Shop Smart At The Kvstore

Best Value Tricks From The Splunk Kvstore And REST API

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SPLUNK TRUST

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DEFENSE POINT SECURITY

- George Starcher
  - Splunking since 2010
  - Still in love with the Splunk HEC
  - Favorite game is automating Splunk to earn its keep
- Duane Waddle
  - Splunking since 2010
  - Still dreams of one day being a helicopter pilot
- Our Other .conf Talks:
  - .conf 2015: talks SSL and Advanced Lookups
  - .conf 2014: talks on SSL and Alert Script automation
  - .conf 2016: Duane on: Anti Patterns it seemed like a good idea at the time!

Agenda

- Overview:
  - KVStore basics
  - Why KVStore?
- KV Store Management:
  - Creating a KVStore
  - Backing up KVStore
- Use Cases and Serious Code:
  - Sending Threat Intel into ES Threat Intel KV Store
  - Modular Alert + KVStore = shared lookups across instances
  - Dumb Syncing of Database Tables to KVStore
  - Smart Syncing of Database Tables to KVStore
  - Table Flipping! Driving other table based tech. Routing

All Code has README files and in the github repos linked at the end of the slides.

KVStore - Basics:

Splunk Docs Definition: "The App Key Value Store (or simply, KV Store) feature of Splunk Enterprise provides a way to save and retrieve data within your Splunk apps, thereby enabling you to manage and maintain the state of the application."

- Extension of existing lookup functionality
- MongoDB behind the curtain
- REST api access unlike normal CSV-based lookups
  - Gives us random access changes
- Must run at search head level: tcp 8191 default
- http://dev.splunk.com/view/webframework-features/SP-CAAAEY7
- http://dev.splunk.com/view/SP-CAAAEZJ

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KVStore - Basics:

- In a Search Cluster a KVStore Captain is elected. Might <u>NOT</u> also be the SHC Captain
- All nodes read, Captain handles the writes
- You can get great information from the Distributed Management Console
- Prior to Splunk version 6.3:
  - No auto lookup support
  - No replication to Indexers
- Uses _key hidden field as the unique record key per collection
  - You can specify this like _key=src_ip
  - Otherwise it auto generates a key

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KVStore - Why?

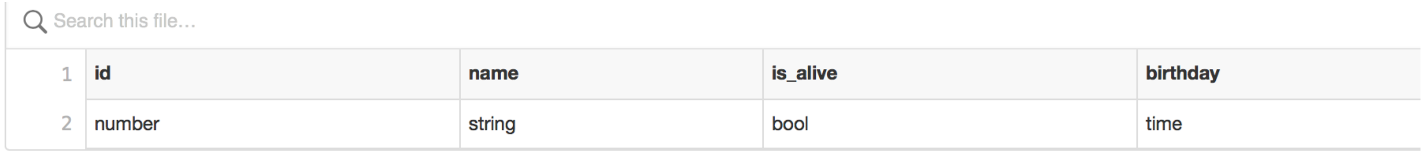
- Splunk is a dynamic indexed data system. Why would it need a random access database?
- Originally added to provide state tracking etc for Splunk App for Enterprise Security

Uses:

- Data value state (ES with notables)
- Lookups: Assets, data enrichment
- Getting sets of structured data out: Tables to control other systems

KVStore - Creation:

- Add by conf file editing/deploying an app. No GUI options for collections.
  - Edit collections.conf and transforms.conf
- Use the REST api:
  - makekvstore.py: https://github.com/georgestarcher/Splunk-createkvstore
    - This makes the collection and it replicates across a cluster
    - This code does not define the lookup in transforms.conf
    - template.csv is the model for your collection
    - The first row defines the field names
    - The second row defines the type of the field



1	id	name	is_alive	birthday
2	number	string	bool	time

KVStore - Creation:

- Edit the kvstore.conf to point to the desired server
- You will provide an admin level Splunk user credential at the prompts when you execute the script

```
> python makekvstore.py app collection
```

- app: is the argument where you specify the app name context you want the collection in. Like “TA-assets”
- collection: is the argument where you specify the collection name to be made. Like “our_assets”

```
> python makekvstore.py TA-assets our_assets
```

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KVStore - Backup: Using Search

```
| inputlookup assets | eval saveKey=_key |
outputlookup kvstore_backup_assets_20160311.csv
```

- Backs up the data not the collection definition.
- Make sure you use a naming convention that is blacklisted from replication!!!

<u>distsearch.conf:</u>

```
[replicationBlacklist]
noBackups = .../kvstore_backup_*
```

KVStore - Backup: Using Python

```
> python backupkvstore.py
```

- Use the REST api:
  - backupkvstore.py: https://github.com/georgestarcher/Splunk-backupkvstore
    - Provide a credential with permissions to all collections to be backed up
    - It will write a text file of JSON data for each collection and the data it contains
    - def_COLLECTIONNAME is the definition
    - data_COLLECTIONNAME is the data

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Use Cases and Serious Code

Splunk App for ES Threat Intel

Use Case: I get some list of ips/domains from an email sharing list.

First configure a csv file with the provided template:

```
threat_key,ip,domain,weight,description,address,city,country,
postal_code,state_prov,organization_name,organization_id,
registration_time

manual_intel,10.63.51.1,,low,TEST:IgnoreThreatIncidents,,,,,,,,

manual_intel,
10.63.51.2,,medium,TEST:IgnoreThreatIncidents,,,,,,,,

myisac,
10.63.51.66,scoobydoo.local,high,TEST:IgnoreThreatIncidents,,,,
,,,,
```

Splunk App for ES Threat Intel

> python splunk-es-threat-intel.py -h

```
splunk-es-threat-intel.py -i <inputfile> -c <confile>
--remove
```

- The <inputfile> is the CSV template file from the previous slide.
- The <confile> is the default or a copy of kvstore.conf with the script.
- Edit kvstore.conf with your splunk_server, splunk_user, and a base64 encoded password matching the user for a service account.
- The user must have a Splunk user role that has permissions to write to DA-ESS-ThreatIntelligence where the collections are stored.
- It will log to intel_to_splunk.log where the script is run from.

Splunk App for ES Threat Intel

Preparation: cleanData(data)

- This method preps the data for the endpoint
- It expands out lines with both domain and IP to two entries to submit

Creation/Update: postDataToSplunk(data)

- We call the REST endpoint to create the object
- If it returns an ERROR we assume the object exists. We call the REST endpoint again with the object _key appended to the URL to update the object
- We then call the REST endpoint to create the metadata Threat Group entries

Deletion: removeDataFromSplunk(data)

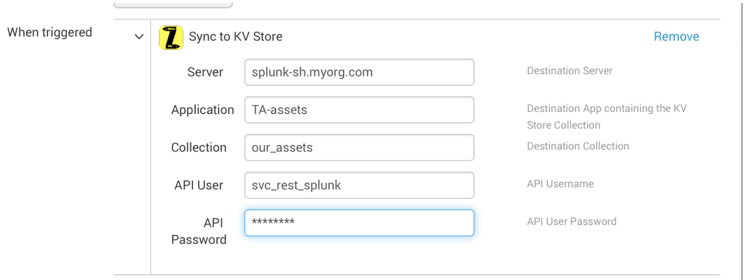
- We just loop through and call the DELETE method on the REST endpoint for that object
- We do NOT remove the Intel Group entries as that could cause old notables to be missing the group metadata info like description

What If I Have Two Different Search Clusters?

- Same search cluster?
  - KVStore auto syncs across search heads in the same cluster
- **Use Case**: I want to sync an asset table over two clusters
  - Try our modular alert: sync_kvstore
  - https://github.com/georgestarcher/sync_kvstore
  - Install the modular alert
  - Configure the alert on a lookup you wish to send TO the destination cluster

```
| inputlookup asset_kvstore
```

- We get around the 10K Modular Alert limit by opening the search results file directly.
- It takes 2.5 minutes to send a 233K row asset table.


When triggered — Sync to KV Store — Remove

Server	splunk-sh.myorg.com	Destination Server
Application	TA-assets	Destination App containing the KV Store Collection
Collection	our_assets	Destination Collection
API User	svc_rest_splunk	API Username
API Password	********	API User Password

Modular Alert - Sync KVStore

First it will clear the remote KV Store collection; then we post the data via threaded batch save call to the API.

```
destKVStore.clearRemoteKVStore()
try:
       postList = []
       for entry in tableContents:
           if ((len(json.dumps(postList)) + len(json.dumps(entry))) < _max_content_bytes) and
(len(postList) + 1 < _max_content_records):
               postList.append(entry)
           else:
               destKVStore.postDataToSplunk(postList)
               postList = []
               postList.append(entry)
       destKVStore.postDataToSplunk(postList)

   except Exception, e:
       raise Exception, "%s" % str(e)
```

DBX Table: Dumb Sync

- **<u>Use Case</u>**: I have a ip360 Vulnerability Scanner system. I want to sync the vuln description table over to splunk
- Splunk DB Connect app lets us do DB lookups (with tears)
  - Search performance impact
  - DB Server performance impact
- Alternative: run a query to fetch a lookup table on a heavy forwarder
  - `| dbquery "<SOME_SQL"> | table ...`
- AND….. use the previously mentioned sync_kvstore modular alert send that DBX sourced lookup table to KVStore lookup in your search heads
- You get to avoid trying to run DBX in a search cluster!!! WIN!!!!!!
- But if your query is big, that could still perform badly
- It does full replace the target table/collection each send

RDBMS Table: Smart Sync

- If caching millions of rows, tears are gonna happen
    - Updating the cache is painful on the DB side (full table scan)
- Can we incrementally update a KVStore collection with data from a DB?
- Need some help in the database (be nice to your DBAs)
    - An auxiliary table to hold “change events”
    - A trigger on the source table that fires on changes and inserts into the auxiliary
- And some glue code
    - Read the auxiliary table to pick up what changes have occurred
    - Push those changed records into KVStore via the REST API

RDBMS Table: Smart Sync

- PostgreSQL Table PRODUCTS:

```
 productid |      description       |     manufacturer      | unitprice | country_of_origin | weight_kg
-----------+------------------------+-----------------------+-----------+-------------------+-----------
         1 | Jar of Dirt            | Capt. Jack Sparrow    |     82.85 | UK                |    1.0000
         2 | Sack of Potatoes       | Pete's Potatoes       |      3.25 | USA               |    2.5000
         3 | Macbook Pro            | Apple Computer        |   1999.95 | China             |    1.1000
         4 | iPad Pro               | Apple Computer        |    999.95 | China             |    0.8000
         5 | 100 Ducks .999 Silver  | Yeager Poured Silver  |      0.65 | USA               |    0.1000
         6 | Fancy Fez              | Splunk                |  10000.00 | USA               |    0.0500
```

- Trigger warning :)

```
CREATE TRIGGER changetrack_products
AFTER INSERT OR UPDATE OR DELETE ON PRODUCTS
    FOR EACH ROW EXECUTE PROCEDURE process_change_products();
```

RDBMS Table: Smart Sync

- Make a DB change:

```
UPDATE PRODUCTS SET manufacturer='Davy Jones'
where manufacturer='Capt. Jack Sparrow';
```

- Trigger picks it up, updates our state table:

```
postgres=# select * from changetrack_products;
 changeid | operation |           stamp            | productid
----------+-----------+----------------------------+-----------
        9 | U         | 2016-07-30 18:31:16.337077 |         1
```

- Script Uses this to push change to KV:

```
2016-07-30 18:31:36 looking for changes newer than 2016-07-30 15:27:38
2016-07-30 18:31:36 Updating kvstore key 1 with record from 2016-07-30 18:31:16.337077
2016-07-30 18:31:36 storing new change state 2016-07-30 18:31:16.337077
```

RDBMS Table: Smart Sync

- Add in some Splunk config options in collections.conf:

```
replicate = true (Splunk v6.3+)
replication_dump_strategy = auto
replication_dump_maximum_file_size = XXX ( def 10240KB)
```

- Result:
  - Usable locally at indexers too
  - Minimized bundle replication impact
- Get the code:
  - https://github.com/georgestarcher/Splunk-smartdbsync-KVStore

⚠️Table Flipping: Routes!

- Wouldn’t it be nice if we could blacklist (from Splunk)
  - Then we wouldn’t have to work so hard
- Most of the time, null routing is as good as a blacklist (possibly better)
  - ACL checks are often done in software, routing in hardware
- What if we could drive a BGP Null Route table via a KVStore collection?
- Make a null-routing server (maybe a Raspi?)

⚠️ Table Flipping: Routes!

- Install Quagga on a Raspberry
- Grab the code project:
- https://github.com/georgestarcher/Splunk-blackhole
  - Edit the settings
  - Crontab the blackholev1.py
  - Edit the table in Splunk KVStore
  - Confirm the routing table edit
  - Redistribute into IGP or BGP

⚠️Table Flipping: Routes!

- Add some data to the KV store collection via SPL

```
| makeresults | eval cidr="13.14.15.16/32", blackhole="true" | eval time=_time | appendcols [ rest /services/authentication/current-context/context/ | fields username, email ] | inputlookup append=true blackhole | stats first(*) as * | outputlookup blackhole
```

- Run the script to add/remove routes in Quagga

```
$ ./blackholev1.py
2016-07-31 13:48:55 Add blackhole for 13.14.15.16/32 successful.  Requestor=admin at=1470023301
```

Code Link Collection:

- Create KVStore: https://github.com/georgestarcher/Splunk-createkvstore
- Backup KVStore: https://github.com/georgestarcher/Splunk-backupkvstore
- Sync KVStore: https://github.com/georgestarcher/sync_kvstore
- ES Intel: https://github.com/georgestarcher/Splunk-ESIntel-KVStore
- Smart DB Sync: https://github.com/georgestarcher/Splunk-smartdbsync-KVStore

What Now?

Other breakouts with Splunk Trust members:

- Fields, Indexed Tokens and You - Martin Müller
- Architecting Splunk for Epic Performance at Blizzard Entertainment - Mason Morales
- Lesser Known Search Commands - Kyle Smith
- Best Practices for Aggregating and Grouping Data From Different Search Results - Nick Mealy

THANK YOU

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