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Agenda

- Setting The Stage, Why Is This Important
- Collection/Forwarding
- Indexing
- Search
- UI/Dashboards
- Summary
Setting The Stage
The Goal

“Let our advance worrying become advance thinking and planning.”

- Winston Churchill
General Architecture Considerations
A Quick Refresher
Architecture Considerations

- Remember: Indexers are search peers and handle the bulk of the search workload
  - More indexers = less data per indexer = higher concurrency = more searches per time unit
  - Indexer processing capacity needs to be > SH capacity, top-heavy deployments can overwhelm the search peers
- Address search performance issues at the search peer tier first, i.e. when in doubt, add an indexer
- Avoid complex architectures, keep it simple (intermediary forwarders, over-building for every failure scenario, etc.)
Collection/Forwarding
Collection/Forwarding Performance

• Forwarder configuration can affect...
  – **Event distribution** across indexers, which negatively affects search performance
    ‣ High-velocity log source can cause stickiness (see: `forceTimebasedAutoLB`)
  – **Event throughput**, which may affect index time latency, causing events to not be searchable for extended periods of time
    ‣ UF has Default MaxKBps of 256kbps
    ‣ Keep number of monitored sources low
    ‣ New in 6.4: `parallelIngestionPipelines` (server.conf)

• Use UF vs. HF for intermediary FWD tier if possible

• Consider HTTP Event Collector for forwarder-less collection
Indexing
Indexer Resources

• Storage performance is single most critical factor
  – Splunk doesn’t care which supported storage technology you use as long as it meets minimum IO performance requirements
  – Locally attached storage almost always wins over shared SAN

• Indexing itself is streaming write IO, but indexers do double duty!
  → Random Seek performance is critical for searching

• Slow storage for COLDDB can slow down indexing

• Indexers need resources (cores, memory, IO); constrained resources are the #1 cause for performance issues
Recommended Approach

- Separate HOT/WARM from COLD and limit HOT/WARM to the minimum required to fulfil ~80% of your search use cases.

This allows you to economically use SSDs for HOT/WARM and cheaper storage for the remaining search use cases (assuming search performance is less critical there).
Indexer Configuration

- Keep number of indices reasonable, create new index to address retention and access control requirements
- Separate high-velocity log sources from low-velocity sources
- Take advantage of parallel indexing pipelines if you can
- Combine things frequently searched together in the same index

- Turn that Hyperthreading ON, it does not hurt!
- Turn CPU power-safe OFF!
- If you are on RedHat Linux, turn THP off!
“Although the default Splunk configurations are typically appropriate, certain high-performance environments can benefit from tuning various parameters.”

- John F. Kennedy
Data Source Configuration

- For each sourcetype, always set:
  - `TIME_FORMAT` (TF)
  - `TIME_PREFIX` (TP)
  - `MAX_TIMESTAMP_LOOKAHEAD` (MLA)
  - `LINE_BREAKER`
  - `TRUNCATE`
  - `SHOULD_LINEMERGE=false`
  - `ANNOTATE_PUNCT=false` (AP)
Searching – Part 1

• Search time field extractions
  – Use DELIMS based field extractions when you can (KV, comma, pipe)
  – Anchor RegExs, Avoid RegEx lookbehind if you can

• Be as specific as you can when writing searches
  – Pick the smallest search timerange that meets your needs (Default!=All time)
  – Use indexed fields (host/source/sourcetype)
  – Specify index explicitly, e.g. index=firewall

• Don’t use |table in the middle of a search, use |fields instead

• Avoid realtime searches (use indexed_realtime if you can’t)

• Avoid verbose mode, unless you are exploring
Searching – Part 2

• When reporting on indexed fields, consider using `| tstats` to search index files only

• Exploit acceleration options where it makes sense
  – Report acceleration
  – Data model acceleration

• Got extra indexer cores? Use parallel search pipelines (see D)

• Stay current on Splunk releases, we continuously focusing on performance improvements
Example: Search Vs. tstats

index=_internal | stats count by sourcetype: 1.37MM events, 53.66secs
| tstats count where index=_internal by sourcetype: 1.88MM events, 0.056secs
Example: Verbose Vs. Smart/Fast Mode
Example: Table Vs. Fields

Time taken: 6.8 secs
Data read from indexers: 125MB
Example: Table Vs. Fields

Time taken: 2.76 secs
Data transferred from indexers: 214KB

<table>
<thead>
<tr>
<th>Component</th>
<th>Time</th>
<th>Data Transferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>dispatch.stream.remote</td>
<td>2.70</td>
<td>214,730</td>
</tr>
<tr>
<td>dispatch.stream.remote.undiag-idx01</td>
<td>1.05</td>
<td>71,193</td>
</tr>
<tr>
<td>dispatch.stream.remote.undiag-idx03</td>
<td>0.64</td>
<td>46,581</td>
</tr>
<tr>
<td>dispatch.stream.remote.undiag-idx04</td>
<td>0.59</td>
<td>50,183</td>
</tr>
<tr>
<td>dispatch.stream.remote.undiag-idx02</td>
<td>0.42</td>
<td>30,801</td>
</tr>
</tbody>
</table>
UI/Dashboading
UI/Dashboarding

- Use saved/scheduled searches in dashboards (reuse search results across users)
- Use summary indices for long-term, aggregated metrics (don’t recalculate from raw)
- Restrict time-range picker options to minimum req’d for use case
- Use base searches and PostProcess for panels that are based on the same raw event search
- Minimize the number of panels that require individual searches
- Avoid auto-refresh if you can (kiosk/NOC use-case only)
- Don’t use real-time searches or at least use indexed_realtime
Conclusions

- Architecture choices affect performance. KISS!
- Pick the fastest storage you can afford for HOT/WARM
- Configurations at all tiers can affect performance
- Inefficient use of SPL affects performance
- Concurrent searches is the critical metric for search capacity planning
- Always consider search impact on ‘indexers’
- Enjoy your well-performing Splunk deployment!
Where To Go From Here

- Docs on search performance:
  - Optimize Splunk for Peak performance:
    http://docs.splunk.com/Documentation/Splunk/6.1.4/Admin/OptimizeSplunkforpeakperformance
  - Splunk performance checklist:
    http://docs.splunk.com/Documentation/Splunk/6.4.2/Capacity/Performancechecklist
  - How search types affect performance:
    http://docs.splunk.com/Documentation/Splunk/6.4.2/Capacity/HowsearchtypesaffectSplunkEnterpriseperformance
Related Sessions Of Interest

- **Observations and Recommendations on Splunk Performance**  
  Wednesday, September 28, 2016 | 12:05 PM-12:50 PM
- **Behind the Magnifying Glass: How Search Works**  
  Wednesday, September 28, 2016 | 1:10 PM-1:55 PM
- **Fields, Indexed Tokens and You**  
  Wednesday, September 28, 2016 | 11:00 AM-11:45 AM
- **Indexer Clustering Internals, Scaling, and Performance**  
  Tuesday, September 27, 2016 | 3:15 PM-4:00 PM
- **Worst Practices... and How to Fix Them**  
  Tuesday, September 27, 2016 | 10:30 AM-11:15 AM
- **Jiffy Lube Quick Tune-up for Your Splunk Environment**  
  Wednesday, September 28, 2016 | 11:00 AM-11:45 AM
- **Architecting Splunk for Epic Performance at Blizzard Entertainment**  
  Tuesday, September 27, 2016 | 12:40 PM-1:25 PM
- **Lesser Known Search Commands**  
  Wednesday, September 28, 2016 | 3:30 PM-4:15 PM
THANK YOU