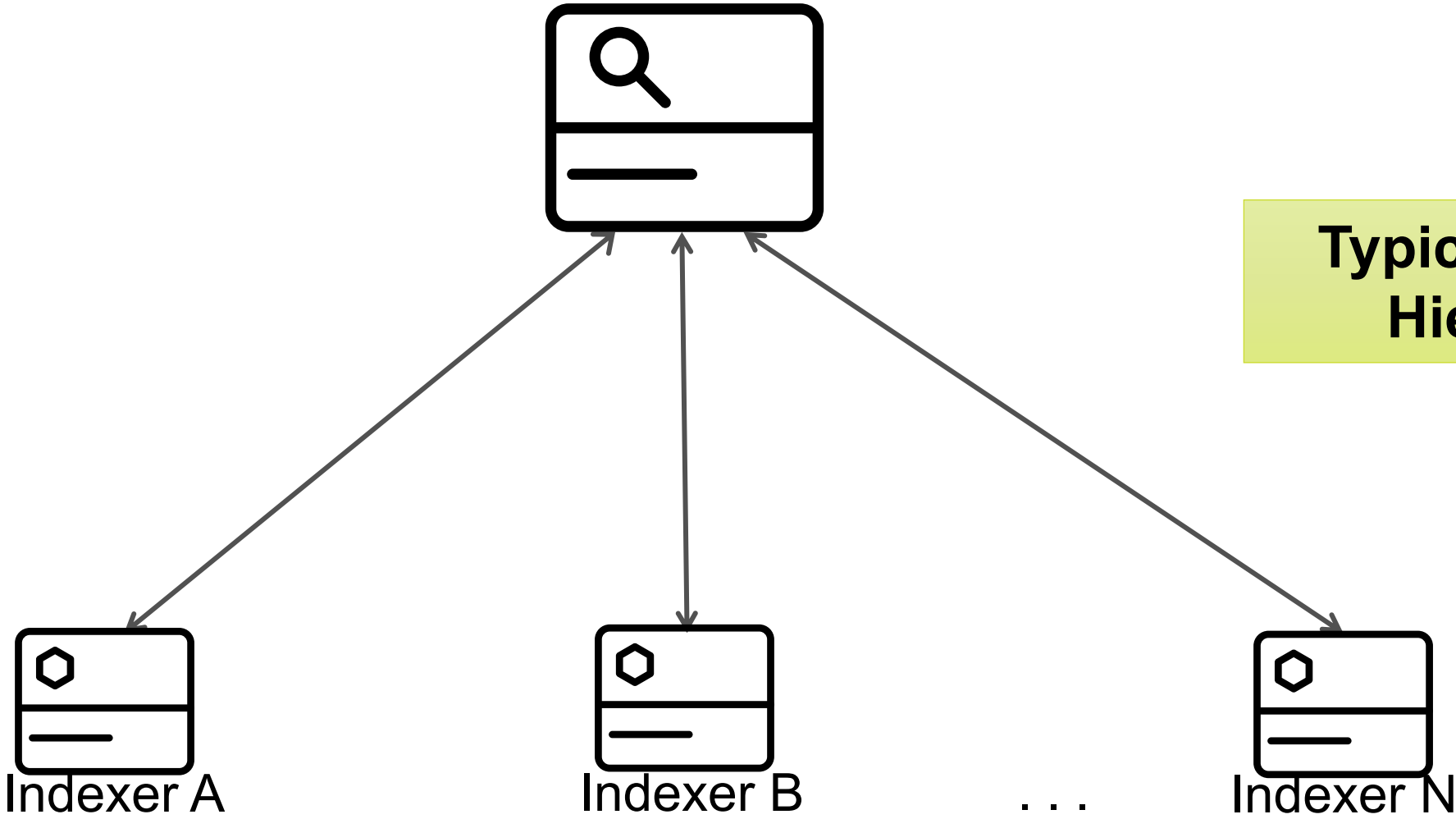
```

130.60.4 - - [07/Jan 18:10:57:123] "GET /category.screen?category_id=GIFTS&JSESSIONID=S01SLAFF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-SW-01" Mozill/2.0
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CJ-01" Mozilla/2.0
317.27.160.0.0 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CJ-01" Mozilla/2.0
130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=S01SLAFF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-SW-01" Mozilla/2.0
128.241.220.82 - - [07/Jan 18:10:57:153] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CJ-01" Mozilla/2.0
317.27.160.0.0 - - [07/Jan 18:10:57:153] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CJ-01" Mozilla/2.0
130.60.4 - - [07/Jan 18:10:58:022] "GET /oldlink?item_id=EST-26&JSESSIONID=S05SL9FF1ADFF3 HTTP 1.1" 468 125.17.14.1 "http://buttercup-shopping.com/c" Mozilla/2.0
128.241.220.82 - - [07/Jan 18:10:58:022] "GET /oldlink?item_id=EST-26&JSESSIONID=S05SL9FF1ADFF3 HTTP 1.1" 468 125.17.14.1 "http://buttercup-shopping.com/c" Mozilla/2.0
317.27.160.0.0 - - [07/Jan 18:10:58:022] "GET /oldlink?item_id=EST-26&JSESSIONID=S05SL9FF1ADFF3 HTTP 1.1" 468 125.17.14.1 "http://buttercup-shopping.com/c" Mozilla/2.0
130.60.4 - - [07/Jan 18:10:58:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" Mozilla/2.0
128.241.220.82 - - [07/Jan 18:10:58:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" Mozilla/2.0
317.27.160.0.0 - - [07/Jan 18:10:58:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" Mozilla/2.0
130.60.4 - - [07/Jan 18:10:58:198] "GET /category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" Mozilla/2.0
128.241.220.82 - - [07/Jan 18:10:58:198] "GET /category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" Mozilla/2.0
317.27.160.0.0 - - [07/Jan 18:10:58:198] "GET /category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=S05SL7FF6ADFF0 HTTP 1.1" Mozilla/2.0

```

HA

Searching



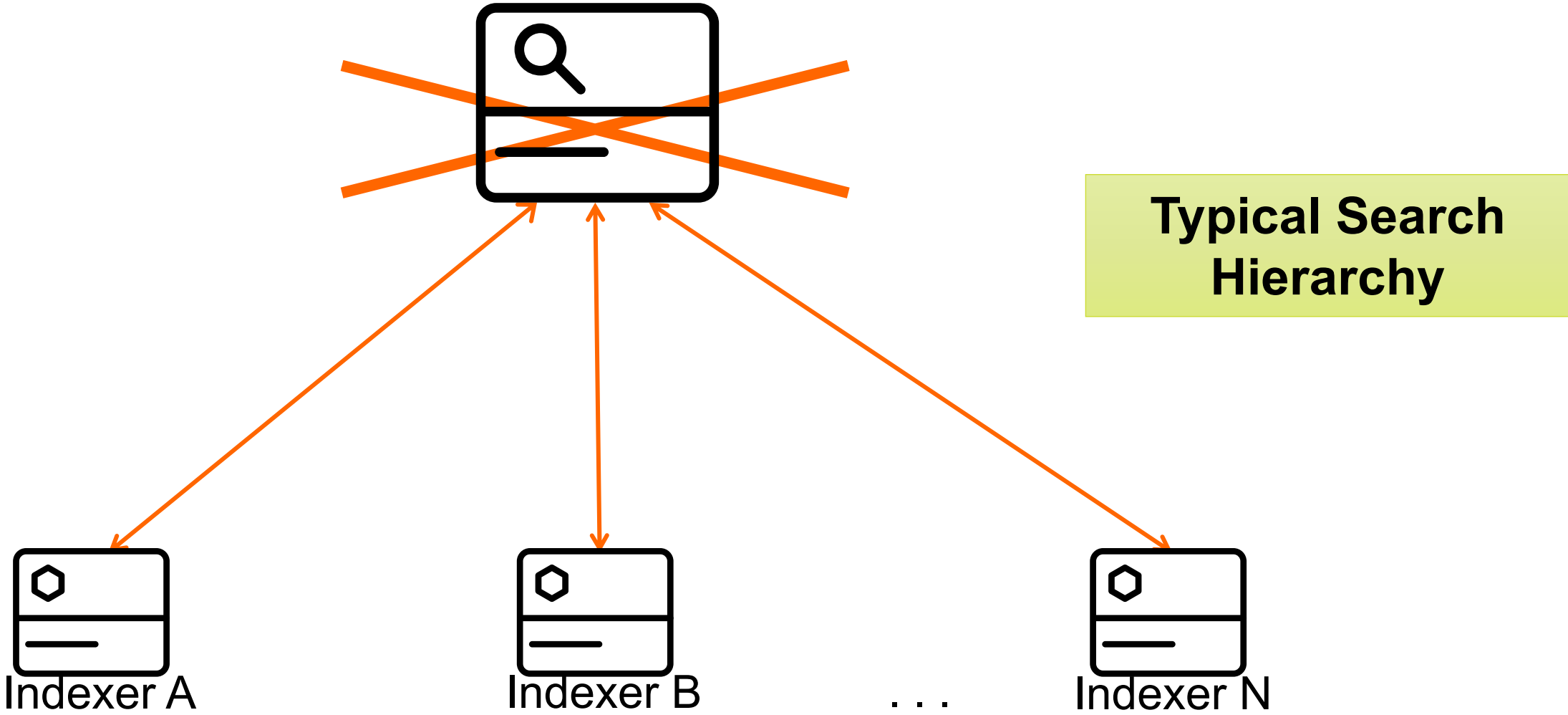
Typical Search Hierarchy

```

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=SD1SLAFF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-5W-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=SD35L7FF6ADFF0 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"
317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=SD55LFF6ADFF10"
10.0.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
10.0.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
10.0.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
10.0.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
10.0.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
10.0.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
10.0.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
  
```

HA

Searching



```

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D1SLAFF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FFGADFF9 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=KQ-CW-01"
1317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5SL9FFIADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
1317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5SL9FFIADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
1317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5SL9FFIADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
1317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5SL9FFIADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
1317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5SL9FFIADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
1317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5SL9FFIADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
1317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5SL9FFIADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"
1317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D5SL9FFIADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02"

```


HA

Search Head Pooling



NFS based Search Head Pooling has been **deprecated***

*still works and supported for current Splunk version but plan for its eventual removal.

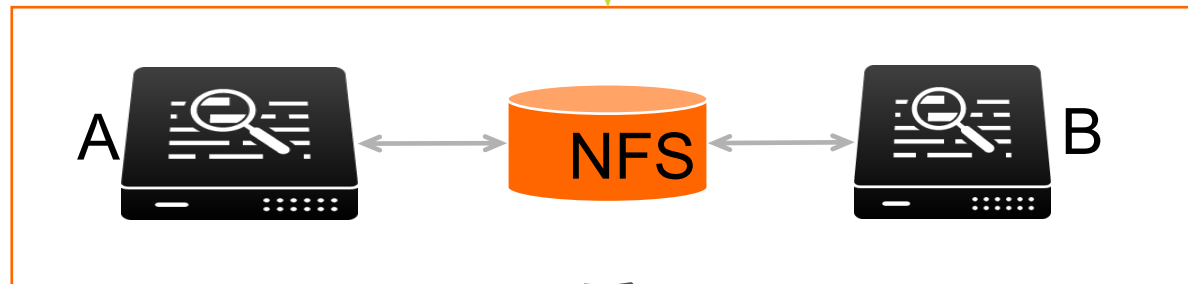
```

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L9FF1ADFF3 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D55L7FF6ADFF9 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/category.screen?category_id=GIFTS"
ows NT 5.1; SV1; .NET CLR 1.1.4322" 468 125.17 14 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L7FF6ADFF9"
itemId=EST-16&product_id=RP-LI-02" 0 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D15L9FF1ADFF3 HTTP 1.1" 200 3855 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=5D15L9FF1ADFF3"
do?action=purchase&itemId=EST-26&JSESSIONID=5D55L9FF1ADFF3" 200 1318 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L7FF6ADFF9"
http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=5D15L9FF1ADFF3" 200 3855 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=5D15L9FF1ADFF3"

```

HA

SHP



NFS used to sync:
SH Configurations
Job Artifacts
SH Schedulers



Indexer A



Indexer B

...

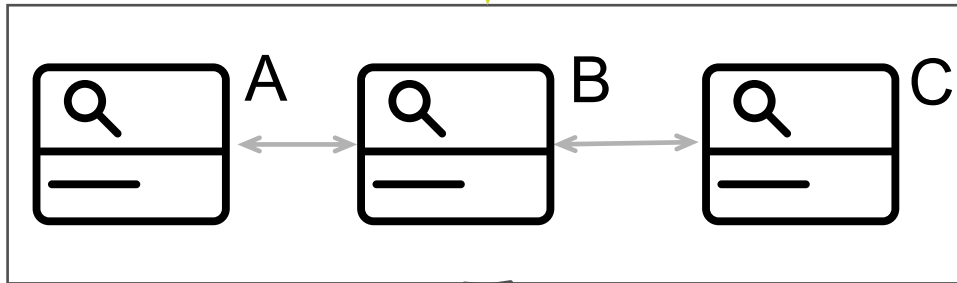


Indexer N



HA

SHC



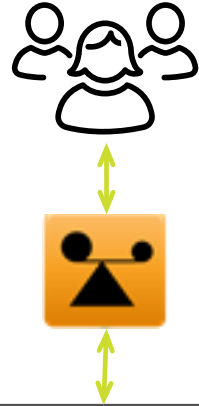
Replication **protocol** syncs:

- Configurations
- Job Artifacts

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-5W-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"
192.168.1.100 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"
192.168.1.100 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"
192.168.1.100 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"
192.168.1.100 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"
192.168.1.100 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"
192.168.1.100 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"
192.168.1.100 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"
192.168.1.100 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5\$L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=KQ-CW-01"

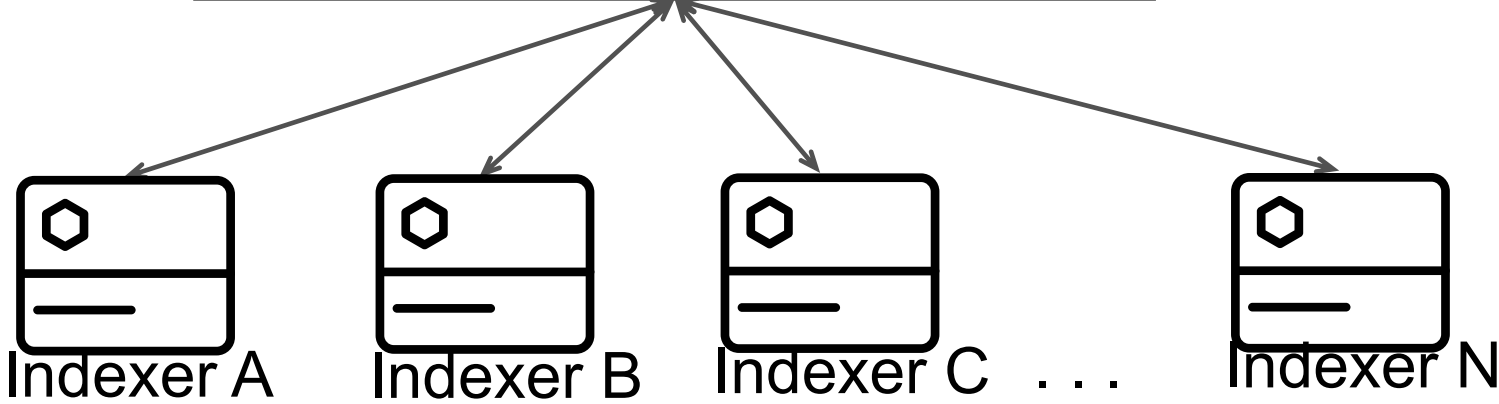
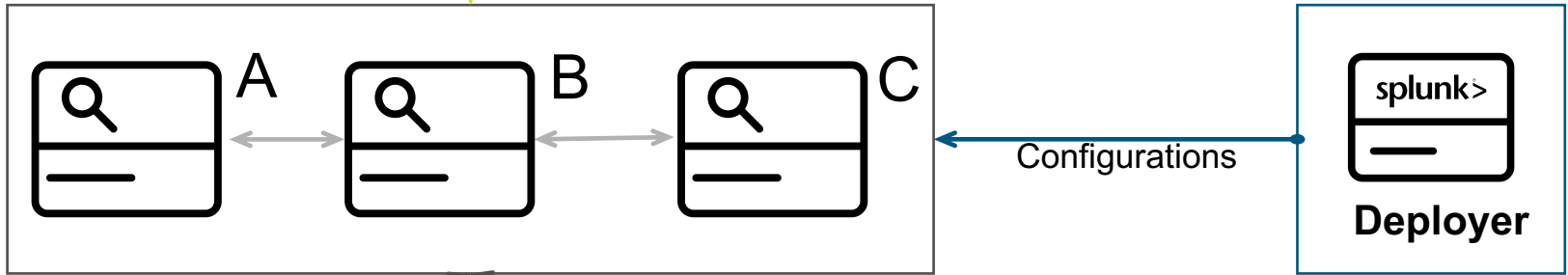
HA

SHC



Replication **protocol** syncs:

- Configurations
- Job Artifacts



```
130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1"
317.27.160.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
125.17.14 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
125.17.14 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
125.17.14 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
125.17.14 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
125.17.14 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
125.17.14 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
125.17.14 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
125.17.14 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5$L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-6&product_id=FI-SW-03"
```


HA

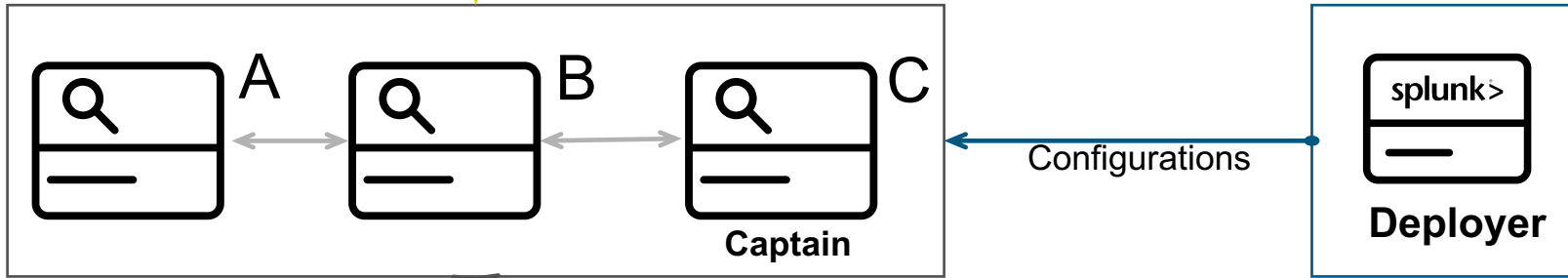
SHC



Replication **protocol**

syncs:

- Configurations
- Job Artifacts



Captain plays a special role in cluster orchestration and job scheduling

130.60.4 ... [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=SD1SLAFF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-5W-03"
128.241.220.82 ... [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=SD35L7FF6ADFF0 HTTP 1.1" 404 322 "http://shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CW-01"
317 27.160.0.0 ... [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5SL9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=SD55LFF6ADFF0"
... [07/Jan 18:10:57:153] "GET /category.screen?category_id=FLOWERS&JSESSIONID=SD18SL9FF2ADFF9 HTTP 1.1" 200 3885 "http://shopping.com/cart.do?action=remove&itemId=EST-108"
... [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5SL9FF1ADFF3 HTTP 1.1" 200 1318 "http://shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=SD55LFF6ADFF0"
... [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5SL9FF1ADFF3 HTTP 1.1" 200 1318 "http://shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=SD55LFF6ADFF0"

HA

SHC Operation – High Level

- ▶ Deployer ensures all SHC members have identical baseline configurations
 - Subsequent UI changes propagated using an internal replication mechanism
- ▶ Job Scheduler gets disabled on all members but the Captain
- ▶ Captain selects members to **run scheduled jobs based on load**
 - Selection based on load statistics
 - Captain orchestrates job artifact replication to selected members/candidates of the cluster
- ▶ Transparent job artifact proxying (and eventual replication) if artifact not present on user's SH

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130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15LAF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-5W-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FF6ADFF0 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CU-01"
317.27.160.0.0 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15LAF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-5W-03"
ows NT 5.1; SV1; .NET CLR 1.1.4322)" 468 125.17 14 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CU-01"
itemId=EST-268product_id=K0-CU-01" 200 2423 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CU-01"
:/buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CU-01" 200 2423 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CU-01"
action=purchase&itemId=EST-268product_id=K0-CU-01" 200 2423 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CU-01"
/buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CU-01" 200 2423 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CU-01"

```


HA

SHC Operation – High Level

- ▶ Majority requirement and failure handling
 - Surviving majority ($\geq 51\%$)
- ▶ Site-awareness gotchas
 - No notion of **site** in SHC (unlike in index replication)
 - Case for static captain election
- ▶ Latency and number of nodes

```

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D55L7FF6ADFF0 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/category.screen?category_id=GIFTS"
ows NT 5.1; SV1; .NET CLR 1.1.4322" 468 125.17 14.189] "GET /category.screen?category_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=KQ-CU-01"
:/buttercup-shopping_id=RP-LI-02" 404 125.17 14.189] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1"
do?action=purchase&itemId=EST-26&product_id=KQ-CU-01" 404 125.17 14.189] "GET /category.screen?category_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=KQ-CU-01"

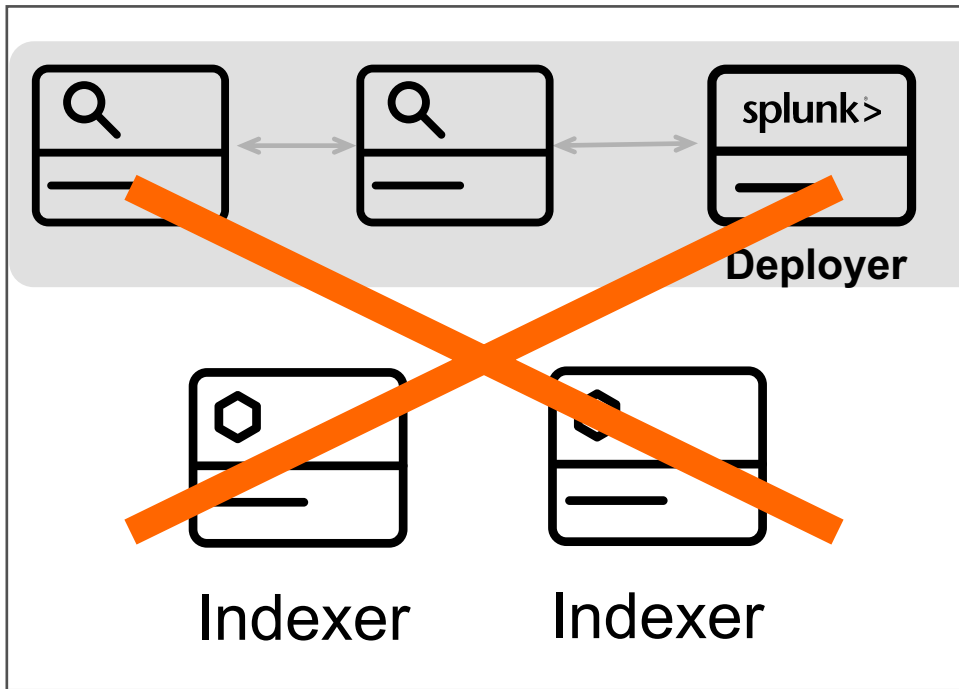
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HA

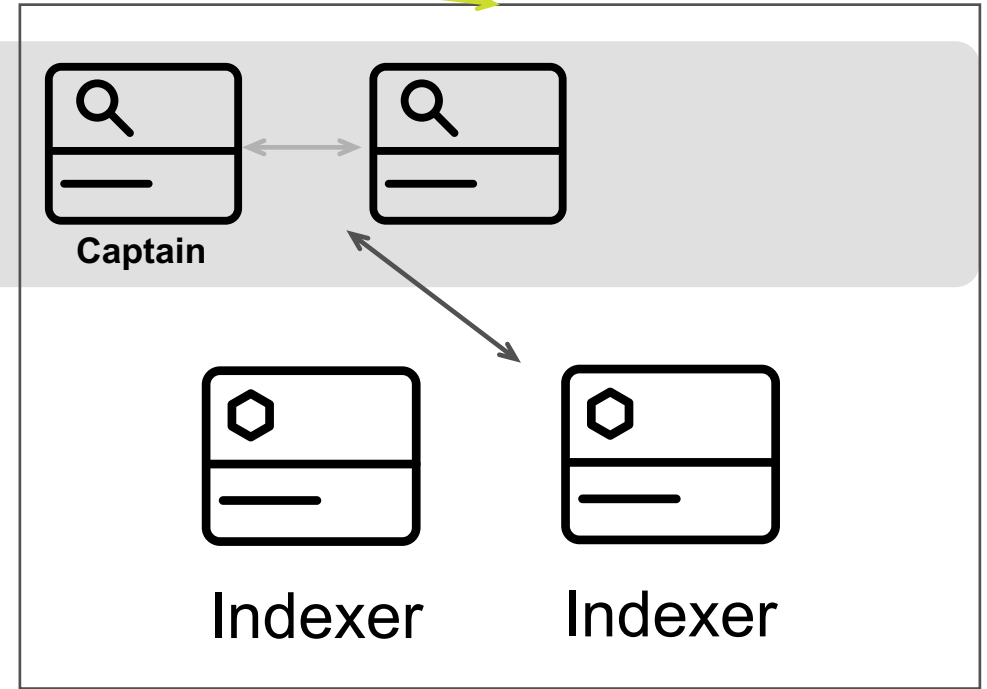
Stretched SHC



Captain must be statically elected as there is no SHC majority



Site A



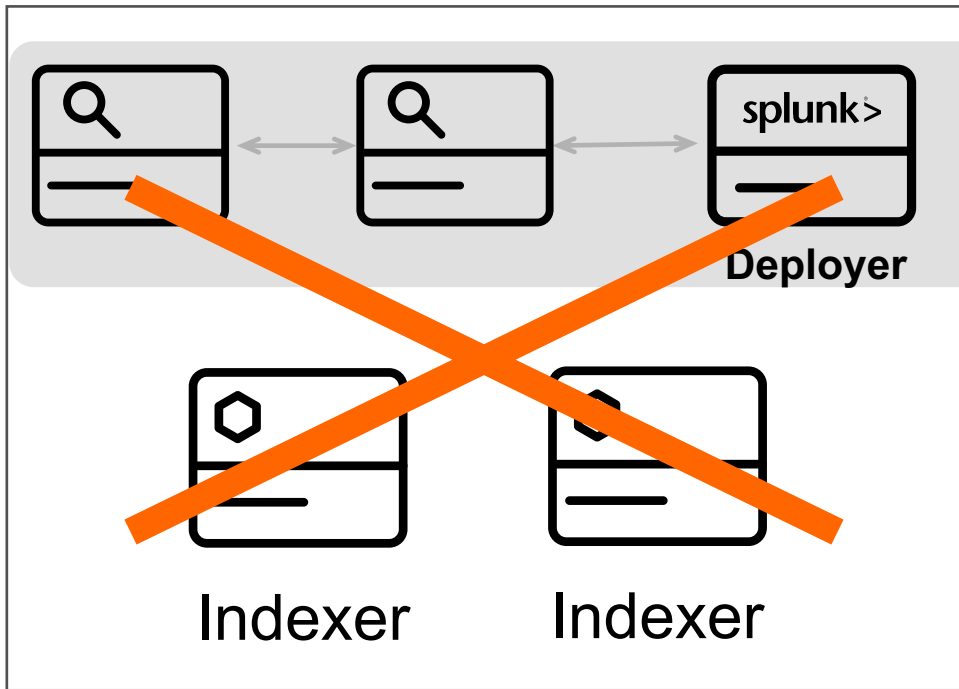
Site B

HA

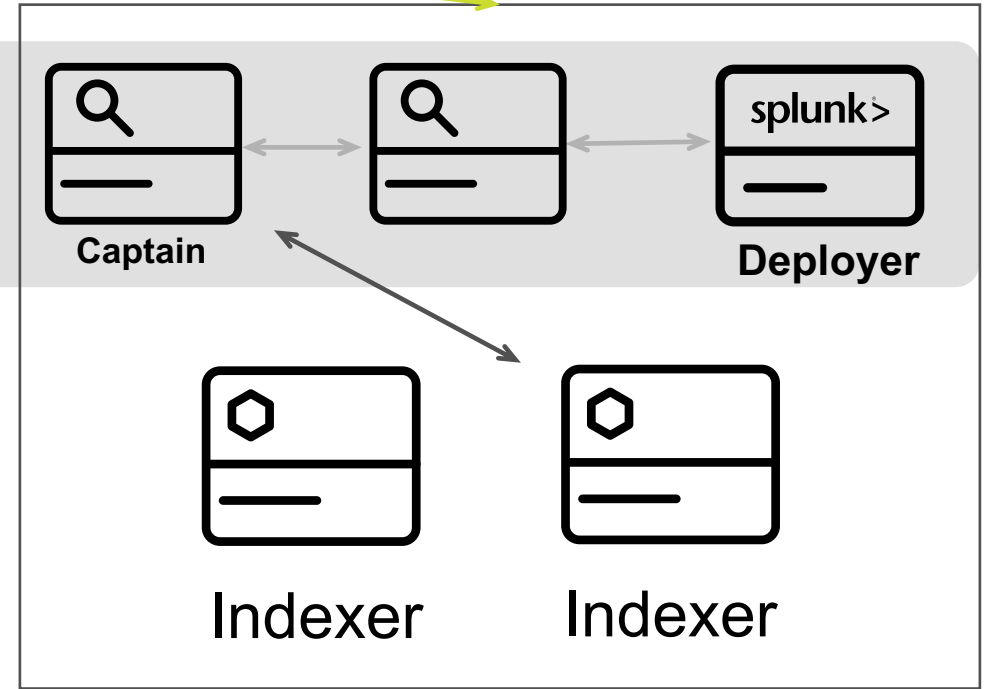
Stretched SHC



Deployer launched in second site, if SCH updates required



Site A



Site B

HA

Deploying SHC

- ▶ Same SH version and high speed network (LAN)
 - More storage required vs. stand-alone SHs. Linux/Solaris only
- ▶ Needs LB and a Deployer instance (DS or MN can also be used to fulfill this role)
- ▶ Select RF per your HA/DR requirements
- ▶ Configure Deployer first with a secret key
- ▶ Initialize each instance, point them to Deployer, then bootstrap **one** of them to become the cluster captain
- ▶ More details on Splunk Docs

HA

Index Replication

- ▶ **Cluster** = a group of search peers (indexers) that replicate each others' buckets
- ▶ **Data Availability**
 - Availability for ingestion and searching
- ▶ **Data Fidelity**
 - Forwarder Acknowledgement, assurance
- ▶ **Disaster Recovery**
 - Site awareness
- ▶ **Search Affinity**
 - Local search preference vs. remote

Trade offs

- Extra storage
- Slightly increased processing load

HA

Cluster Components

▶ Master Node

- Orchestrates replication/remedial process. Informs the SH where to find searchable data. Helps manage peer configurations

▶ Peer Nodes

- Receive and index data. Replicate data to/from other peers. Peer Nodes Number \geq RF

▶ Search Head(s)

- **Must** use one to search across the cluster

▶ Forwarders

- Use with auto-lb and indexer acknowledgement

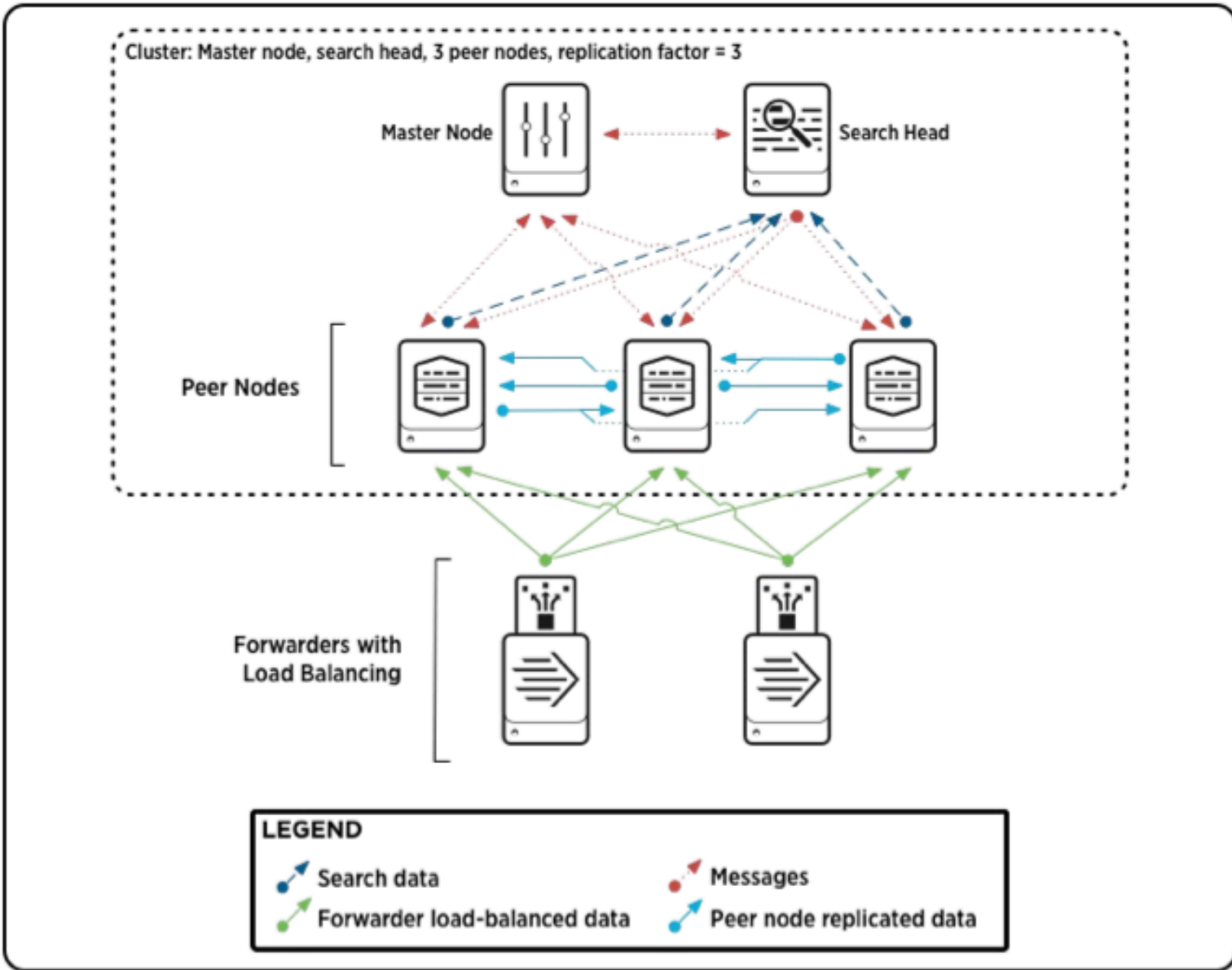
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128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&SESSIONID=5D55L7FF6ADFF0 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=KQ-CU-01"
ows NT 5.1; SV: .NET CLR 1.1.4322" 468 125.17 14.111.111.111 "GET /oldlink?item_id=EST-26&SESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&SESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-16&product_id=RP-LI-02"
doaction=purchase&itemId=EST-16&product_id=RP-LI-02" 404 125.17 14.111.111.111 "GET /category.screen?category_id=FLOWERS&SESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-16&product_id=RP-LI-02"
opping.com/cart.do?action=purchase&itemId=EST-16&product_id=RP-LI-02" 404 125.17 14.111.111.111 "GET /category.screen?category_id=FLOWERS&SESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-16&product_id=RP-LI-02"

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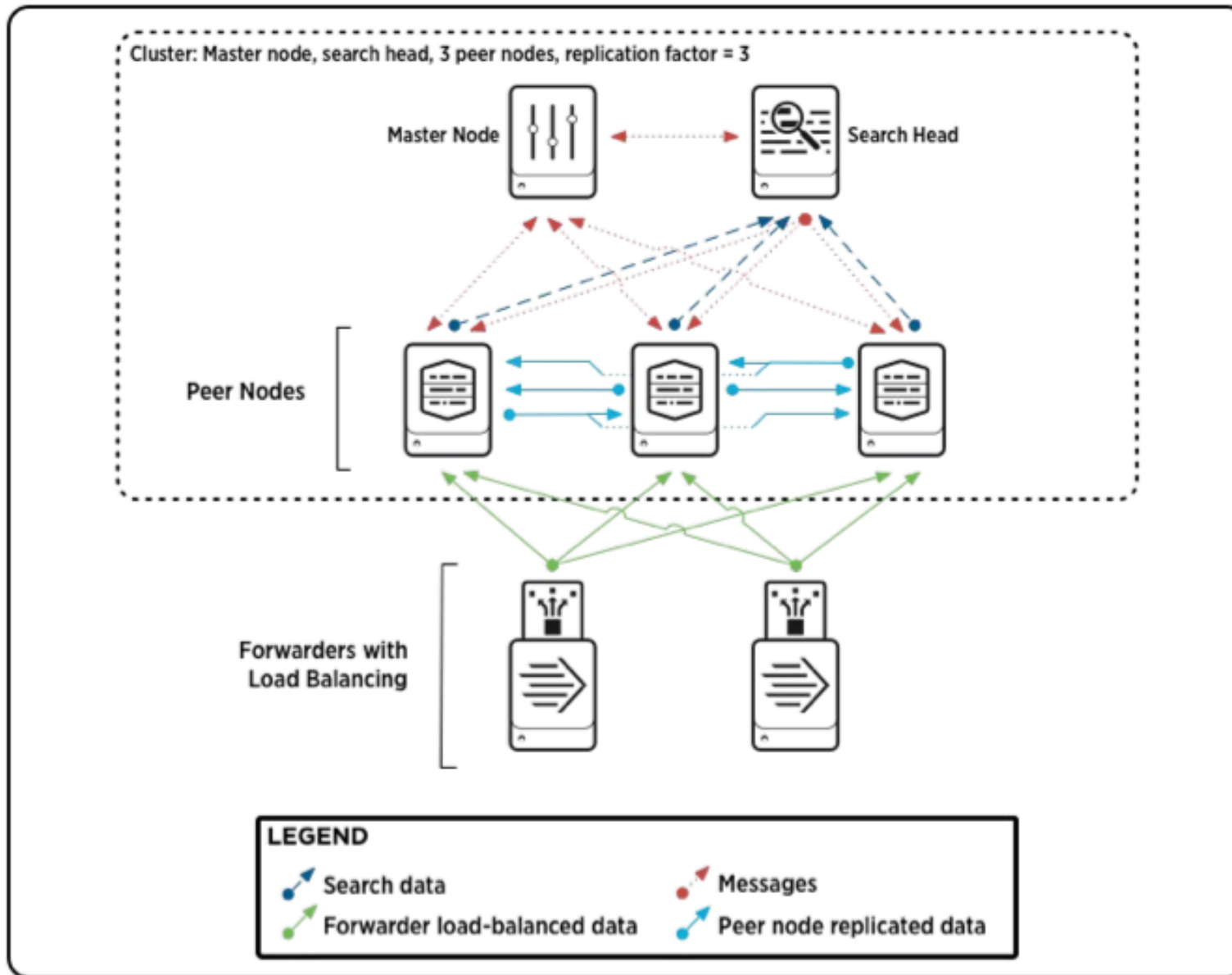

HA

Single Site Cluster Architecture



Credit: Splunk Docs Team

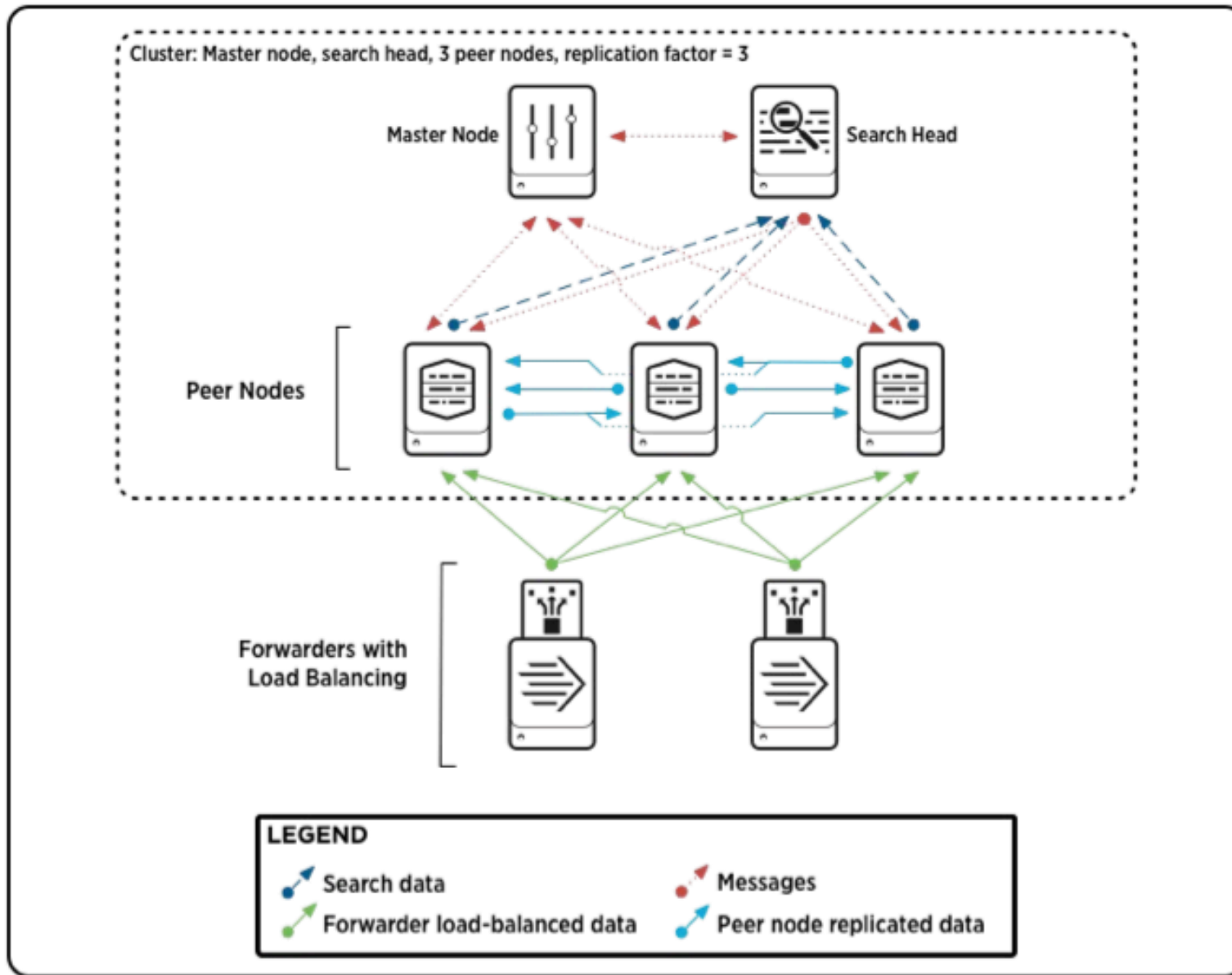
130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-5W-01" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" 468 125.17 14
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D55L7FF6ADFF9 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CW-01" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" 468 125.17 14
317 27.160.0.0 - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 2423 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268&product_id=K9-CW-01" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" 468 125.17 14
10 - - [07/Jan 18:10:57:189] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-14" "Mozilla/5.0 (Windows NT 5.1; SV1; .NET CLR 1.1.4322)" 468 125.17 14



Replication Factor (RF)

- ▶ Number of copies of data in the cluster. Default **RF=3**
- ▶ Cluster can tolerate **RF-1** node failures

Credit: Splunk Docs Team



Search Factor (SF)

- ▶ Number of copies of data in the cluster. Default **SF=2**
- ▶ Requires more storage
- ▶ Replicated vs. Searchable Bucket

Credit: Splunk Docs Team

HA

Clustered Searching

- ▶ Search head coordinates all searches in the cluster
- ▶ SH relies on master to tell it who its peers are.
 - The master keeps track of which peers have searchable data
- ▶ Only **one** replicated bucket is searchable a.k.a. **primary**
 - i.e., searches occur over **primary** buckets, only
- ▶ Primary buckets may change over time
 - Peers know their status and therefore know where to search

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L4FF10ADF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-01" "Mozilla/5.0 (Macintosh; Intel Mac OS X 11_0_0) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.102 Safari/537.36

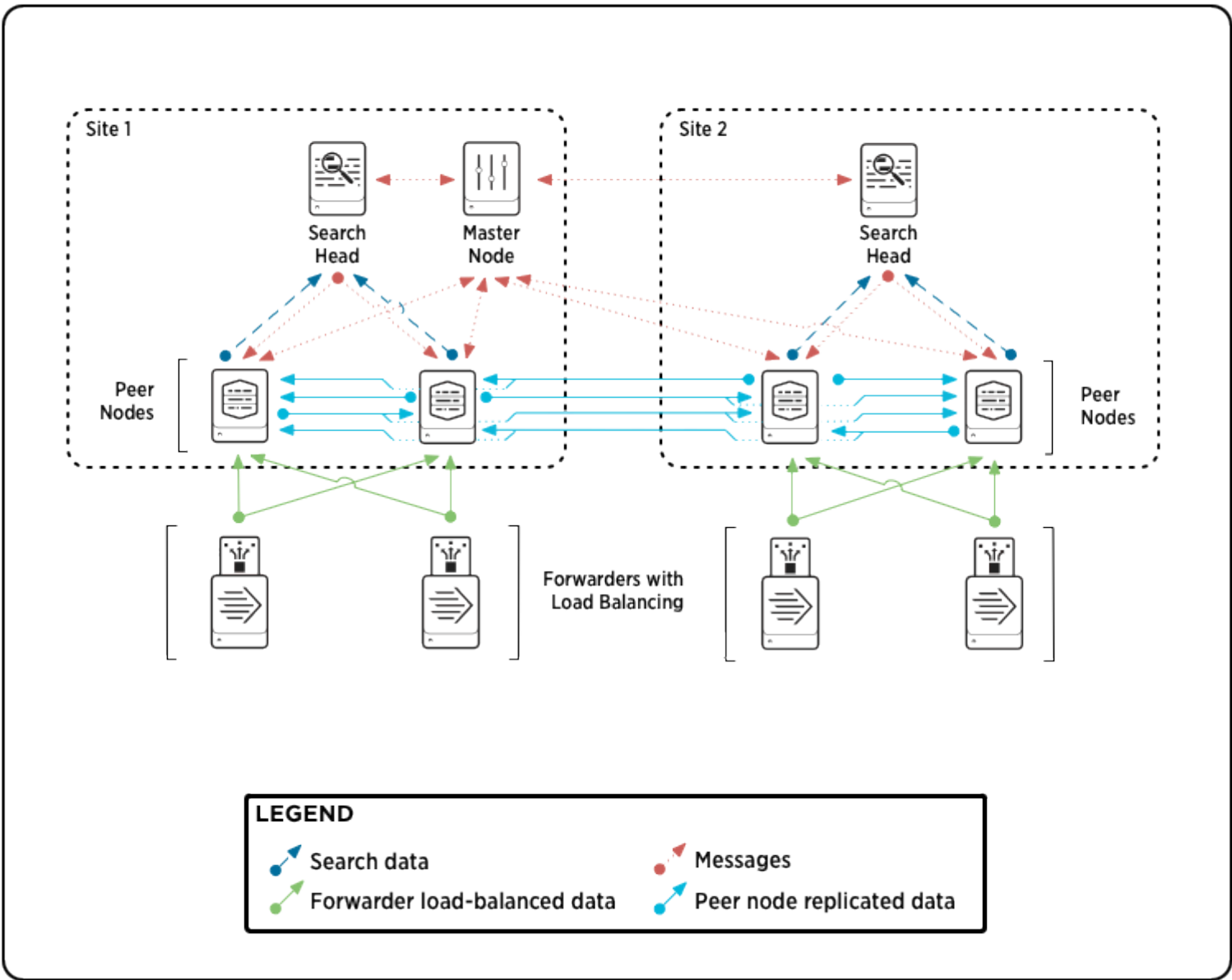
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109.228.254.16 - - [07/Jan 18:10:57:156] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D55L7FF6ADF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L7FF6ADF0 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=LI-02" "Mozilla/5.0 (Macintosh; Intel Mac OS X 11_0_0) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.102 Safari/537.36

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109.228.254.16 - - [07/Jan 18:10:57:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADF3 HTTP 1.1" 404 1189 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=LI-02" "Mozilla/5.0 (Macintosh; Intel Mac OS X 11_0_0) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.102 Safari/537.36

109.228.254.16 - - [07/Jan 18:10:57:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADF3 HTTP 1.1" 200 1189 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L7FF6ADF0 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=LI-02" "Mozilla/5.0 (Macintosh; Intel Mac OS X 11_0_0) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/70.0.3538.102 Safari/537.36



Multi Site Cluster Architecture

Differences vs Single site

- ▶ Assign a site to each node
- ▶ Specify RF and SF on a site by site basis

Credit: Splunk Docs Team

Multisite Clustering Cont'd

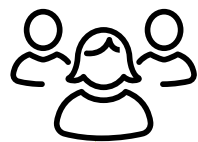
- ▶ Each node belongs to an assigned site, except for the Master Node, which controls all sites but it's not **logically** a member of any
- ▶ Replication of bucket copies occurs in a site-aware manner.
 - Multisite replication determines # copies on each site. Ex. 3 site cluster:
site_replication_factor = origin:2, site1:1, site2:1, site3:1, total:4
- ▶ Bucket-fixing activities respect site boundaries when applicable
- ▶ Searches are fulfilled by local peers whenever possible (a.k.a **search affinity**)
 - Each site must have at least a full set of searchable data

```

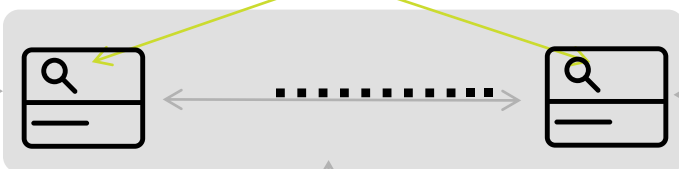
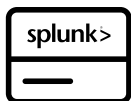
130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-5W-03"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FF6ADFF0 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=K0-CU-01"
ows NT 5.1; SV: - - [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L9FF1ADFF3"
:/buttercup-shopping_id=RP-LI-02" 468 125.17 14 - - [07/Jan 18:10:55:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 3885 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-14&product_id=K0-CU-01"
http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-14&product_id=K0-CU-01"

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Putting It Together



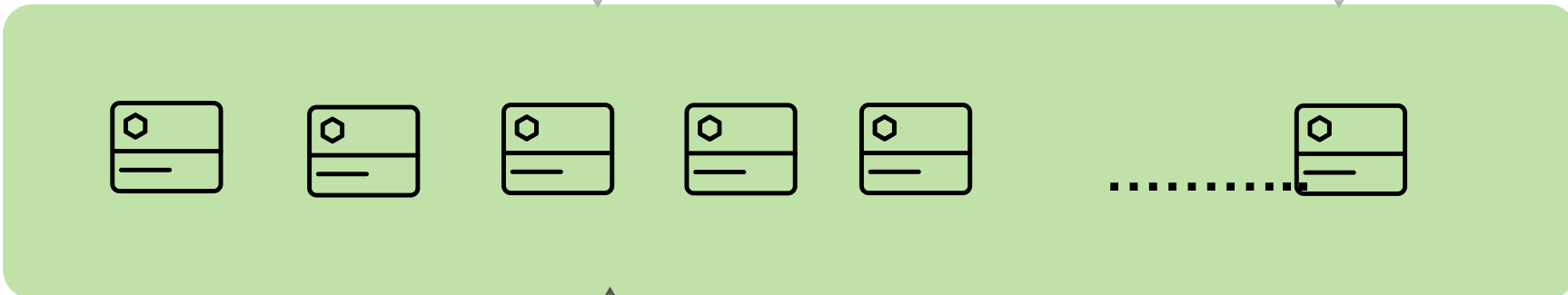
Deployer



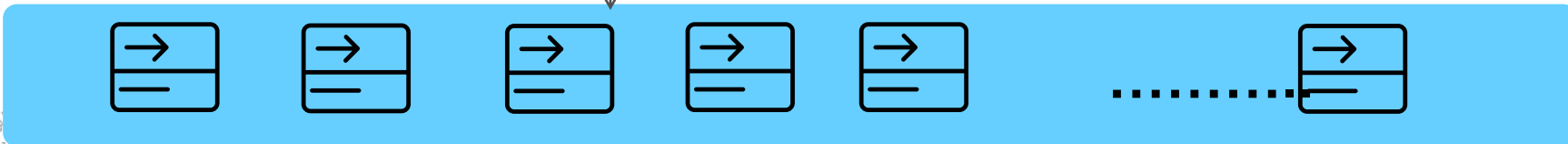
Master



Search Head Clustering



Indexer Clustering



Forwarding Layer – autoLB

130 [07/Jan 18:10:57:123] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03" ...
128 [07/Jan 18:10:57:123] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=KQ-CW-01" ...
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://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-16&product_id=RP-LI-02" 468 125.17.14.1 "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3" [07/Jan 18:10:55:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3" ...
action=purchase&itemId=EST-16&product_id=RP-LI-02" [07/Jan 18:10:55:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3" [07/Jan 18:10:55:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3" ...

END

Top Take-Aways

- ▶ **DR – Process of backing-up and restoring service in case of disaster**
 - **Configuration files** – copy of \$SPLUNK_HOME/etc/ folder
 - **Indexed data** – backup and restore buckets
 - Hot, warm, cold, frozen
 - Can't backup hot (without snapshots) but can safely backup warm and cold
- ▶ **HA – continuously operational system bounded by a set of tolerances**
 - **Data collection**
 - Autolb from forwarders to multiple indexers
 - Use Indexer Acknowledgement to protect in flight data
 - **Searching**
 - Search Head Clustering (SHC)
 - **Indexing**
 - Use Index Replication

Q&A

Thank You

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