splunk> 4 ninjas

SPL Best Practices

January 2026

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Please introduce Yourself!

- Name
- Role
- What is your SPL experience?
- What are your expectations?

Before we get started

It is important to clarify that this workshop is designed to complement, not replace, formal **Splunk Education**. Our focus is on providing practical insights, hands-on experiences, and real-world applications. Consider it a supplementary, focused exploration to enrich your existing knowledge base. Let's make the most of this learning journey together, understanding that this workshop serves as a valuable addition to your educational experience.

Agenda for Today's Workshop

Performance!

We will start slowly with the basics then get into actual perf. Tuning. Then, we also prepared some optional modules that may help your daily life as a Splunk Power User.

- ✓ Mission statement: Why Optimize?
- ✓ Recap: Splunk Search Processing Language (SPL)
- ✓ I am just an end user, can I really influence search performance?
- ✓ Tips & Tricks for Writing More Efficient Searches
- ✓ Optional: Macros, eval tricks, stats & eventstats, spath, rex & co.
- ✓ SPL2 – Who, What, When?
- ✓ Wait, but couldn't we automate all this with an LLM?
- ✓ Wrap Up & Resources - Lots of Resources!

However, to avoid being sidetracked we had to exclude some topics →

- ✓ **Dashboarding**
  -> A great Dashboard starts with a great search, but this deserves it's own dedicated session!

- ✓ **CIM, a.k.a. Common Information Model**
  -> There is also dedicated training material.

- ✓ **Datamodels** (ok, maybe just a little bit)
  -> Same as CIM

- ✓ **Clusters,** and **Splunk Administration** in general
  -> Today's session is intended for **Power Users** rather than **Administrators**.

- ✓ **Getting Data In, Ingestion Tuning**
  -> This also falls into the scope of administration

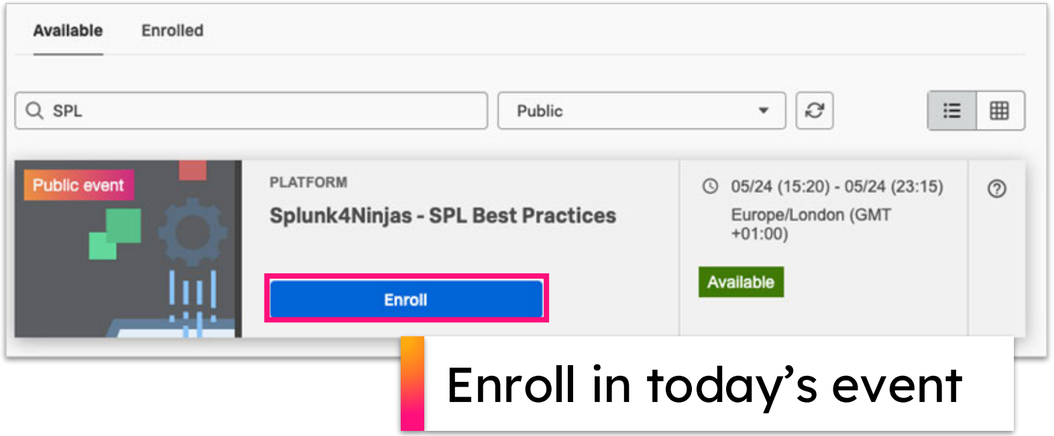
REGISTRATION 5 MINS

Enroll in Today's Workshop

Tasks

1. Get a splunk.com account if you don't have one yet: https://splk.it/SignUp
2. Enroll in the Splunk Show workshop event: https://splunk.show/<uniqueID>
3. Download a copy of today's slide deck: https://splk.it/SPL-Attendee

Goal



Enroll in today's event

The Lab

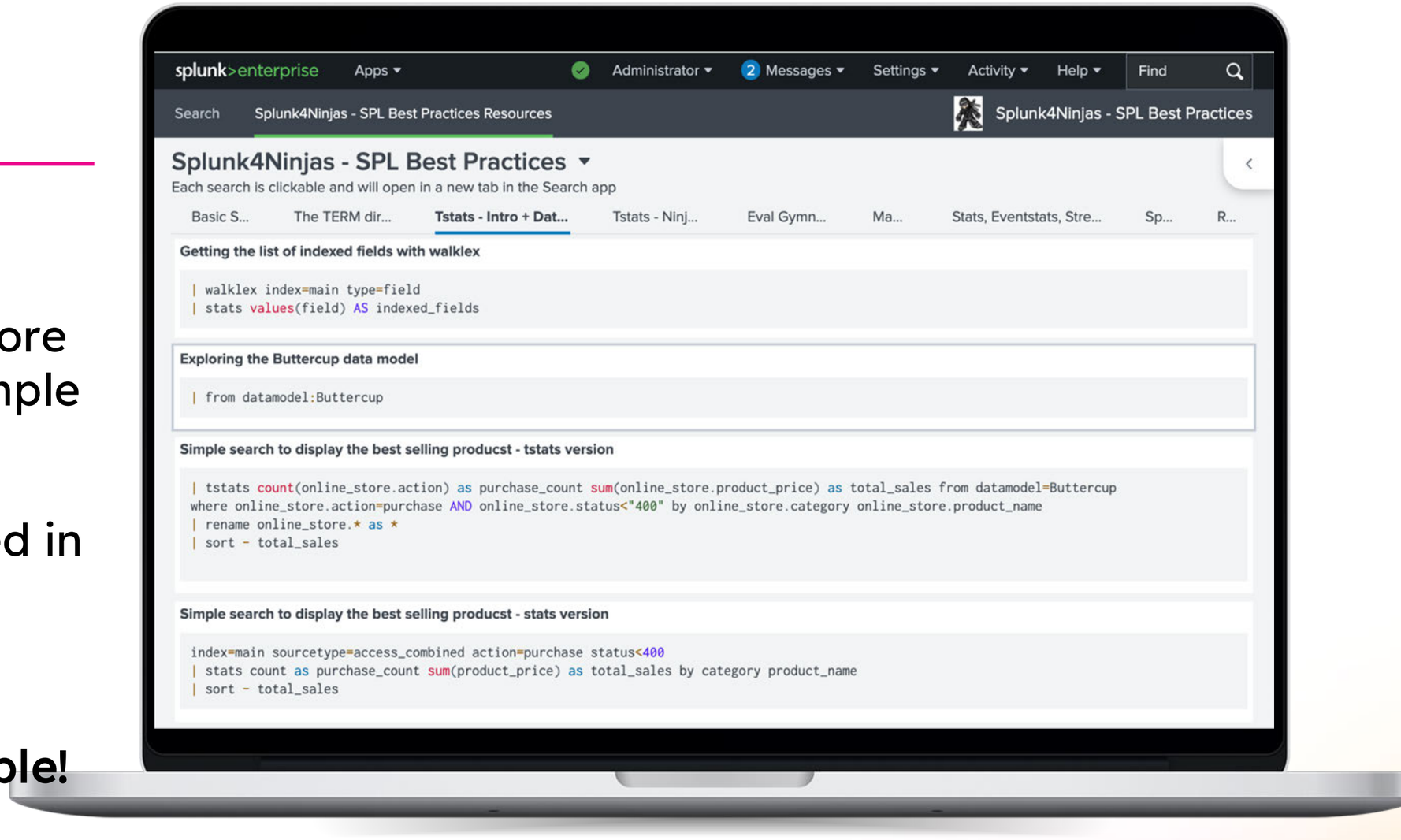
2 datasets:

- The Buttercup online store
- A very minimal json sample

All searches are provided in an

Ad-Hoc Dashboard

All the panels are clickable!



This lab environment will allow us to demonstrate the concepts.

However, be aware that the performance measurements will not be comparable to a real life production environment.

Why optimize anything? My searches are working after all!

True, but…

- Big datasets and complex use cases are less forgiving.
- If we adhere to good practises from the beginning, we won’t have to do the work two times.
- Cost. Inefficient searches put more load on the infrastructure, which may have repercussions for you as a customer (depending on the hosting chosen and the licensing model).

Recap: Search Processing Language (SPL)

SPL (Search Processing Language) Refresher

Events are retrieved → **Results passed linearly through SPL commands for processing**

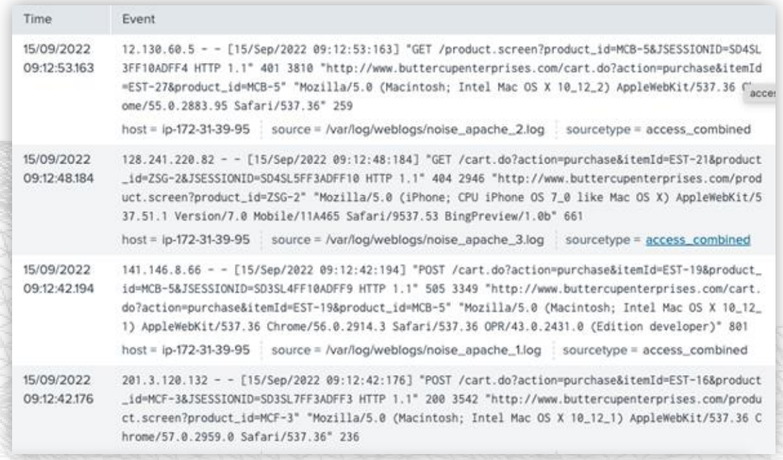
Search Terms | Commands | Clause

```
index=main action=purchase | stats count by status | rename count as "number of events"
```

Pipe character: Output of left is input to right

Functions

e.g. `index=main action=purchase`



Time	Event
15/09/2022 09:12:53.163	12.130.60.5 - - [15/Sep/2022 09:12:53:163] "GET /product.screen?product_id=MCB-5&JSESSIONID=SD4SL3FF10ADFF4 HTTP 1.1" 401 3810 "http://www.buttercupenterprises.com/cart.do?action=purchase&itemId=EST-27&product_id=MCB-5" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_12_2) AppleWebKit/537.36 Chrome/55.0.2883.95 Safari/537.36" 259 host = ip-172-31-39-95 source = /var/log/weblogs/noise_apache_2.log sourcetype = access_combined
15/09/2022 09:12:48.184	128.241.220.82 - - [15/Sep/2022 09:12:48:184] "GET /cart.do?action=purchase&itemId=EST-21&product_id=ZSG-2&JSESSIONID=SD4SL5FF3ADFF10 HTTP 1.1" 404 2946 "http://www.buttercupenterprises.com/product.screen?product_id=ZSG-2" "Mozilla/5.0 (iPhone; CPU iPhone OS 7_0 like Mac OS X) AppleWebKit/537.51.1 Version/7.0 Mobile/11A465 Safari/9537.53 BingPreview/1.0b" 661 host = ip-172-31-39-95 source = /var/log/weblogs/noise_apache_3.log sourcetype = access_combined
15/09/2022 09:12:42.194	141.146.8.66 - - [15/Sep/2022 09:12:42:194] "POST /cart.do?action=purchase&itemId=EST-19&product_id=MCB-5&JSESSIONID=SD3SL4FF10ADFF9 HTTP 1.1" 505 3349 "http://www.buttercupenterprises.com/cart.do?action=purchase&itemId=EST-19&product_id=MCB-5" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_12_1) AppleWebKit/537.36 Chrome/56.0.2914.3 Safari/537.36 OPR/43.0.2431.0 (Edition developer)" 801 host = ip-172-31-39-95 source = /var/log/weblogs/noise_apache_1.log sourcetype = access_combined
15/09/2022 09:12:42.176	201.3.120.132 - - [15/Sep/2022 09:12:42:176] "POST /cart.do?action=purchase&itemId=EST-16&product_id=MCF-3&JSESSIONID=SD3SL7FF3ADFF3 HTTP 1.1" 200 3542 "http://www.buttercupenterprises.com/product.screen?product_id=MCF-3" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_12_1) AppleWebKit/537.36 Chrome/57.0.2959.0 Safari/537.36" 236

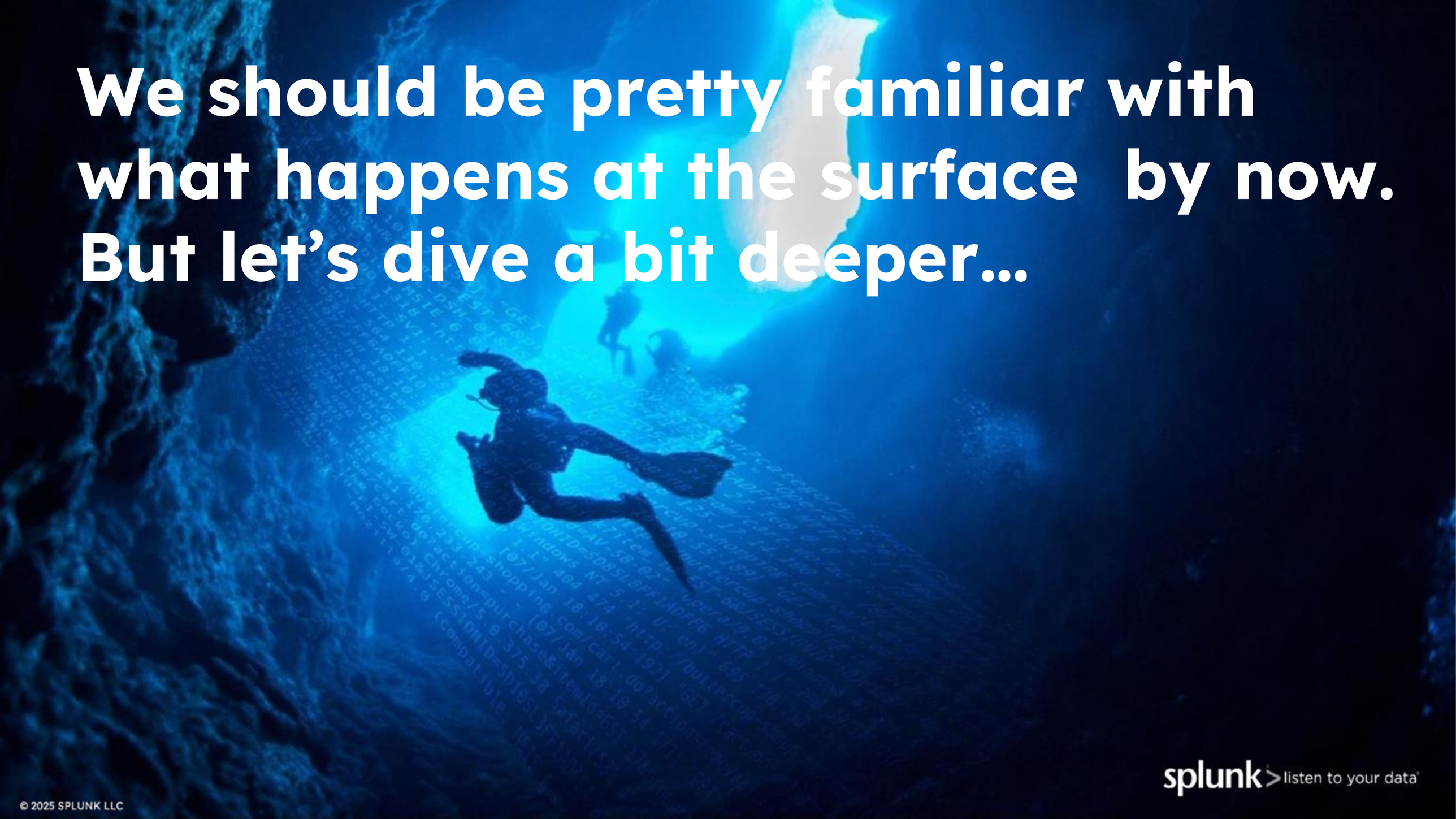
`| stats count by status`

status	count
200	850
400	81
401	76
402	50
403	57

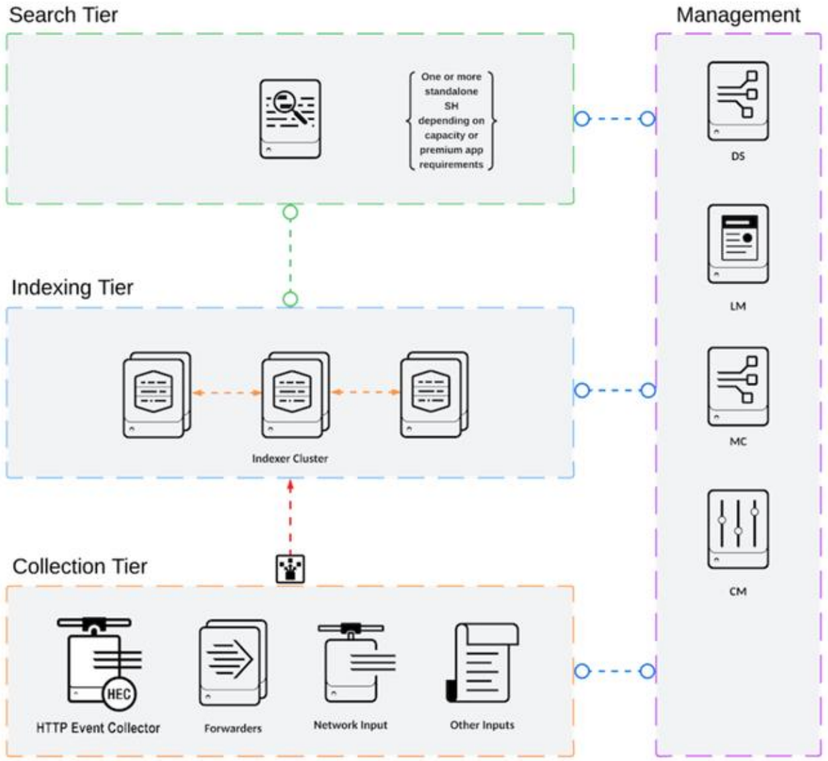
`| rename count as "number of events"`

status	number of events
200	850
400	81
401	76
402	50
403	57

Want to know more? Check out:
Splunk Quick Reference Guide: Splunk Quick Reference Guide
Search manual: Get started with Search (SPL)



A quick word about architecture



A typical Splunk implementation uses a tiered architecture with both vertical and horizontal scalability.

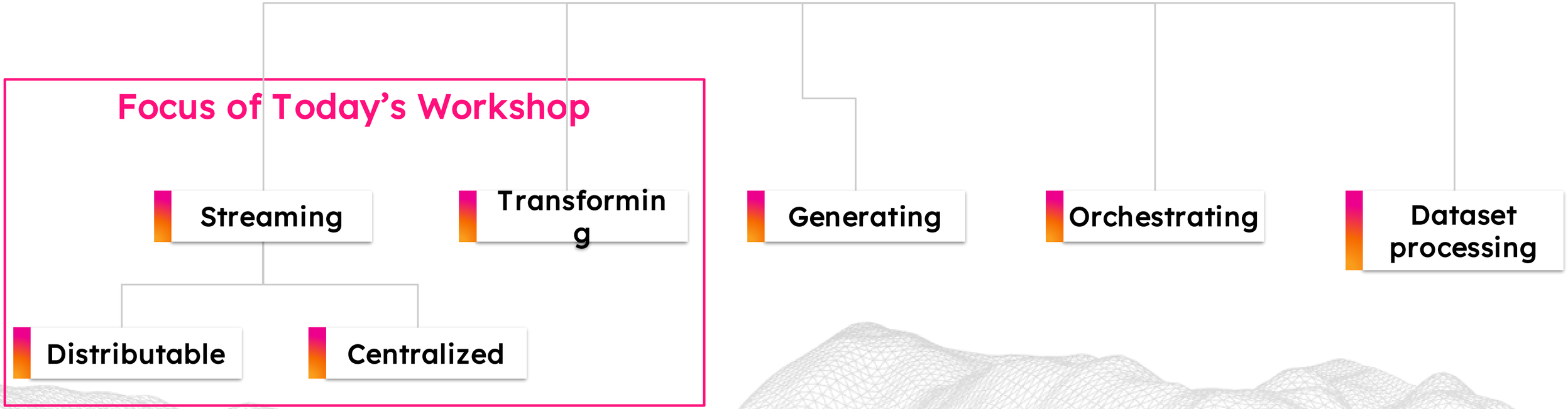
Today we'll focus on the "**scale out**" part, since this will also influence how we build our "**search pipeline**".

As seen previously, the search pipeline works in a sequential way: **…|…|…| -> results**

Although it works fine we can still make things a tiny bit **faster** if we take advantage of the underlying parallelism of the Indexing Tier.

Learn more: Splunk's Validated Architectures

SPL Command Types

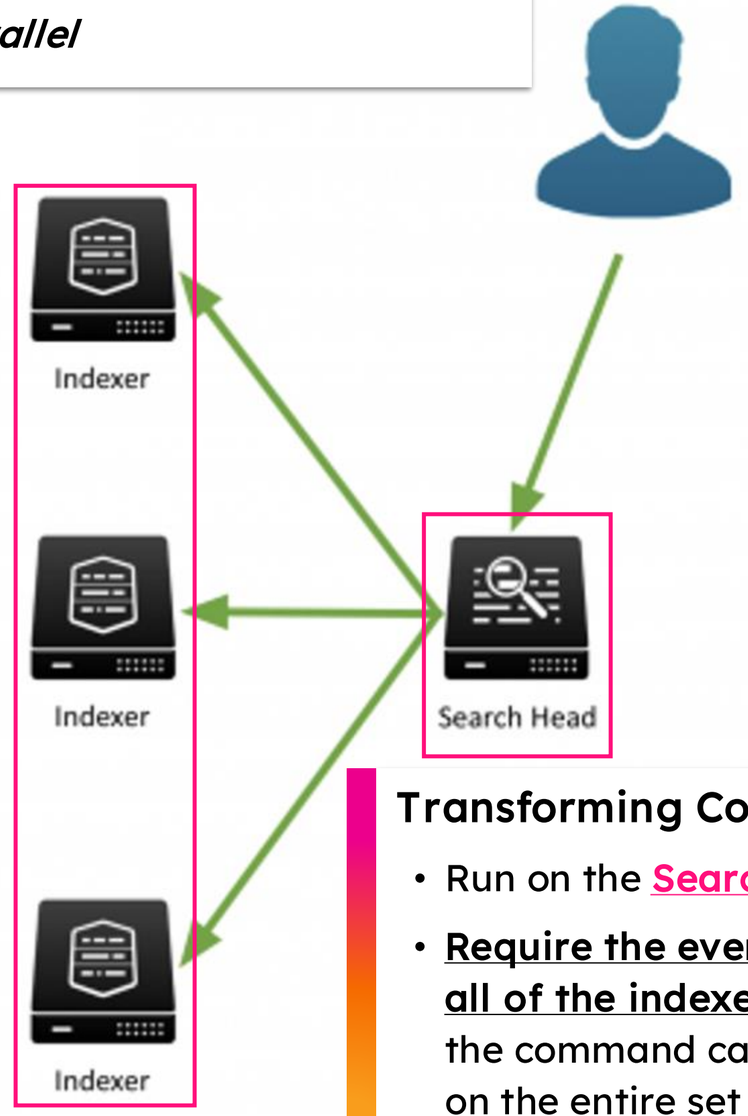


Learn more: Types of Commands

Streaming and Transforming Commands

Distributable Streaming Commands

- Can run on **indexers**
- Can be applied to subsets of index data in ***parallel***



Transforming Commands

- Run on the **Search Head**
- **Require the events from all of the indexers** before the command can operate on the entire set of events.

A few examples

Distributable Streaming Commands

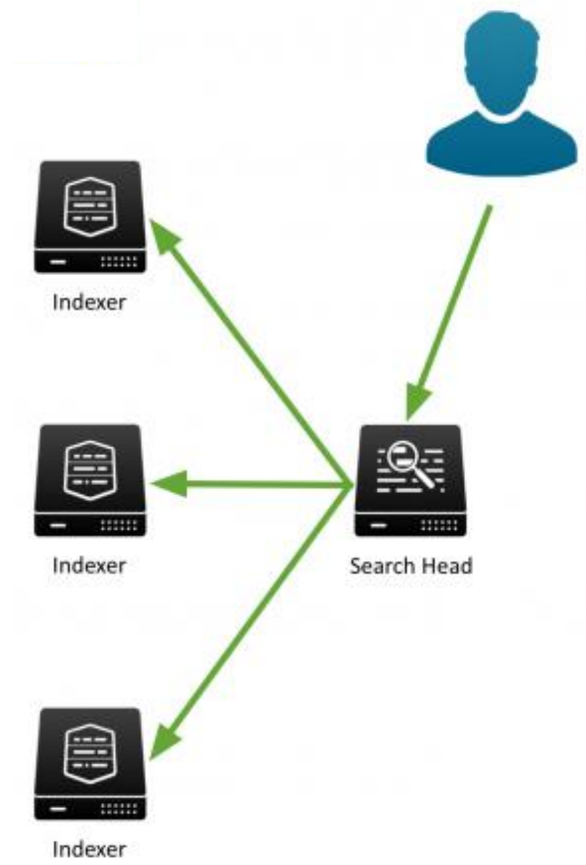
eval
makemv
rex
spath
lookup
rename

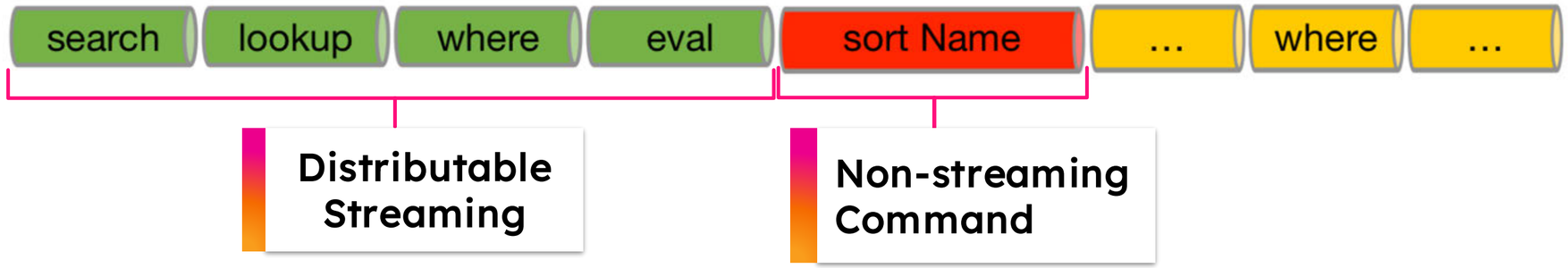
Transforming Commands

timechart
chart
stats
table
top
rare

Search Processing Example

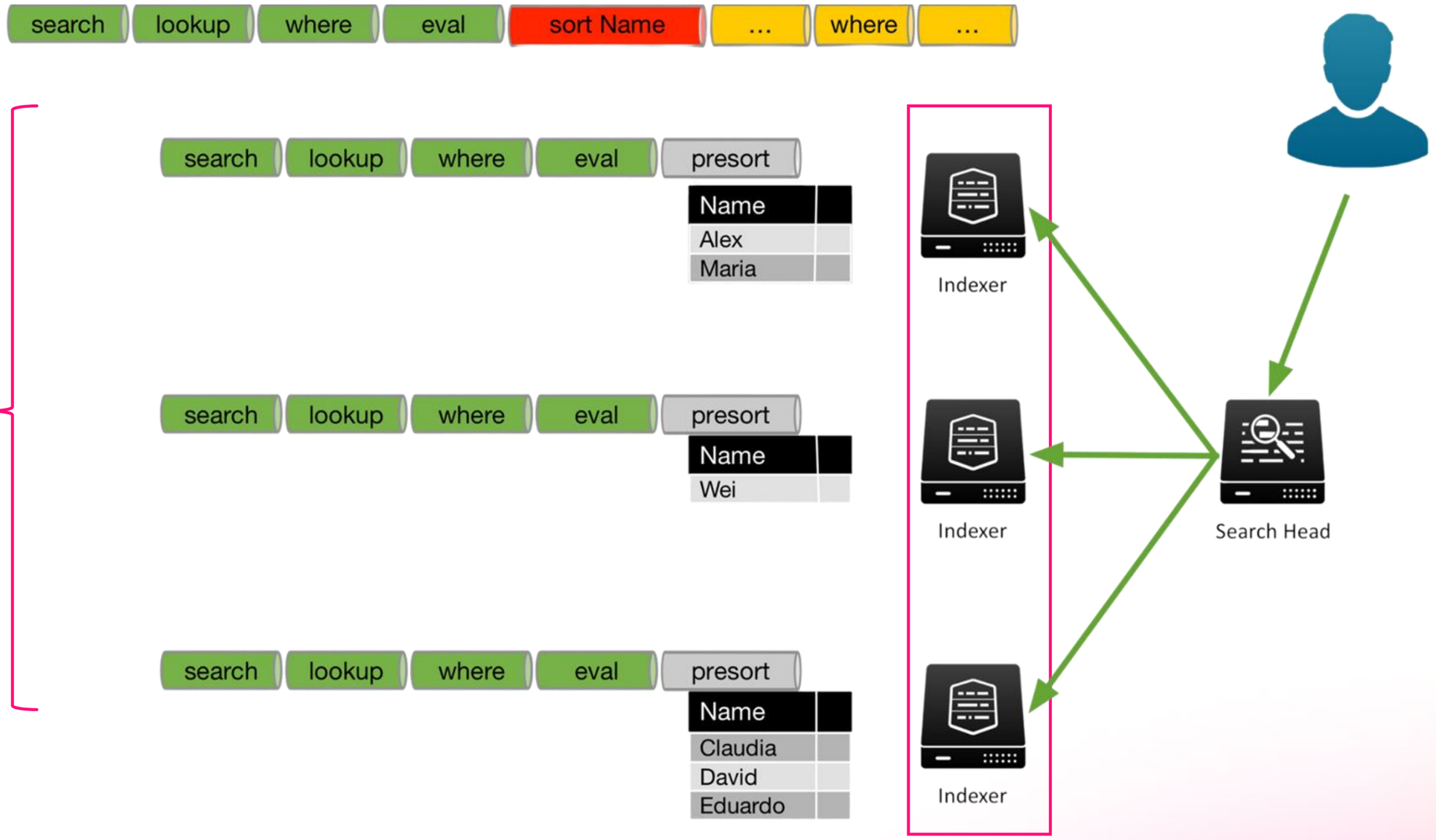
User search > Search Head > Distributed to Indexers





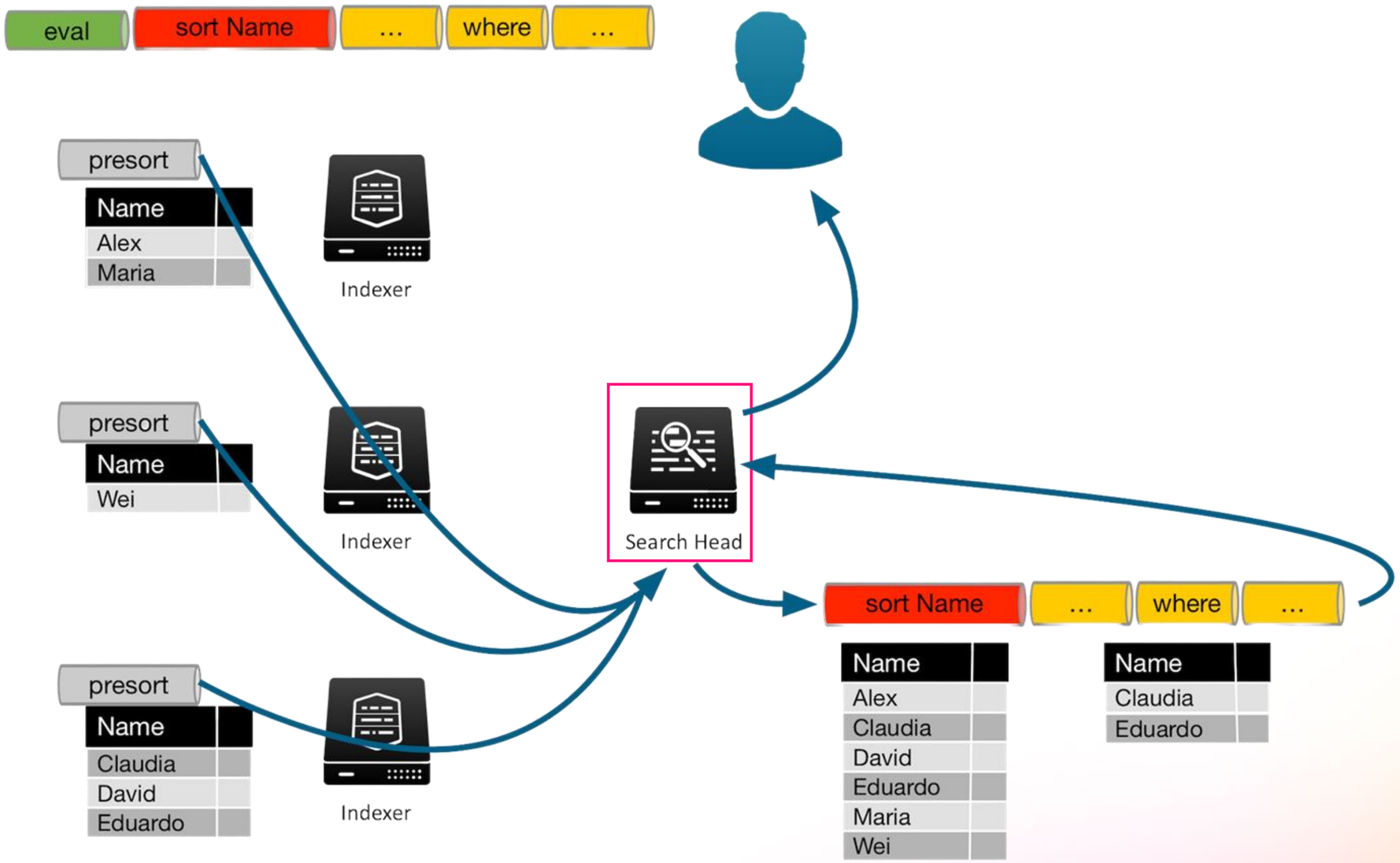
Learn more: SPL Command "sort"

Search Processing Example



Search Processing Example

- Results sent to **Search Head >** run `sort` on the **ENTIRE dataset.**
- **Following commands** run on **Search Head.**



Learn more: Write better searches

SPL Command Types

1 - Find the command.
The **Command quick reference** page is a pretty good starting point.

- How to quickly find out what we're dealing with ?

Command Quick Reference

2 - Refer to the upper right index of the help page, section "Usage"

eval

Description

Syntax

Usage

Basic Examples

Extended Examples

See also

Command quick reference

The table below lists all of the search commands in alphabetical order. There is a short description of the command and links to related commands. For the complete syntax, usage, and detailed examples, click the command name to display the specific topic for that command.

Some of these commands share functions. For a list of the functions with descriptions and examples, see Evaluation functions and Statistical and charting functions.

If you don't find a command in the table, that command might be part of a third-party app or add-on. For information about commands contributed by apps and add-ons, see the documentation on Splunkbase.

Command	Description	Related commands
abstract	Produces a summary of each search result.	highlight
accum	Keeps a running total of the specified numeric field.	autoregress, delta, trendline, streamstats
addcoltotals	Computes an event that contains sum of all numeric fields for previous events.	addtotals, stats
addinfo	Add fields that contain common information about the current search.	search
addtotals	Computes the sum of all numeric fields for each result.	addcoltotals, stats
analyzefields	Analyze numerical fields for their ability to predict another discrete field.	anomalousvalue
anomalies	Computes an "unexpectedness" score for an event.	anomalousvalue, cluster, kmeans, outlier
anomalousvalue	Finds and summarizes irregular, or uncommon, search results.	analyzefields, anomalies, cluster, kmeans, outlier

3 - This is what we are looking for:

Usage

The `eval` command is a **distributable streaming command**. See Command types.

Tips for Writing Better Searches #1: The Basics

- **Keywords:** Search for a single word (e.g., error) or group of words (e.g., error password)
- **Booleans:** **NOT**, **OR**, **AND**
  AND is implied - **MUST** be uppercase
  can use ()'s to force precedence, e.g.
  sourcetype=vendor_sales **OR**
  (sourcetype=access_combined action=purchase)
- **Phrases:** "**web error**" (different than **web AND error**)
- **Field Searches:** status=404, user=admin
- **Wildcard(*):** status=40* matches 40, 40a, 404, etc; starting keywords with a wildcard is very inefficient
- **Comparisons:** =,!=,<=,>=,<,>
  e.g. status>399, user!=admin

Learn more: Quick Tips for Optimization

Tips for Writing Better Searches #2: Advanced

> **Reduce the amount of data Splunk must Search**
- Specify and limit the index(es) and other meta-fields like host(s), source(s) and sourcetype(s)
- Limit the time range for searching
- Fine-tune your searches to your unique events as much as possible
- Reduce the number of fields being passed down the SPL pipeline for processing (use fields command)

> **Distributed Search**
- Place streaming commands earlier in the pipeline

Be as specific as possible within search

Overrides the time-picker

```
index=my_index host=my_host sourcetype=my_srctype field1=val1 raw_text_search earliest=-1h latest=now
| eval field2=do_some_eval_here
| rename field2 as new_field2
| fields field1, new_field2
| stats count(field1) by new_field2
```

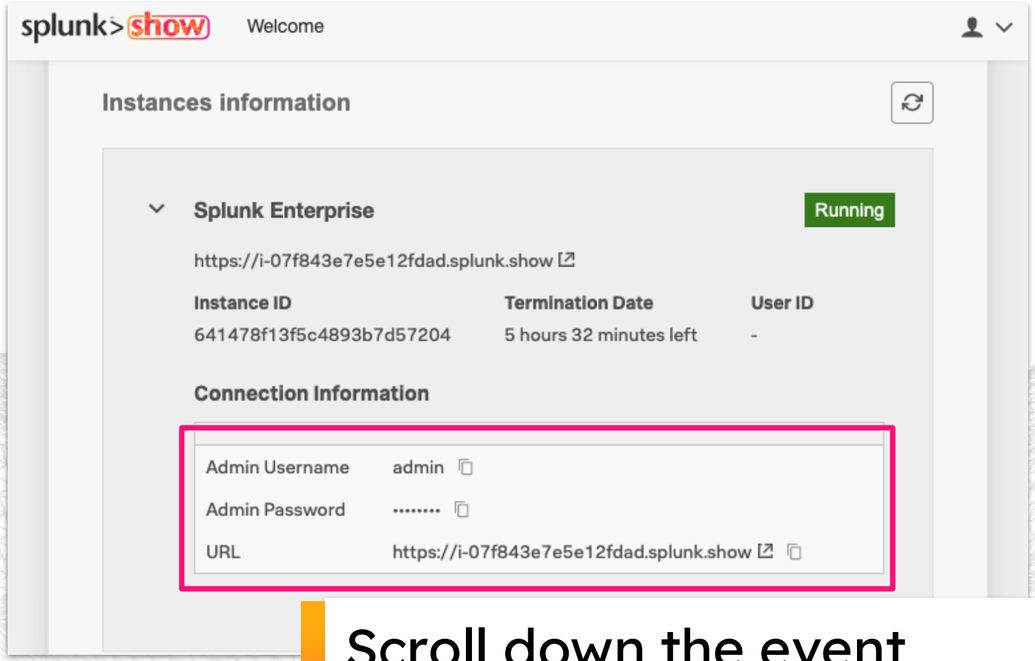
Streaming commands used earlier in the search pipeline

Reduce number of fields in pipeline

Transforming commands used later in the search pipeline

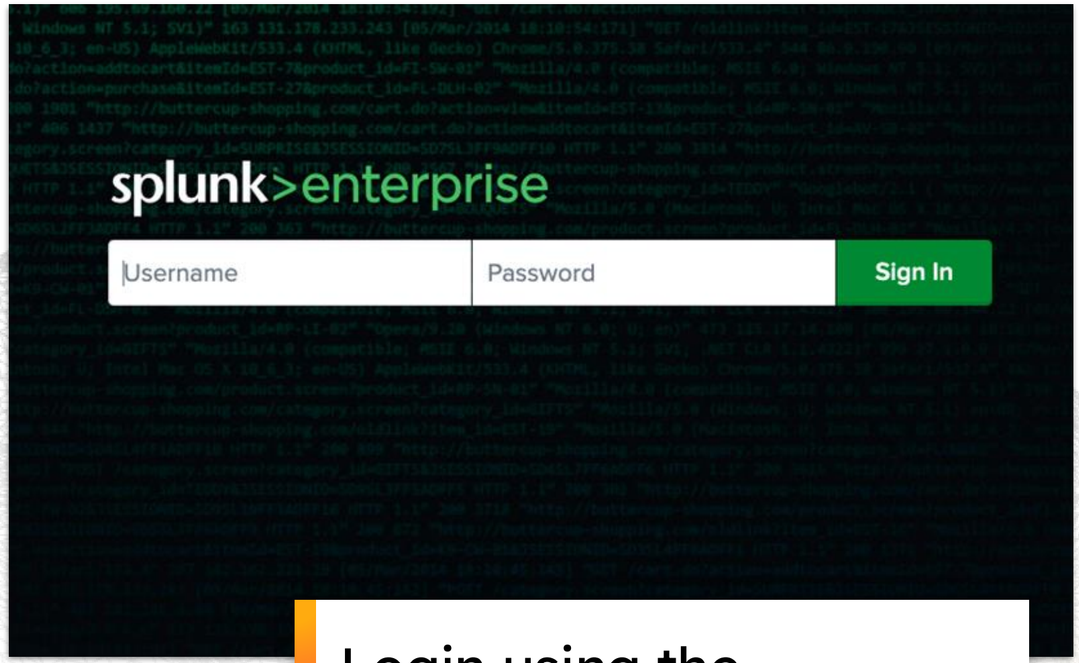
Log in to Splunk

Locate your instance URL and credentials in the Splunk Show event https://show.splunk.com



Scroll down the event page and expand the Splunk Enterprise section to view your login details

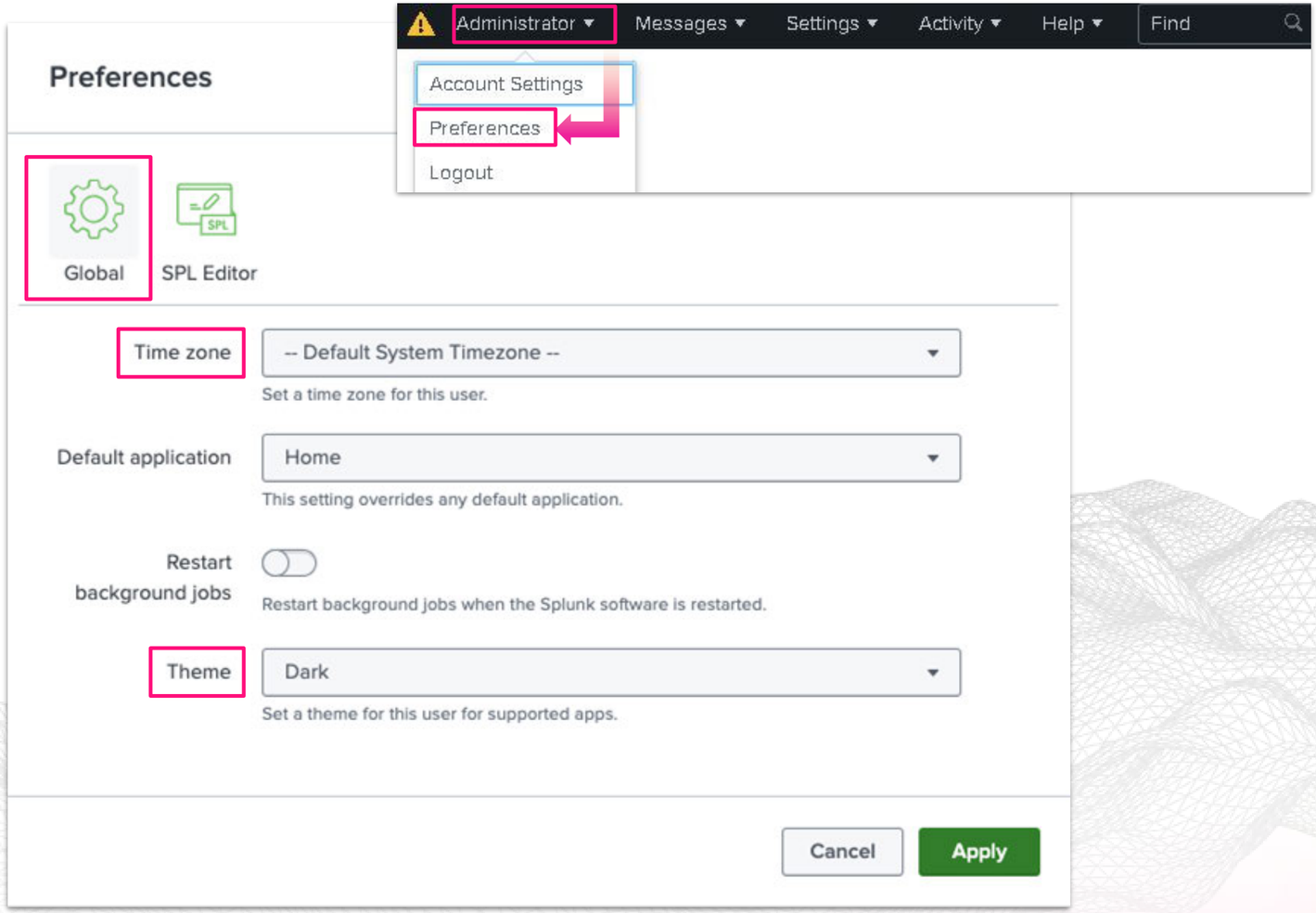
Log in to your Splunk instance



Login using the credentials from Splunk Show

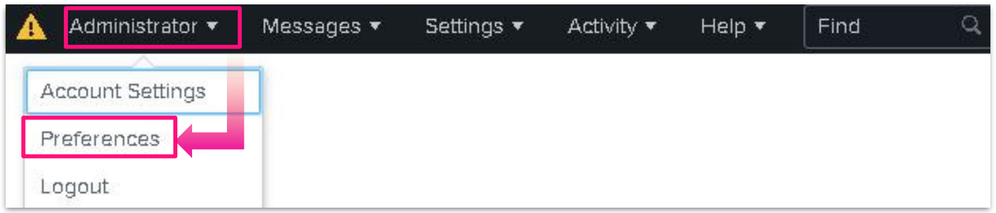
Initial Set-up

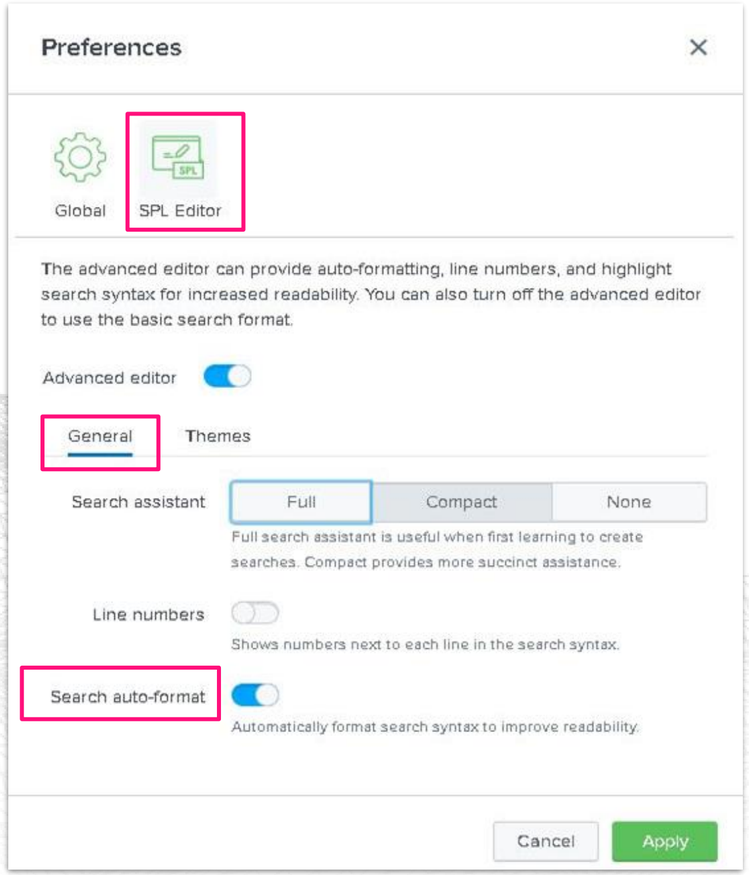
- It’s important to set-up your **timezone**
- Dark theme can be selected for **supported Apps**

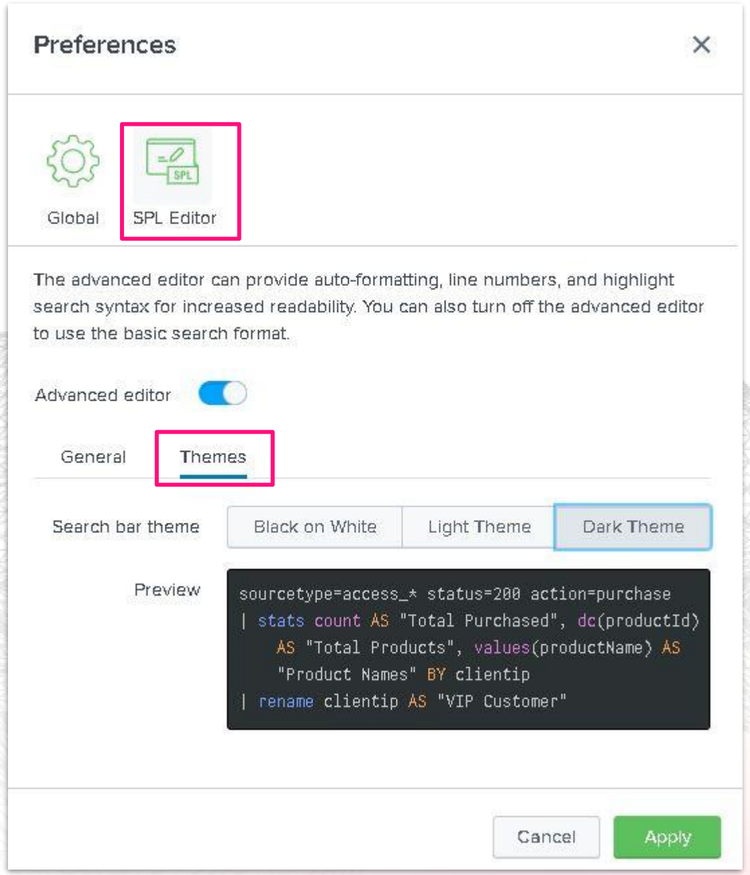


Learn more: How Time Zones are Processed by the Splunk Platform

UI Improvements







SPL Commenting

- Use three backticks (```) before and after your comment
- Comment out portions of your search to help identify and isolate problems
- To make very long SPL easier to read, add comments directly after the pipe (|)

```
index=security sourcetype=linux_secure
| ```single-series column chart```
    chart count over vendor_action
```

```
index=security sourcetype=linux_secure
```| single-series column chart
    chart count over vendor_action```
```

```
index=security "failed password" earliest=-14d@d latest=@d
| ```line chart with week-to-week comparison```
    timechart span=1d count as Failures
| timewrap 1w
| rename _time as Day
| eval Day = strftime(Day, "%A")
```

Useful for:

- Explaining each "**step**" of a complicated search that is shared with other users.
- Discussing ways of **improving** a search with other users.
- Leaving **notes** for yourself in unshared searches that are works in progress.
- **Troubleshooting** searches by running them with chunks of SPL "**commented out**".

Example:

Search

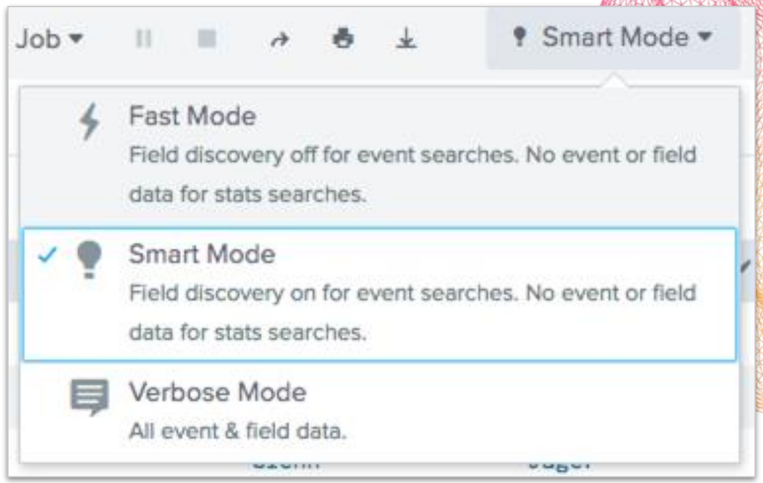
```
sourcetype=access_* status=200 ```Get all successful website access events.```
| stats count AS views count(eval(action="addtocart")) AS addtocart count(eval(action="purchase")) AS purchases by productName
    ```Create counts of site views, add-to-cart actions, and purchase actions. Break them out by product name.```
| eval viewsToPurchases=(purchases/views)*100 ```Find the ratio of site views to purchases.```
| eval cartToPurchases=(purchases/addtocart)*100 ```Find the ratio of add-to-cart actions to purchases.```
| table productName views addtocart purchases viewsToPurchases cartToPurchases ```Put all this data into a table.```
| rename productName AS "Product Name", views AS "Views", addtocart as "Adds To Cart", purchases AS "Purchases" ```Rename some table
    columns.```
```

Learn more: Add Comments to Searches

Splunk Search Modes

Fast vs. Smart vs. Verbose

- **Fast:** emphasizes speed over completeness
- **Smart:** balances speed and completeness (default)
- **Verbose:** emphasizes completeness



Learn more: Splunk's Search Modes

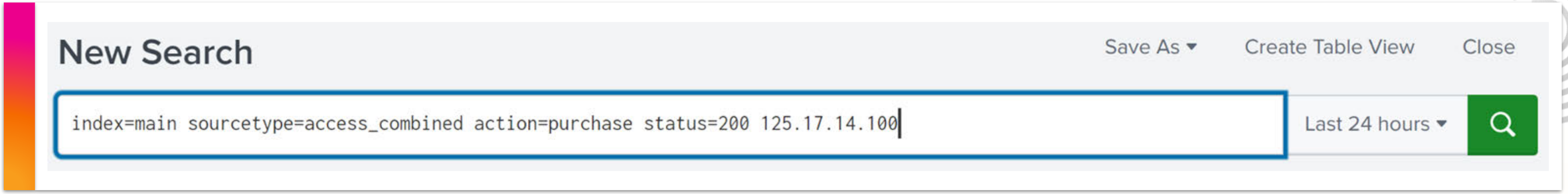
Tips & Tricks for Writing More Efficient Searches

SPL# >

Dealing with delimiters and measuring search performance

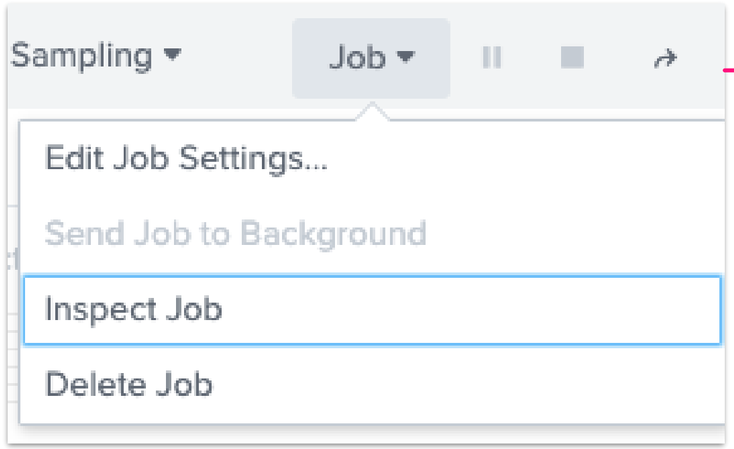
SPL# > Counting successful Purchase Actions for a specific IP address

Let's start with a common use case: Finding out how many successful actions were performed by the address 125.17.14.100 during the last hour.



Measuring the Search Execution Time

Inspect Job > check the Search Summary



Search job inspector

This search has completed and has returned **397** results by scanning **931** events in **0.205** seconds

(SID: 1621398493.191) search.log

Check the search duration

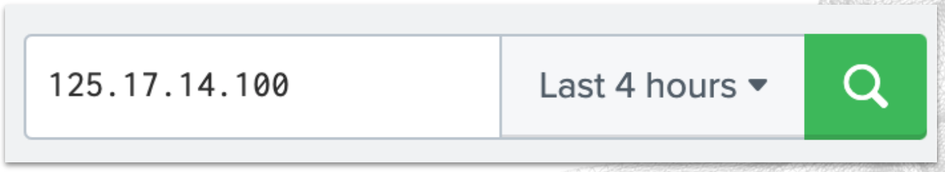
Execution costs

Duration (seconds)	Component	Invocations	Input count	Output count
0.00	command.fields	6	397	397
0.07	command.search	6	-	397
0.01	command.search.expand_search	2	-	-
0.00	command.search.calcfields	3	931	931

Raw Text Searches in Splunk are great!

Easy to start off… but are they efficient with huge datasets??

Let's see what happens when we ask Splunk to Search for an IP address.



Pros:

- ✓ **Very easy** to build searches.
- ✓ Use raw **text** and **keywords** that you want to find in data.
- ✓ Use **wildcards** to find multiple patterns.
- ✓ Build logic using AND/OR and brackets ()

Cons:

- ✗ **Inefficient** when searching huge datasets.
- ✗ Applied on **Big datasets** leads to slower outputs.

What Happens during Data Ingestion?

Event segmentation – data is broken into smaller segments for indexing

- Data is segmented by **separating terms** into smaller pieces
  - First with **major breakers** and then with **minor breakers**

Raw Data `125.17.14.100 - - [20/Aug/2024 08:20:54]`

Major segment breaker

(space is the breaker)

```
125.17.14.100
-
-
20/Aug/2024
08:20:54
```

```
INTERMEDIATE_MAJORS = false
MAJOR = [ ] < > ( ) { } | ! ; , ' " * \n \r \s \t & ? + %21 %26 %2526 %3B %7C %20 %2B %3D -- %2520
%5D %5B %3A %0A %2C %28 %29
MINOR = / : = @ . - $ # % \\ _
```

```
125
17
14
100
125.17
125.17.14
125.17.14.100
17.14
and so forth
```

Minor segment breaker
dot (.) breaks it further

Learn more: About Event Segmentation

How is Data being Stored ?

raw data + dictionary a.k.a. the
(as well as couple other things we won't detail today)

```
125.17.14.100 - - [22/Oct/2024 06:55:45] "POST /product.screen?uid=100dea6a-2e3f-489b-901
12.130.60.5 - - [22/Oct/2024 06:55:45] "GET /product.screen?uid=a9564fea-1f07-451d-9332-9
12.130.60.4 - - [22/Oct/2024 06:55:45] "GET /product.screen?uid=4de2e850-8fd0-4451-94e4-2
27.35.11.11 - - [22/Oct/2024 06:55:45] "POST /product.screen?uid=046182fc-e40a-47a4-b39c-
125.17.14.100 - - [22/Oct/2024 06:55:45] "GET /product.screen?uid=7b0a0ca4-96f8-4d85-b462
195.80.144.22 - - [22/Oct/2024 06:55:45] "POST /product.screen?uid=cf721ea8-0c3d-46d8-9b4
12.130.60.5 - - [22/Oct/2024 06:55:45] "GET /cart.do?action=remove&product_id=DFS-2&JSESS
141.146.8.66 - - [22/Oct/2024 06:55:45] "GET /cart.do?action=changequantity&product_id=MC
84.34.159.23 - - [22/Oct/2024 06:55:45] "GET /product.screen?uid=a2e15361-de09-4fe4-82ae-
125.17.14.100 - - [22/Oct/2024 06:55:45] "GET /product.screen?uid=6d3e3d04-1532-483c-9757
69.80.0.18 - - [22/Oct/2024 06:55:45] "GET /cart.do?action=view&product_id=PP-5&JSESSIONI
201.122.42.235 - - [22/Oct/2024 06:55:46] "GET /product.screen?uid=f3104afb-bfd4-49fb-938
130.253.37.97 - - [22/Oct/2024 06:55:46] "GET /product.screen?uid=c7a82d76-e6c3-4ea6-95a8
141.146.8.66 - - [22/Oct/2024 06:55:46] "GET /product.screen?uid=c304dc64-d2a2-4d32-963e-
125.17.14.100 - - [22/Oct/2024 06:55:46] "GET /product.screen?uid=6e231484-0dbd-4fce-ae40
```

LEXICON

Term	Postings List
GET	1,2,3,5…
POST	0,3,…
125	0,4,9,14,…
17	0,4,9,14,…
14	0,4,9,14,…
100	0,4,9,14,…
125.17	0,4,9,14,…
125.17.14	0,4,9,14,…
125.17.14.100	0,4,9,14,…
17.14	0,4,9,14,…
17.14.100	0,4,9,14,…

Learn more: How the Indexer Stores Indexes

Introducing LISPY

LISPY refers to a type of **internal query syntax** used by Splunk Search Processing Language (SPL) behind the scenes. LISPY stands for "LISP-like." It represents the way Splunk structures its search requests when they are processed internally.

It is not typically something users interact with directly, but understanding LISPY can be helpful for advanced troubleshooting and when debugging complex search queries.

Key points about LISPY:

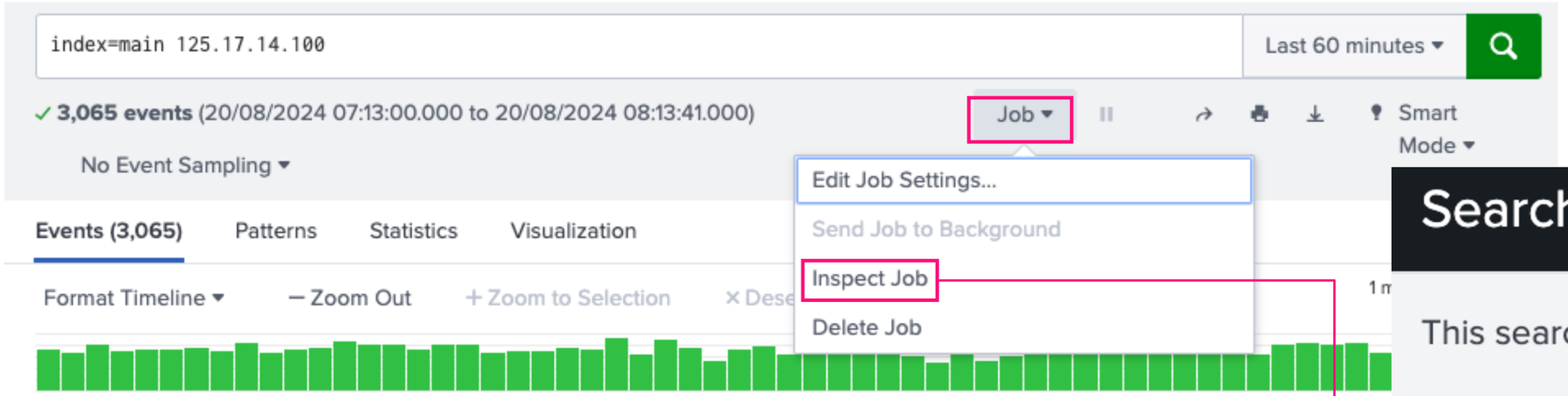
- **LISP-like syntax**: The structure resembles LISP programming language, which uses nested lists and parentheses to represent function calls and operations.
- **Internal representation**: SPL queries are converted into LISPY format by Splunk to be processed more efficiently by the search engine.
- **Advanced usage**: It is mainly useful for Splunk administrators and developers who need to dive deep into query execution or troubleshoot search performance issues.

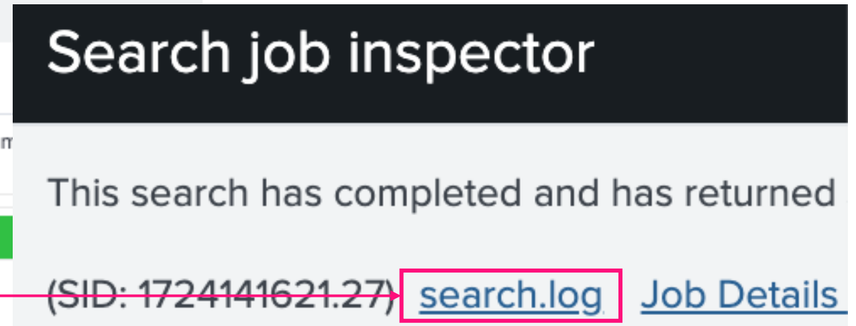
Optimising your search for optimal LISPY can significantly reduce the workload on the indexers by limiting the quantity of data processed.

LISPY mentions found in the wild:
"*LISPY is the search language that we use to search the lexicon*"
(.Conf talk by Richard Morgan: "TSTATS and PREFIX", Slide 14,)
"*LISPY expressions are predicates Splunk uses to locate events*"
(.Conf talk by Martin Mueller: "Fields, Indexed Tokens and You", Slide 11,)

Searching for Raw data

What happens when the search string contains Segment Breakers





And here is how the LISPY for our IP Address looks in the Job Inspector.
Don't you notice anything weird?

```
Expanded index search = (125.17.14.100 index=main)
base lispy: [ AND 100 125 14 17 index::main ]
```

Minor Segment (.)

It breaks the **key word** to look for these values with AND condition.

Learn more: Event Segmentation and Searching

SPL# >

Exploring the TERM directive

The TERM directive is an easy way to improve the search performance …

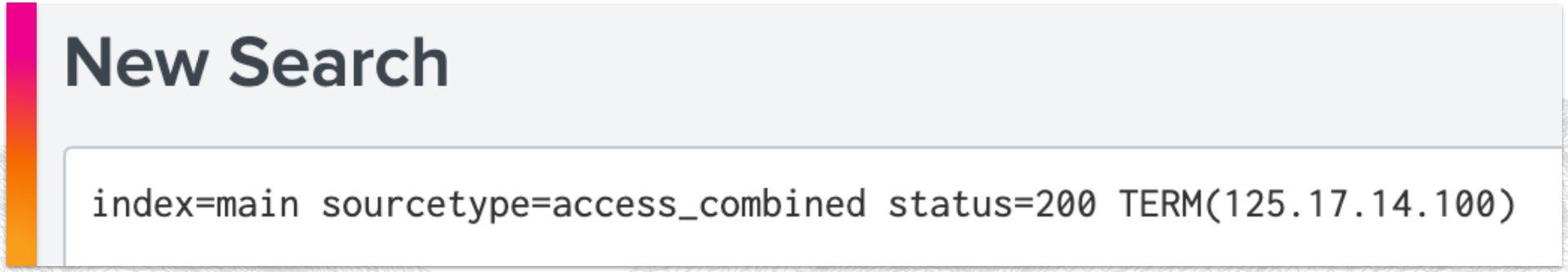
The **TERM() directive** is useful for finding **terms** more efficiently, when:

- They **contain minor breakers**
- Are **bounded by major breakers**, such as spaces or commas
- They **don't contain major breakers**

How can I use it?

It is **quite easy** to try, although not necessarily intuitive at first.
Trial and error **will** be needed.

Here is our previous search modified to include TERM for the IP address



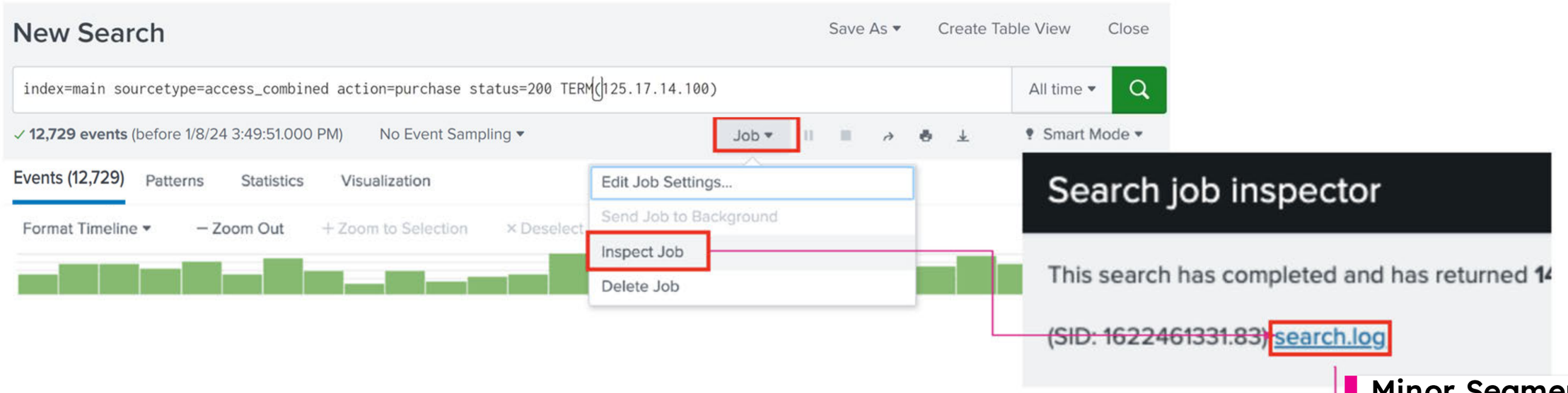
Let’s run it again and see how it performs

When to use TERM: Use CASE() and TERM() to Match Phrases

Measure again, compare results

The **Job Inspector** is our friend

Inspect Job > Check the Search Summary, then head to the search.log & look for the “base lispy” line



Minor Segment (.) breakers are not used. The **Exact string** is searched in the data.

Do's and Dont's of the TERM directive

Your term **must** be bounded by major segmenters.

- E.g. **spaces, tabs, carriage returns.**
- See segmenters.conf for the complete list.

Your term **cannot** contain major segmenters.

Few Major Breakers:

- A space
- A newline
- A tab
- Square brackets [ ]
- Parenthesis ( )
- Curly brackets { }
- An exclamation point !
- A question mark ?
- A semicolon ;
- A comma ,
- Single and double quotation marks ' "
- The ampersand sign &

Learn more:

> segmenters.conf: Segmenters.conf

> CASE and TERM: Use CASE() and TERM() to Match Phrases

Explore the TERM Directive

Some more examples to try out

Task

Exploring the usage of TERM directive

Try the searches and investigate/discuss the following:

1) Are all of these 3 searches going to **work**?
2) In *search.log* find "*base lispy*" and review the **output**.

a) `TERM(131.178.233.243)`

b) `TERM(status=200)`

c) `product_id=TERM(MCB-6)`

TERM - The easy way

a.k.a. “Hovering Method”

Try to run a search and move your mouse slowly over the raw events.
Whatever is under the cursor will change color segment by segment, encompassing minor breakers.
The boundaries of the biggest continuous block of data that can be highlighted at once are major breakers, and therefore a good fit for the TERM directive!

i	Time	Event
>	14/10/2024 12:04:52.000	200.6.134.23 - - [14/Oct/2024 12:04:52] "GET /product.screen?uid=0af7b10f-c0f7-4e51-bd7e-5e0df0db9122&product_id= t.screen?product_id=PP-5" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_12_1) AppleWebKit/602.2.14 Version/10.0.1 Sa host = Domane-Demo- source = /var/log/weblogs/noise_apache.log24 sourcetype = access_combined

It is now as simple as copy pasting the chosen segment into your search:

```
index=main sourcetype=access_combined TERM(uid=0af7b10f-c0f7-4e51-bd7e-5e0df0db9122)
```

No need to remember by heart the list of major and minor breakers :-D

Search Optimization - Wrap Up

We have learned today some general principles behind efficient searches:

- Retrieve only the required data.
- Move as little data as possible.
- Parallelize as much work as possible.
- Pick appropriate time frames.

Within the search, we want to:

- Filter as much as possible in the initial search.
- Perform joins and lookups on **only** the required data.
- Perform evaluations on the minimum number of events possible.
- Position commands that bring data to the search head towards the end of your search.

Reference: About Search Optimization

SPL# > Tstats

Stats is good, but

Tstats is…

~~Better ?~~

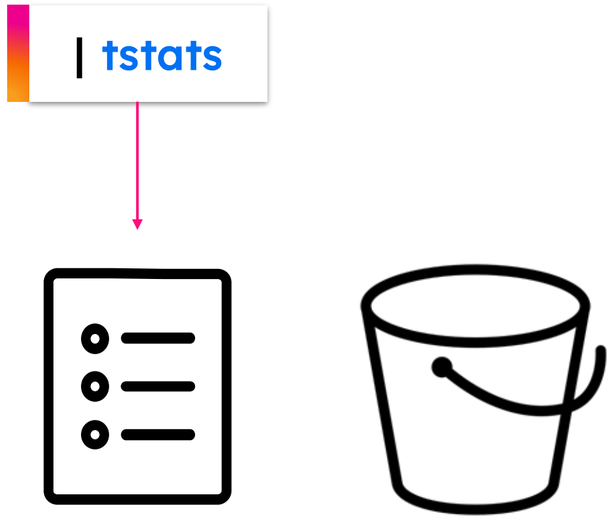
~~Prettier ?~~

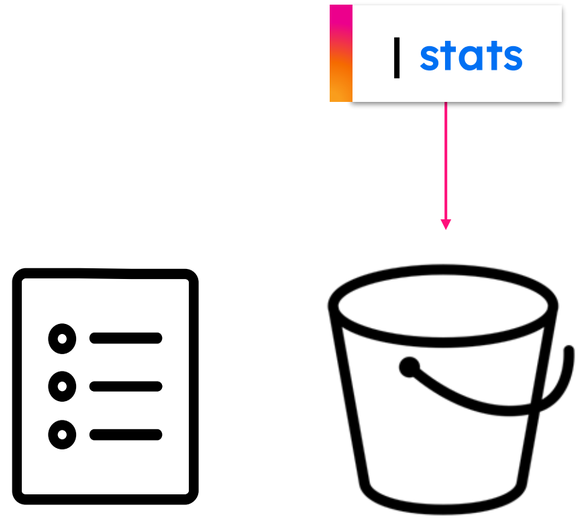
~~Easier ?~~

---> FASTER!

Why use tstats?

- **tstats** is faster than **stats** because it only looks at the **indexed metadata** (the **tsidx files**), while **stats** looks at the **raw data** from the upstream query.





Learn more: SPL Command - "tstats"

Tstats limitations and challenges

- Pre-existence of indexed fields - indexed fields can be either from **indexed data**, or from **Data Model acceleration.**
  - At ingestion we can extract **metadata** from **raw event** and create indexed fields.
  - Some **structured data** sources can optionally create indexed fields **automatically.**
  - The **HTTP Event collector** has a “**fields**” section.
  - Post ingestion we can create a **data model.**

- It is difficult to discover the existence of **indexed fields** when available
  - The `walklex` command can help
  - The existence of **TERMS** can be inferred from log data

```
| walklex index=main type=field
| stats values(field) AS indexed_fields
```

Learn more: SPL Command - "walklex"

SPL# > Tstats the easy way

=

with

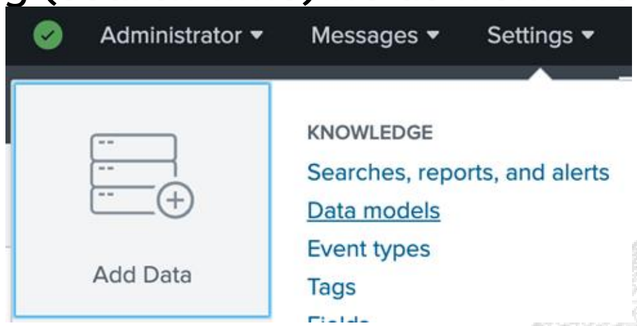
a Data Model

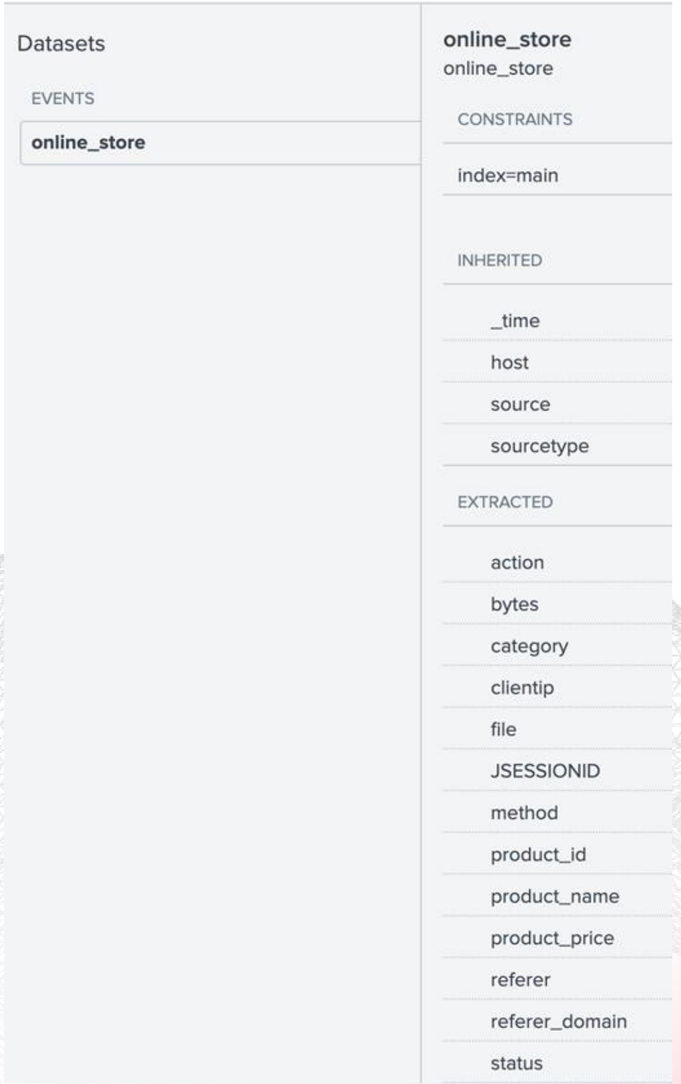
Tstats with a Data Model

We added to our sandboxes a Data Model called

Buttercup / online_store

It simply reuses the existing (search time) fields from the main index



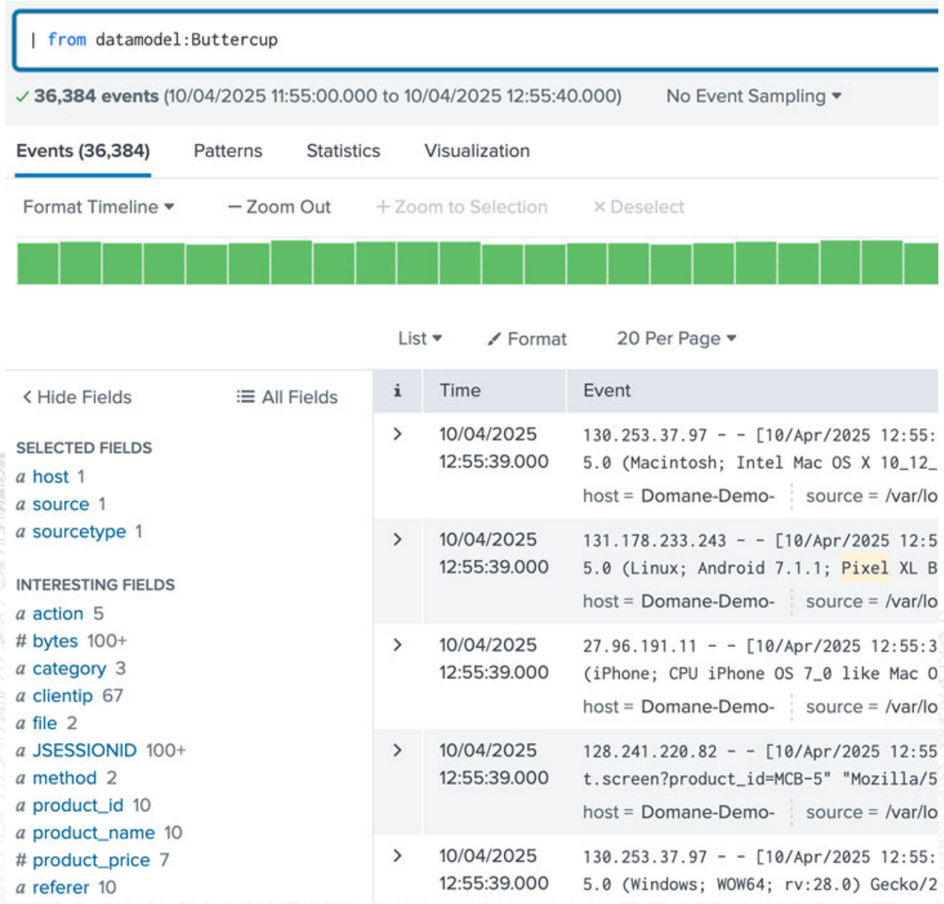


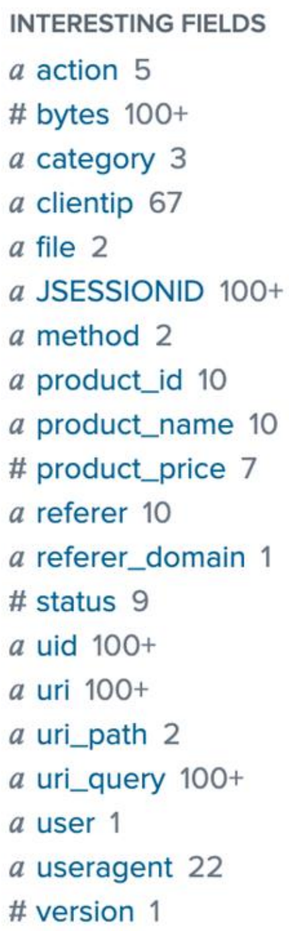
[Data Models deserve a dedicated session, so we won't get too much into details here.
In case you want to catch up, we can recommend:
Data Models Education Course

Splunk Workshops
Splunk4Ninjas - Common Information Model
Splunk4Ninjas - Data Onboarding]

Tstats with a Data Model

It's easy to explore our **Buttercup** data model: just use the **from** command + "**:**" + Data Model name:





All the fields are there, we can run any search as usual. Pretty boring…

So what about **tstats** then?

Tstats with a Data Model

This is where it becomes interesting: you can use tstats with all the fields declared in your DM.

The syntax (and order) are a bit different but it shouldn't be too difficult to figure out:

```
| tstats count as purchase_count sum(online_store.product_price) as total_sales from datamodel=Buttercup
where online_store.action=purchase AND online_store.status<"400" by online_store.category online_store.product_name
| rename online_store.* as *
| sort - total_sales
```

Last 60 minutes

✓ **981 events** (16/04/2025 07:18:00.000 to 16/04/2025 08:18:02.000) No Event Sampling Job Verbose Mode

Events (981) Patterns **Statistics (10)** Visualization

Show: 20 Per Page Format Preview: On

category	product_name	purchase_count	total_sales
Clothing	Costume- ManHawk	87	8482.5
Clothing	Batguy Slippers	100	2570.0
Gifts	Double Fudge Sundae	82	1865.50
Books	Mad Comics- Flyman	124	1574.8
Books	Zombie Survival Guide	93	1414.53
Books	Mad Comics- Bronze Man	100	1270.0
Books	Mad Comics- Batguy	98	1244.6
Clothing	Batguy Watch	104	1038.96
Gifts	Pony Potpourri	89	889.11
Gifts	Waterproof Scratch and Sniff	104	518.96

This search will tell us what product is selling the best:

- Aggregations first (count, sum)
- Then the data source (from)
- Then the filter (where)

returned **10** results by scanning **1,103** events **0.088** seconds

As you can see, it is fast!

Tstats with a Data Model (spoiler: stats is slower)

As you will find out, the same search with stats is significantly slower:

```
index=main sourcetype=access_combined action=purchase status<400
| stats count as purchase_count sum(product_price) as total_sales by category product_name
| sort - total_sales
```

Last 60 minutes

✓ **1,014 events** (11/04/2025 11:50:00.000 to 11/04/2025 12:50:32.000) No Event Sampling Job Verbose Mode

Events (1,014) Patterns **Statistics (10)** Visualization

20 Per Page Format Preview

category	product_name	purchase_count	total_sales
Clothing	Costume- ManHawk	109	10627.5
Clothing	Batguy Slippers	103	2647.1
Gifts	Double Fudge Sundae	108	2457.00
Books	Zombie Survival Guide	115	1749.15
Books	Mad Comics- Flyman	102	1295.4
Books	Mad Comics- Batguy	101	1282.7
Books	Mad Comics- Bronze Man	100	1270.0
Gifts	Pony Potpourri	101	1008.99
Clothing	Batguy Watch	76	759.24
Gifts	Waterproof Scratch and Sniff	99	494.01

A bit simpler to write, true.
But look at the performance.

With bigger datasets, leveraging data model acceleration with tstats is well worth the effort!

returned **10** results by scanning **1,847** events in **0.145** seconds

tstats cannot be matched when it comes to speed…

SPL# > Time for the Ninja Trick!

tstats with PREFIX

What is the PREFIX directive?

Search on a raw segment in your **indexed data** as if it were an extracted field.

Locate a recurring segment in your **raw event data.**

PREFIX

Similar to the **CASE** and **TERM** directives in that, that it matches strings in your **raw data**.

Must be in lower case - the matching is **NOT** case sensitive.

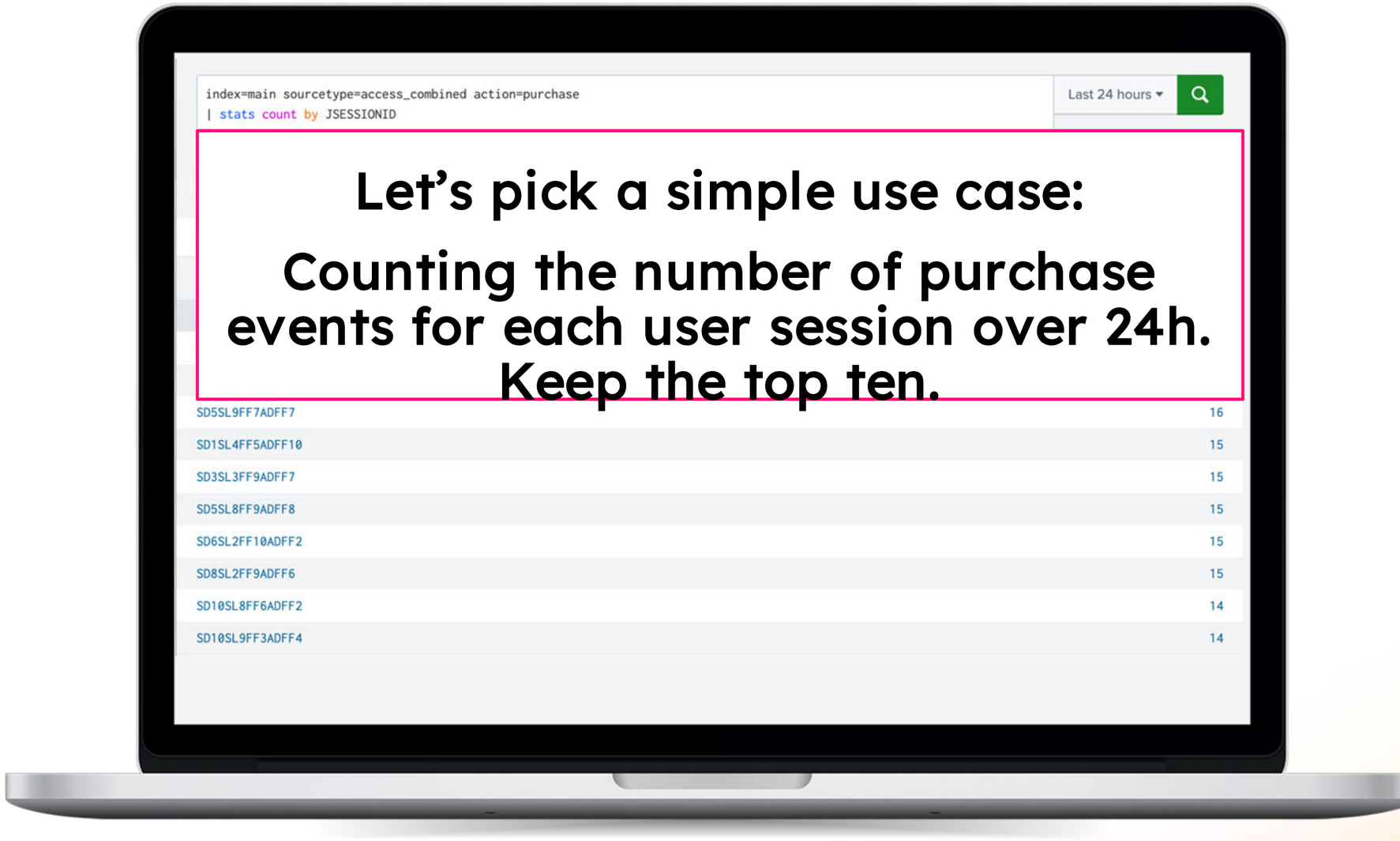
tstats with PREFIX - why does it matters

- With **PREFIX**, **indexed fields** are **no longer** a requirement.
- The **PREFIX** directive **massively increases** the instances where **tstats** can be used.
- **PREFIX allows TERMS** to be processed as if they were **indexed fields.**
- **PREFIX** is also **supported** in **aggregators.**

Learn more: TSTATS and PREFIX

tstats + prefix

in action

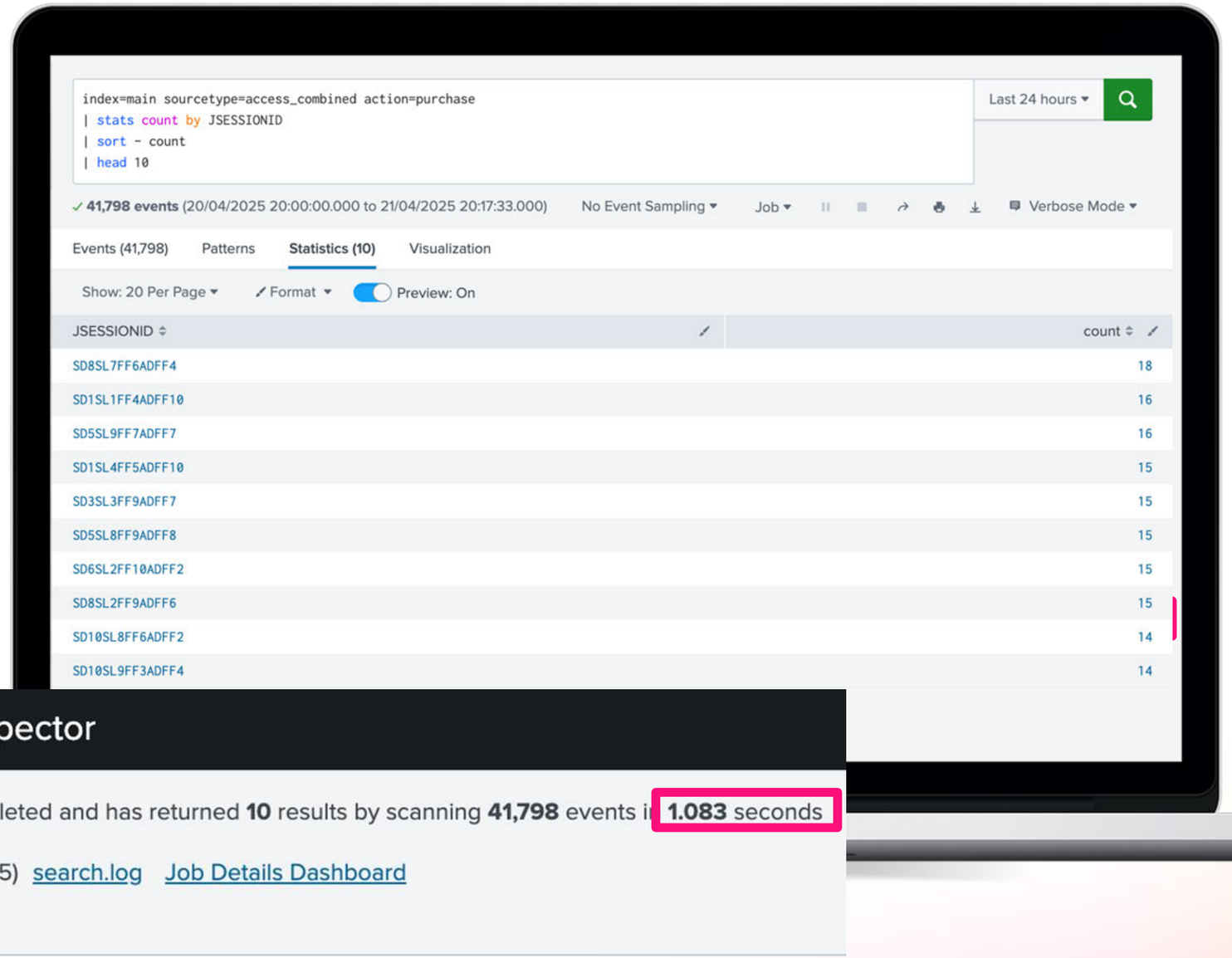


First we will try a regular stats query with our sample dataset over 24h.

It should take about a second.

The goal is to get the results, but also to see the raw events

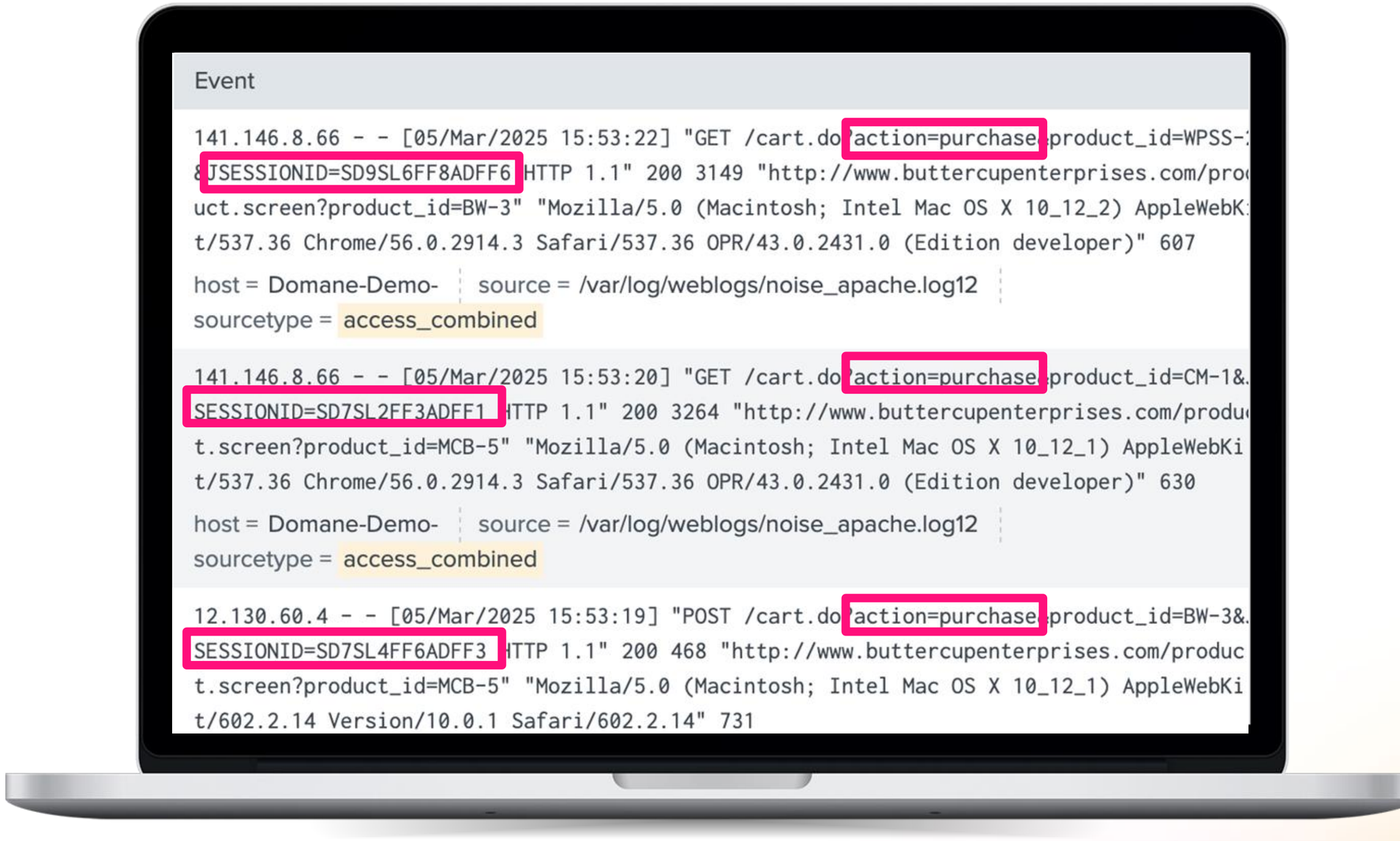
(Verbose Mode recommended)



Next, we try to identify recurring segments, all while paying attention to the major breakers

(same hovering technique as with the **TERM** directive).

This seems to work here. In real life this is not always the case…



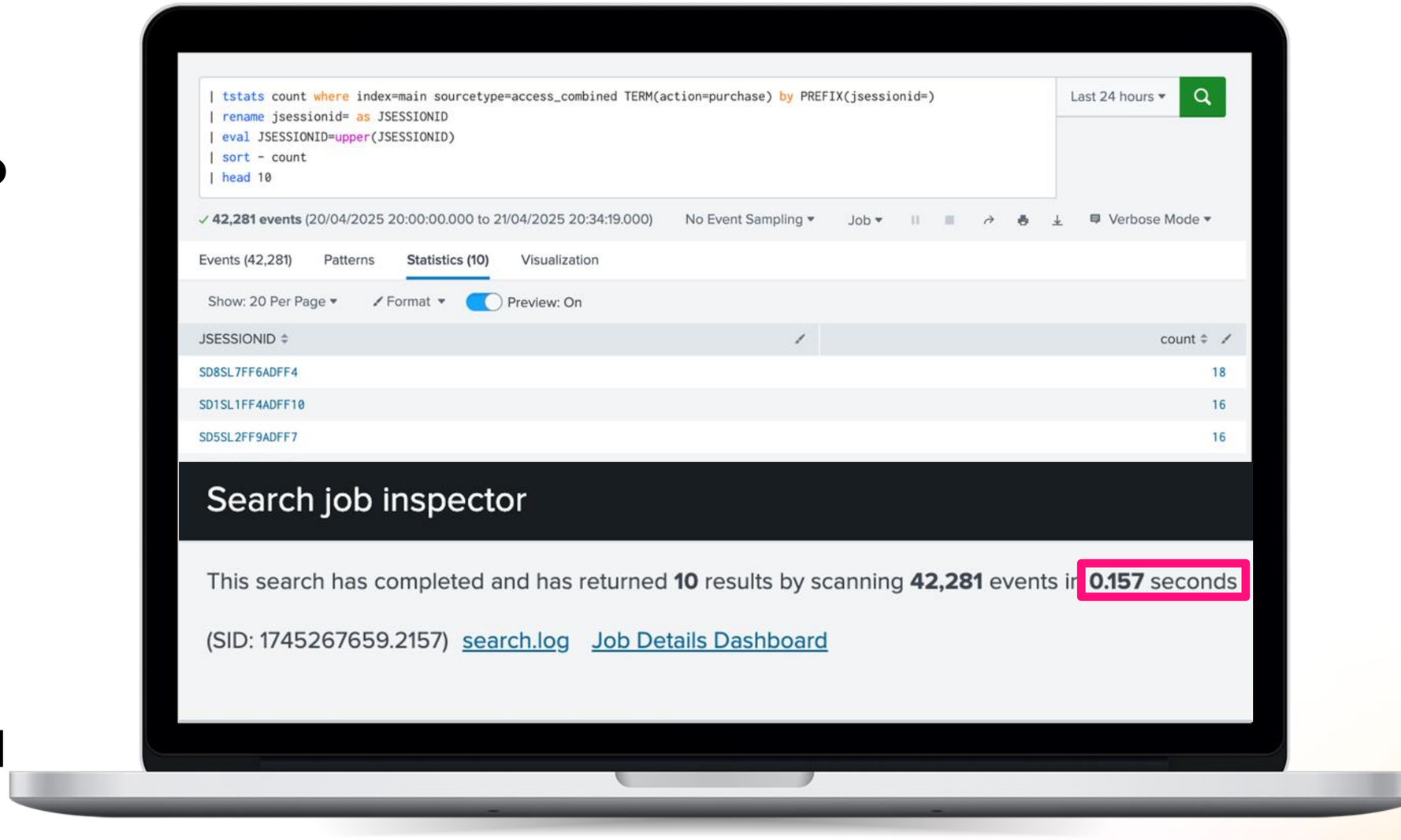
Finally,

We use the ~~fields~~ recurring segments we located earlier to construct our query.

Filters go inside a TERM directive, Aggregations & Group By fields inside a PREFIX

Search time reduced to ~0.157 seconds

Mission Accomplished !



Simple search across Netflow logs

Now let's have a look at a **real world** sample **dataset** to see the **difference** between **tstats** and a **raw search**, where we can see the difference between one and the other. The total number of events in this case is **559,141,805**.

The **difference** is clear: while the **raw search** takes **335.257** seconds to return our results, the **tstats search** takes **17.409** seconds to return the **same amount** of results.

```
index=net_netflow_sec_ext*
| stats count BY src_port
```

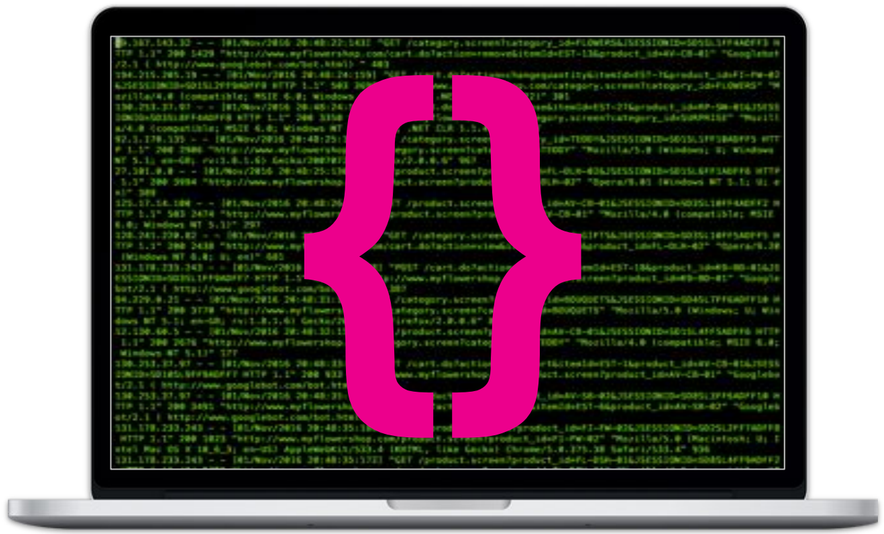
This search has completed and has returned **65,437** results by scanning **559,141,805** events in **335.257** seconds

```
| tstats count WHERE index=net_netflow_sec_ext* BY PREFIX(src_port=)
```

This search has completed and has returned **65,437** results by scanning **559,141,805** events in **17.409** seconds

SPL#>

eval's Hidden Feature



eval and the Field Name Trick

We can use eval to **dynamically** create **additional fields** based on the value of another field. The **trick** is to **use curly braces** “**{}**”.

```
sourcetype = access_combined
| eval is_{category} = 1
```

is_Books 1
is_Clothing 1
is_Gifts 1

is_Books

1 Value, 39.248% of events

Selected: Yes | No

Reports

Average over time | Maximum value over time | Minimum value over time

Top values | Top values by time | Rare values

Events with this field

Avg: 1 **Min:** 1 **Max:** 1 **Std Dev:** 0

Values	Count	%
1	21,337	100%

Learn more: SPL Command - "eval"

eval and the Field Name Trick

That is nice to know, but what problem are we solving here? What's the point?

eval and the Field Name Trick

Let’s demonstrate further with a practical exercise **a.k.a. Challenge Time!**

How could we count the **Total Sales** of each product **category**, and get the results in a format **suitable** to use for a **multi-metric** or a **base search** like below?

Total_Sales_of_Books	Total_Sales_of_Clothing	Total_Sales_of_Gifts
41305.21	103928.31	29798.31

eval and the Field Name Trick

We can get to the results with stats alone, but the output format is **not ideal** for a base search. Since we would like to have one field per category.

Flipping lines and columns using the transpose command can help !

```
index=main sourcetype=access_combined action=purchase status=200
| stats sum(product_price) as Total_Sales by category
| transpose header_field=category
| fields - column
| rename * as Total_Sales_of_*
```

Total_Sales_Of_Books	Total_Sales_Of_Clothing	Total_Sales_Of_Gifts
7610.78	18648.66	5520.81

eval and the Field Name Trick

Quite often with **SPL**, we can get **similar or identical results** using **differents methods**.

Let’s try now with **timechart**.
While this is **not the fastest** way, we can also get pretty **good results**:

```
index=main sourcetype=access_combined action=purchase
status=200
| eval category="Total_Sales_of_"+' category'
| timechart span=1w sum(product_price) by category
| fields - _time
```

Total_Sales_Of_Books	Total_Sales_Of_Clothing	Total_Sales_Of_Gifts
193332.22	477569.83	139191.12

eval and the Field Name Trick

Here's a faster and more elegant way using eval and the **field name trick.**

- We keep only the purchase actions
- We create a new field called "**Total_Sales_of_{category}**" and give each event the **product_price** as value
- As the last step, we combine with stats and **wildcards** to calculate the total amount sold per category

```
index=main sourcetype=access_combined action=purchase
status=200
| eval Total_Sales_of_{category} = product_price
| stats sum(Total_Sales_of_*) as Total_Sales_of_*
```

Total_Sales_of_Books	Total_Sales_of_Clothing	Total_Sales_of_Gifts
41305.21	103928.31	29798.31

SPL# >

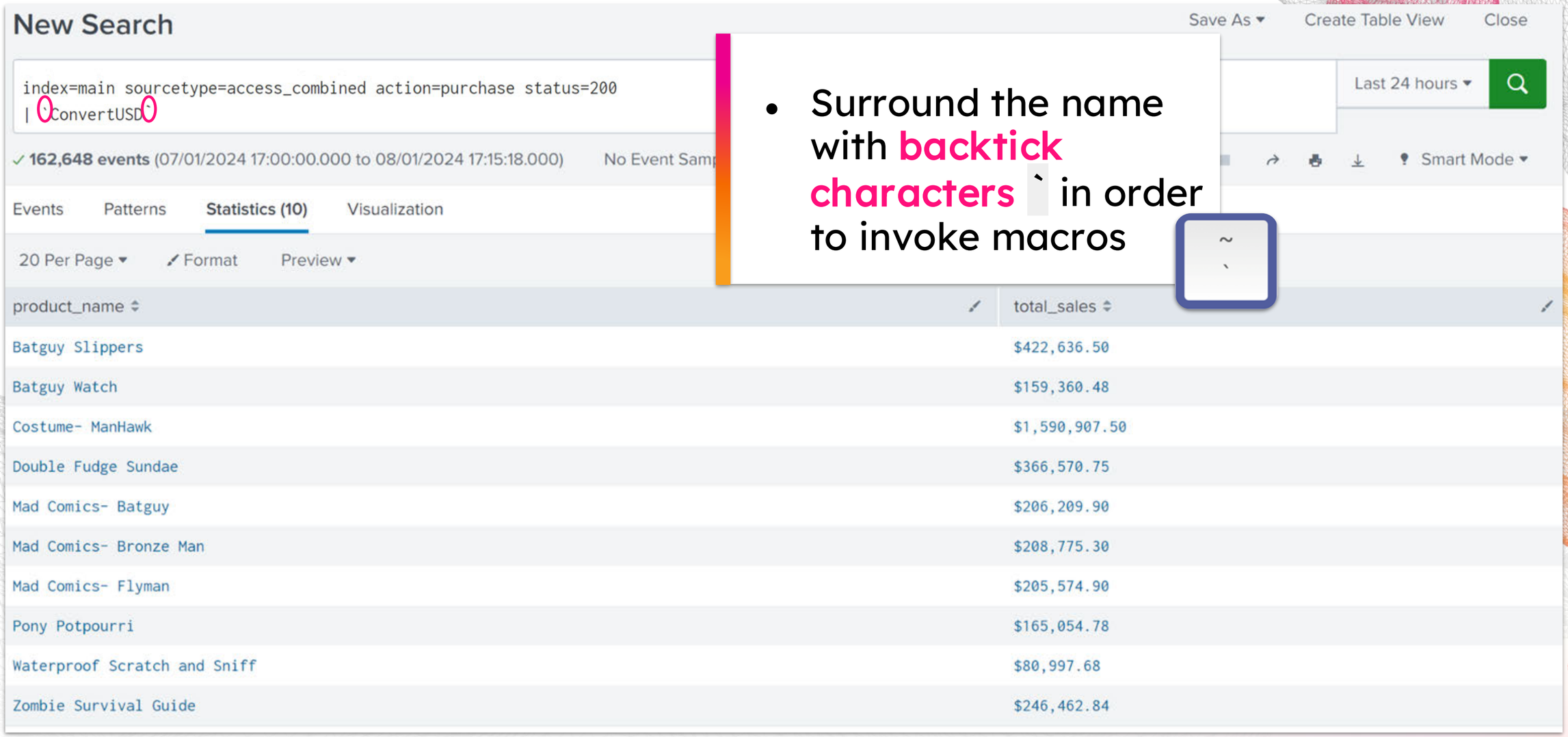
Macros

```
index=main sourcetype="complex_query"
| eval ticket_end_time =
  if(actionCode=="D",strptime(actionTime,"%Y/%m/%d
  %H:%M:%S"),NULL)
| eval ticket_start_time =
  if(actionCode=="I",strptime(firstOccurrence,"%Y/%m/%d
  %H:%M:%S"),NULL)
| transaction serverName serverSerial ticketNumber
| eval ticketDuration = ticket_end_time - ticket_start_time
| eval pretty_ticketDuration =
floor(ticketDuration/60/60)."
  Hours ".floor(floor(ticketDuration -
  (floor(ticketDuration/60/60)*60*60))/60)." Min
  ".floor(ticketDuration%60)." Sec."
| stats avg(ticketDuration) as Average_Ticket_Duration
  list(pretty_ticketDuration) as pretty_ticketDuration by
  serverName serverSerial
```

`Macros`

- Reusable **search strings** or portions of search strings
- Time range **independent**
- Pass **arguments** to the search

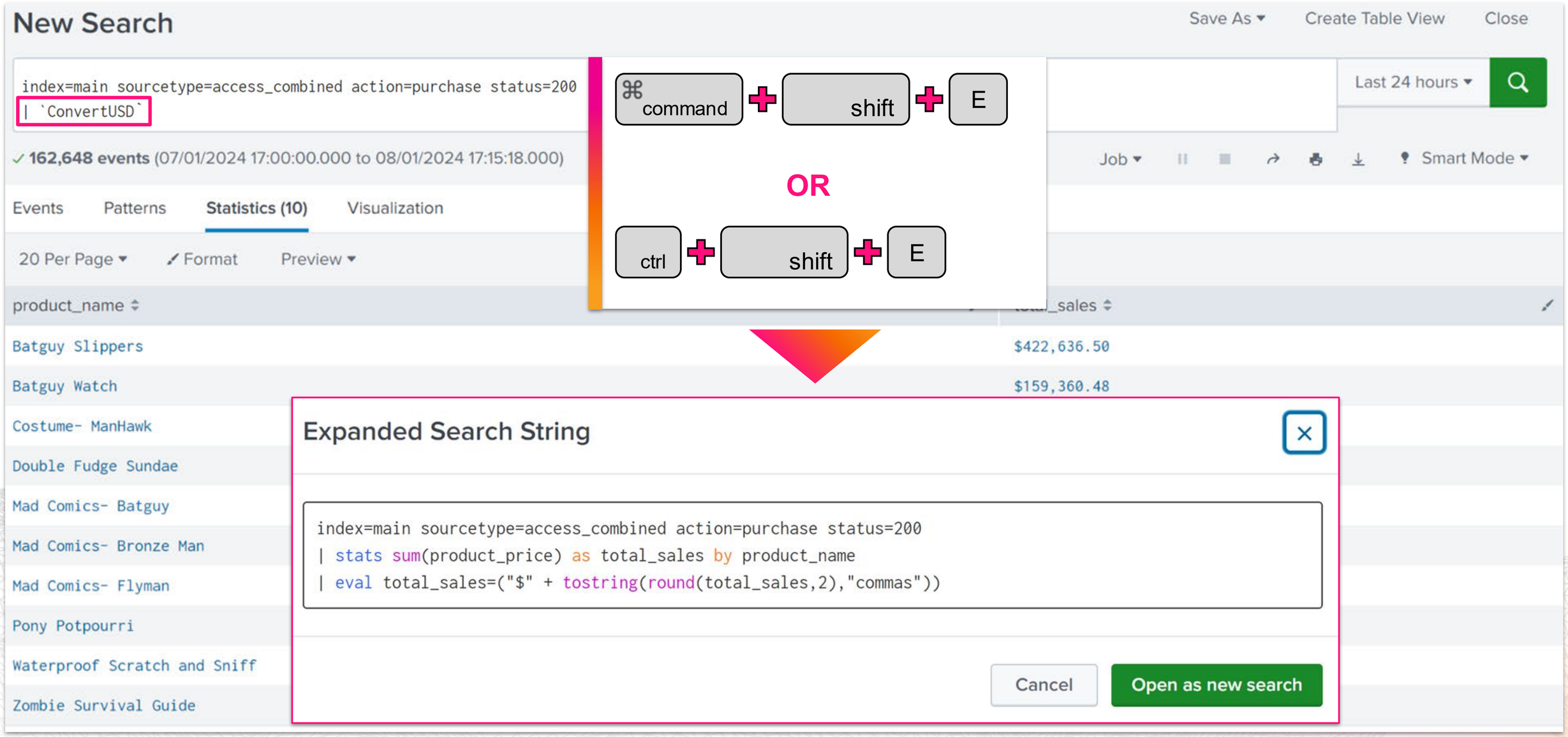
Using Macros



- Surround the name with **backtick characters** `` ` `` in order to invoke macros

Learn more: Define Search Macros in Settings

Expand Macros SPL



SPL# >

eventstats and streamstats

Use Case Example

Thinking beyond stats command

stats may not always be helpful !

So how do you start solving such a use case?

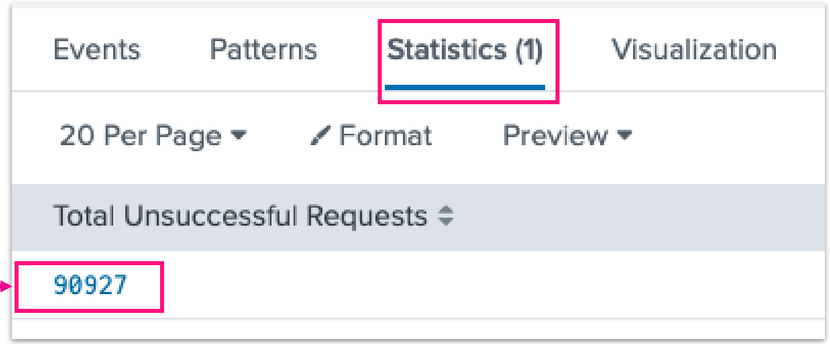
- How many **transactions** did it take to increase the **total revenue** from **$500** to **$1000**
- What is the **total number** of **successful transactions**?

stats is a transforming command

While
eventstats and streamstats add new fields to search while retaining raw data

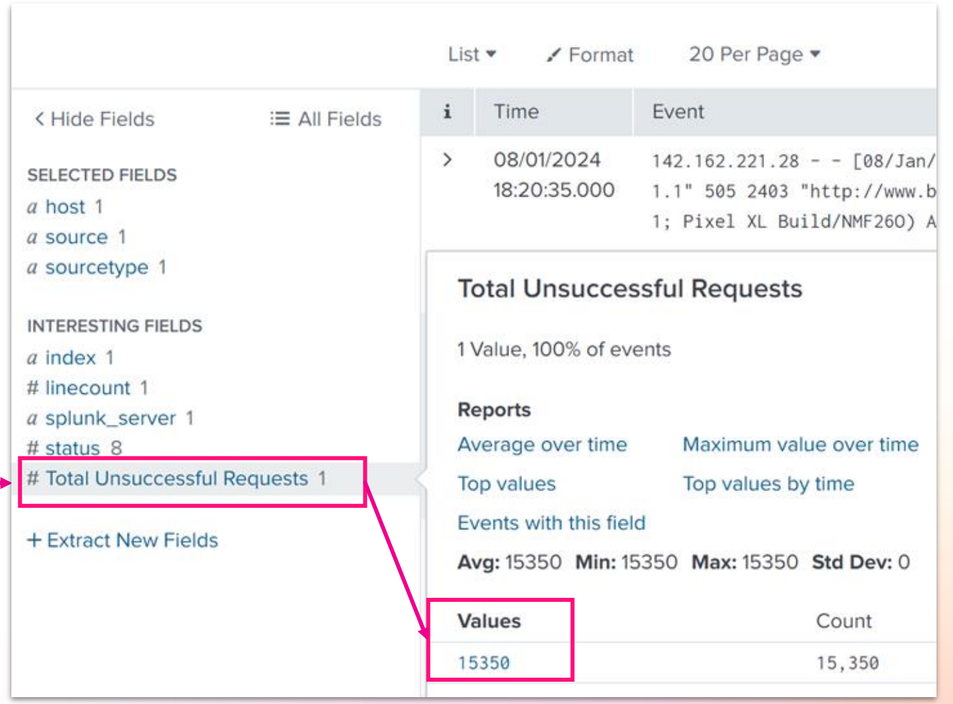
```
index=main sourcetype=access_combined
action=purchase status!=200
| stats count as "Total Unsuccessful Requests"
```

Transforms results into **statistics**




```
index=main sourcetype=access_combined
action=purchase status!=200
| eventstats count as "Total Unsuccessful
Requests"
```

- **Keeps Raw** data
- **Adds** a **new field** for **analytics**



Beyond stats, eventstats and streamstats

Adding Aggregate results to result set for additional calculations

| eventstats
Generates summary statistics from fields in all your events and **saves** those statistics in a new field

| streamstats
Adds cumulative summary statistics to **all search results** in a streaming manner

stats command (works on all results)	eventstats command (works on all results)	streamstats command (works on each event at the time its seen)
Events are transformed into a **table of aggregated search results**	Aggregations are placed into **a new field that is added to each of the events** in your output	Calculates **statistics for each event** at the time the event is seen
You **can only** use the fields in your **aggregated results** in **subsequent commands** in the search	You **can use** the fields in your events in **subsequent commands** in your search, because the events **have not been transformed**	

Statistics functions available with eventstats and streamstats

Similar to stats – more complex functions can be used

Type of function	Supported functions and syntax			

Aggregate functions	`avg()`
	`count()`
	`distinct_count()`
	`estdc()`
	`estdc_error()`
		`exactperc<int>()`
		`max()`
		`median()`
		`min()`
		`mode()`
			`perc<int>()`
			`range()`
			`stdev()`
			`stdevp()`
				`sum()`
				`sumsq()`
				`upperperc<int>()`
				`var()`
				`varp()`

Event order functions	`earliest()`	`first()`	`last()`	`latest()`
Multivalue stats and chart functions	`list(X)`	`values(X)`		

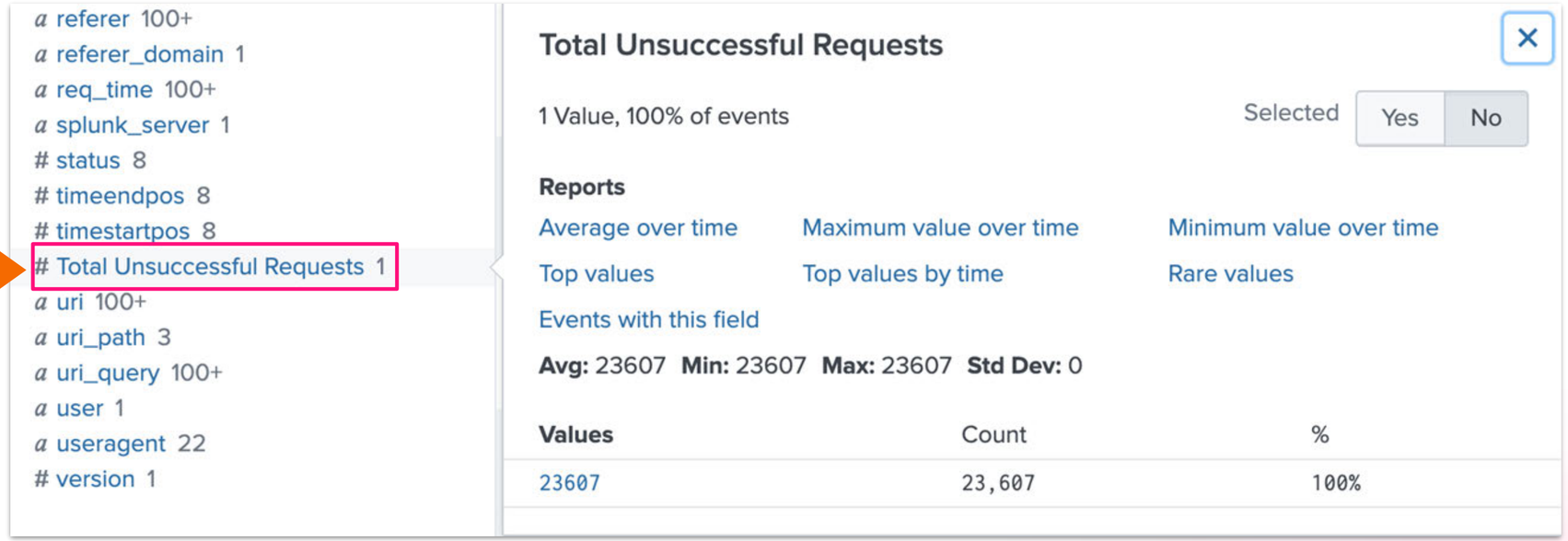
SPL# > eventstats Search

Search for failed purchase transactions over the last 24 hours

Solution:

```
index=main sourcetype=access_combined action=purchase status!=200
| eventstats count as "Total Unsuccessful Requests"
```

New field created with total count of unsuccessful requests



Learn more: SPL Command - "eventstats"

SPL# > streamstats Search

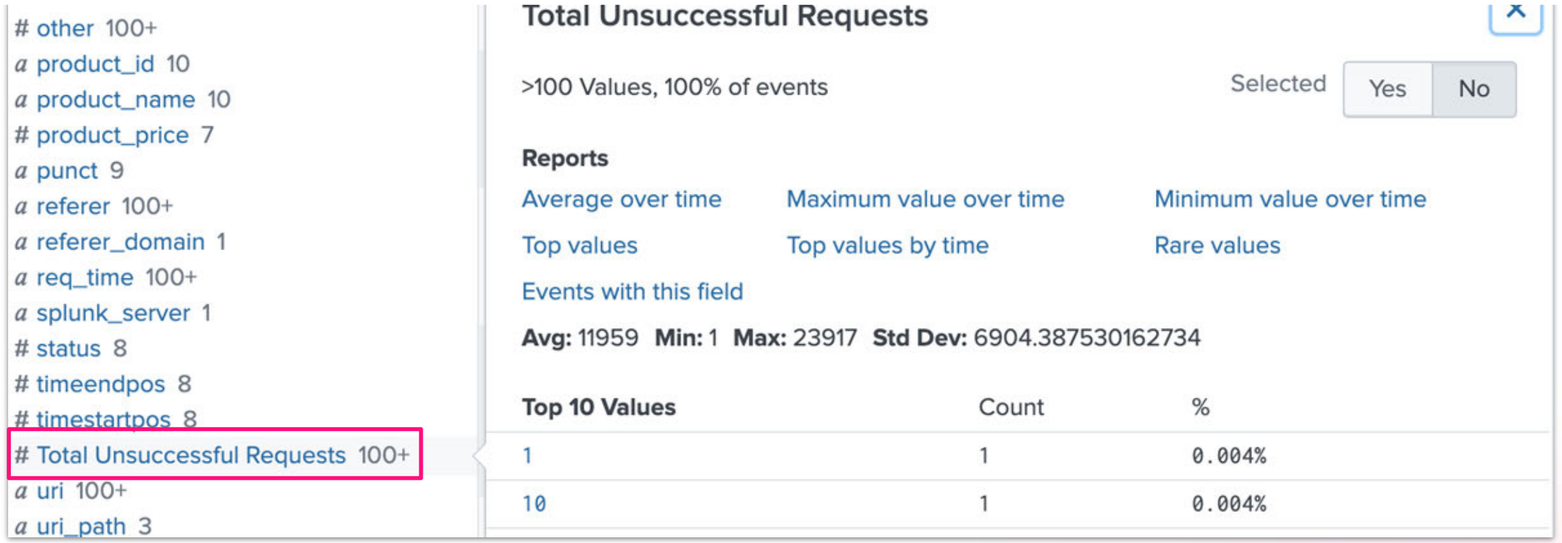
Search for failed purchase transactions over the last 24 hours

Solution:

```
index=main sourcetype=access_combined status!=200 action=purchase
| streamstats count as "Total Unsuccessful Requests"
```

New field created in **streaming manner** >

Adding the **count** as it finds a **new event** with status!=200 and **adds count to event**



Learn more: SPL Command - "streamstats"

SPL# >

Percentage of Total Revenue

SPL# > Percentage of Total Revenue

Percentage of **total** **revenue** generated by “**Zombie Survival Guide**” in the **last 4 hours**

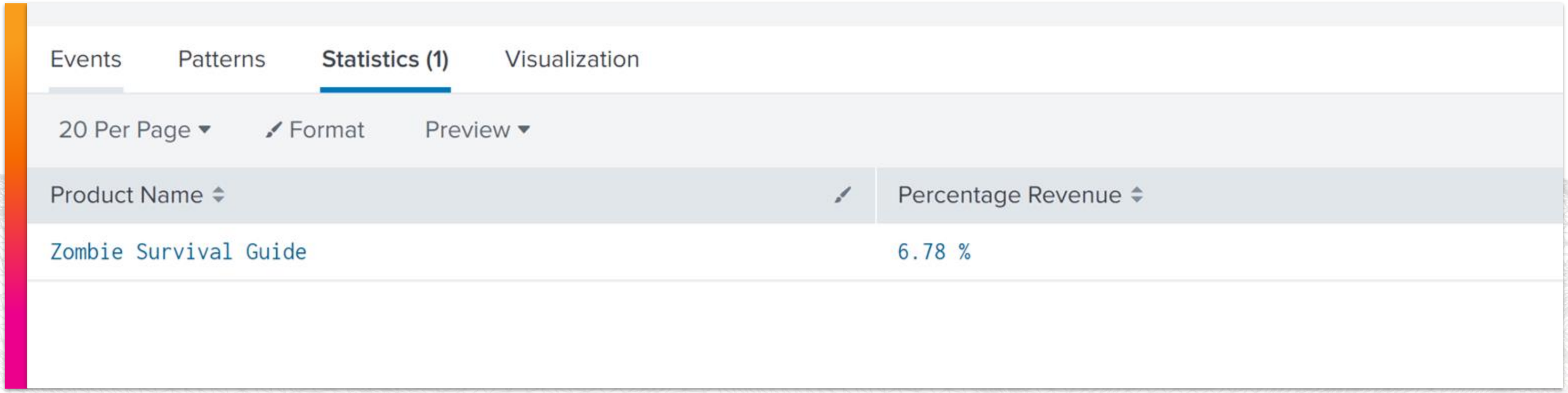
product_name	per_prod_rev	total_rev	rev_pct
Zombie Survival Guide	217731.15	3225141.63	6.7510570

Solution:

```
index=main sourcetype=access_combined action=purchase status=200
| eventstats sum(product_price) as total_rev
| eventstats sum(product_price) as rev_per_prod by product_id
| eval percent_revenue=rev_per_prod/total_rev*100
| where product_name="Zombie Survival Guide"
| stats values(rev_per_prod) as per_prod_rev, values(total_rev) as total_rev,
  values(percent_revenue) as rev_pct by product_name
```

SPL# > Challenge Task

What search should you run to show the table below?



SPL# > Challenge Task Solution

Solution:

```
index=main sourcetype=access_combined action=purchase status=200
| eventstats sum(product_price) as total_rev
| eventstats sum(product_price) as rev_per_prod by product_id
| where product_name="Zombie Survival Guide"
| eval percent_revenue=round(rev_per_prod/total_rev*100,2)." %" , "Product
Name"=product_name
| stats values(percent_revenue) as "Percentage Revenue" by "Product Name"
```

SPL# >

Popularity Ranking

SPL# > Popularity Ranking

Popularity ranking of each product within its category in the last 24 hours

Solution:

```
index=main sourcetype="access_combined" action=purchase status=200
| stats count by product_name, category
| sort - count
| streamstats count as rank by category
| stats list(rank) as "Category Rank", list(product_name) as "Product Name" by category
```

category	Category Rank	Product Name
Books	1	Mad Comics- Flyman
	2	Mad Comics- Bronze Man
	3	Zombie Survival Guide
	4	Mad Comics- Batguy
Clothing	1	Batguy Watch
	2	Batguy Slippers
	3	Costume- ManHawk
Gifts	1	Pony Potpourri
	2	Waterproof Scratch and Sniff
	3	Double Fudge Sundae

SPL# > Using streamstats and eventstats

stats may not be always sufficient !

Challenge Task

How many transactions did it take to increase the **total revenue** from $500 to $1000 and what was the **total number** of successful transactions?

Use Case Breakdown:

1. **Find** successful purchase **events**
2. **Calculate** the **total revenue** from the point in time when it was $500 and then increased to $1000
3. **Calculate** the **total** number of **events** it took to go from $500 to $1000
4. **Calculate** the **number** of **total transactions**

SPL# > Challenge

How many **transactions** did it take to increase the **total revenue** from **$500 to $1000** and what was the **total number** of **successful transactions?**

Transaction Count <500	Transaction Count 500<1000	Transaction Count >1000	Total Transaction Count	Total Sales
25	27	24649	24701	556919.86

```
index=main sourcetype=access_combined action=purchase status=200
| reverse
| streamstats sum(product_price) as revenue_tracker
| eval txn_count = case(revenue_tracker<500, " <500", revenue_tracker>=500 AND revenue_tracker<1000, "500
    <1000", revenue_tracker>=1000, ">1000"), txn_count_{txn_count}=txn_count
| stats count(txn_count_*) as "Transaction Count *" count as "Total Transaction Count" sum(product_price)
    as "Total Sales"
```

SPL# >

spath as an SPL Command

Extract Specific Information

Default > Splunk Extracts JSON

Directly in SPL

```
| spath [input=<field>] [output=<field>]
  path=<datapath>
```

spath command

As function within eval command

```
| eval A=spath(X,Y)
```

SPL# > spath as an SPL command

Use spath command directly within SPL

Syntax

```
| spath [input=<field>] [output=<field>] [path=<datapath> | <datapath>]
```

Field to **read & extract** values from

Output written to this field

Location path to the value needed for **extraction**

Learn more: SPL Command - "spath"

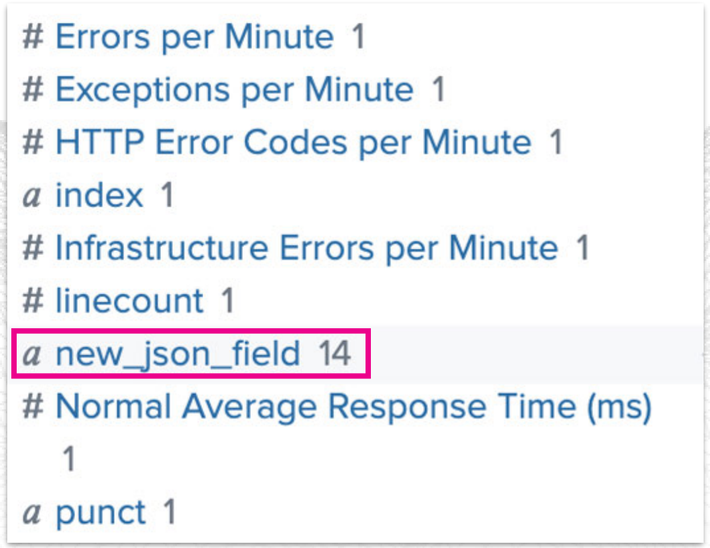
SPL# > spath as an SPL command

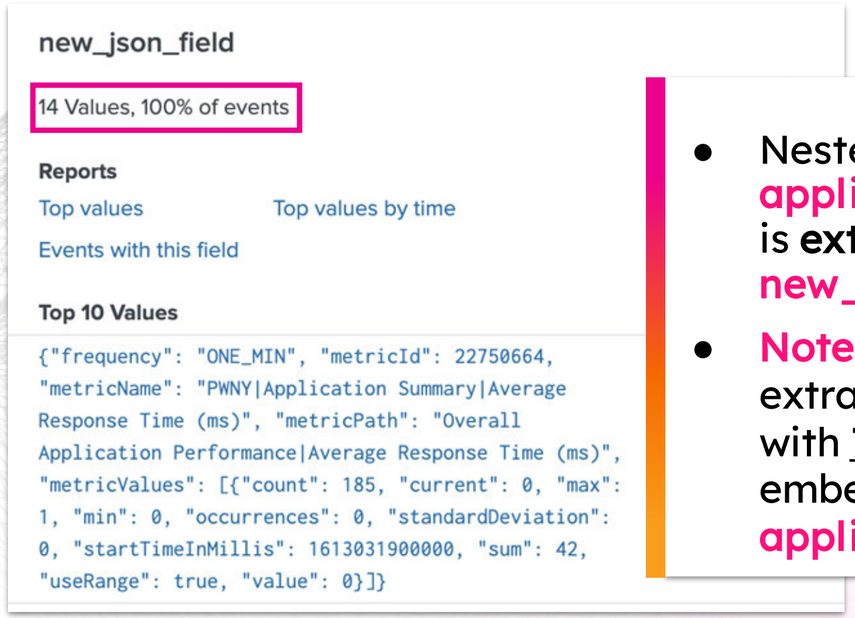
Use spath command directly within SPL

Solution:

```
index=sample_data application_performance
| spath input=_raw output=new_json_field path=application_performance{}
```

Explore the **newly** created field "new_json_field"





- Nested **JSON** Array under application_performance is **extracted** & **added** into new_json_field.
- **Note:** There are **14 values** extracted. We have **2 events** with **7 values** each embedded within application_performance.

SPL# >

spath as an eval Function

Extract Specific Information

Default > Splunk Extracts JSON

Directly in SPL

```
| spath [input=<field>] [output=<field>]
  path=<datapath>
```

spath command

As function within eval command

```
| eval A=spath(X,Y)
```

SPL# > spath as an eval function

Use spath function directly within the eval command

Syntax:

```
| eval A=spath(X,Y)
```

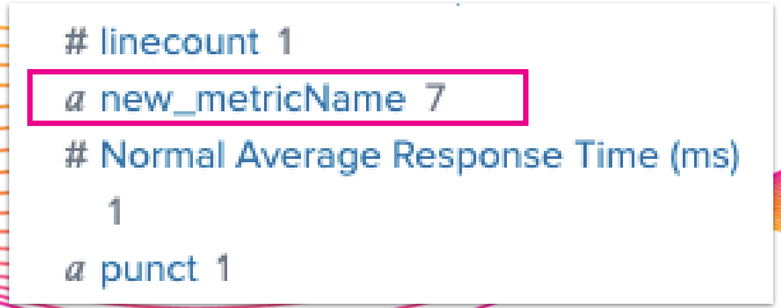
From **structured** data type(X) in **XML** or **JSON** format; extract value at Y and assign to A

SPL# > spath as an eval function

SPL#12 > Search 1 of 2 over All Time

Solution:

```
index=sample_data application_performance
| eval new_metricName=spath(_raw,"application_performance{}.metricName")
```

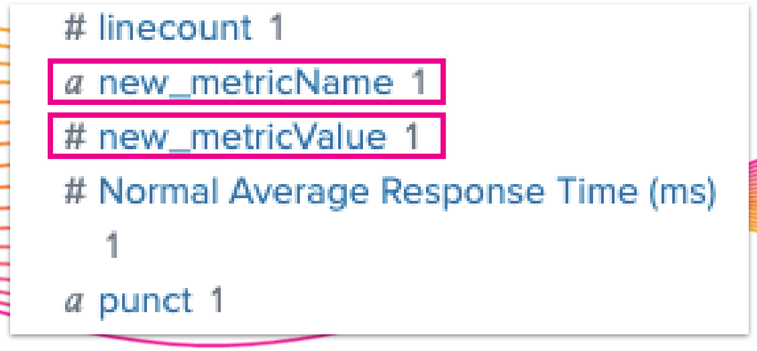


SPL# > spath as an eval function

SPL#12 > Search 2 of 2 over All Time

Solution:

```
index=sample_data application_performance
| eval new_metricName=spath(_raw,"application_performance{4}.metricName")
| eval new_metricValue=spath(_raw,"application_performance{4}.metricValues{}.current")
```



Learn more: SPL Command - "spath"

Validate if a new field was created

Validate if a new field was created

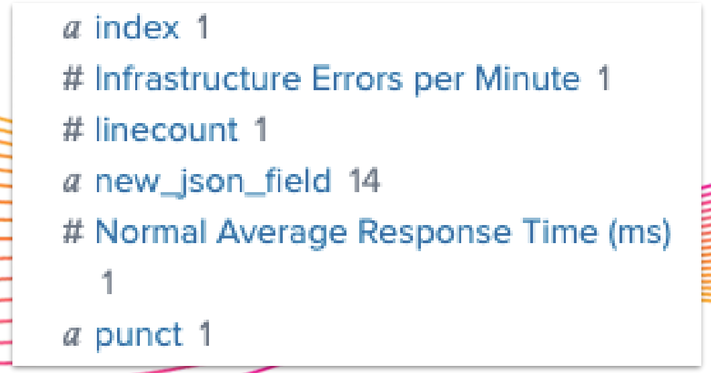
Explore the output field(s):

Solution:

```
index=sample_data application_performance
| spath input=_raw output=new_json_field path=application_performance{}
| eval new_metricName=spath(new_json_field,"metricName")
```

The SPL does **NOT** extract new field "new_metricName"

Why not?



Find out why the new field was not created

Find out why the new field was not created

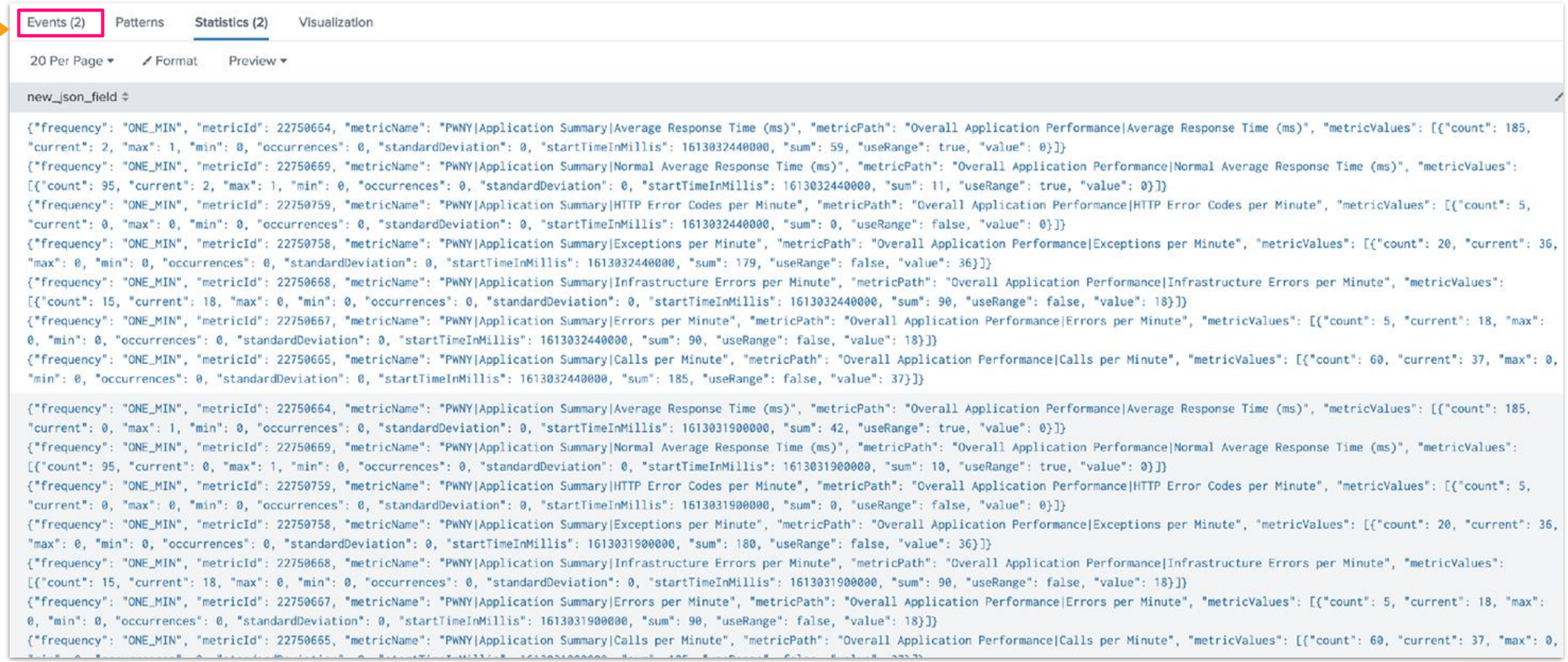
spath command creates a multi-value field:

Solution:

```
index=sample_data application_performance
| spath input=_raw output=new_json_field path=application_performance{}
| table new_json_field
```

Find out why the new field was not created

Two events returned with multiple values



Learn more: SPL Command - "spath"

SPL# >

The mvexpand Command

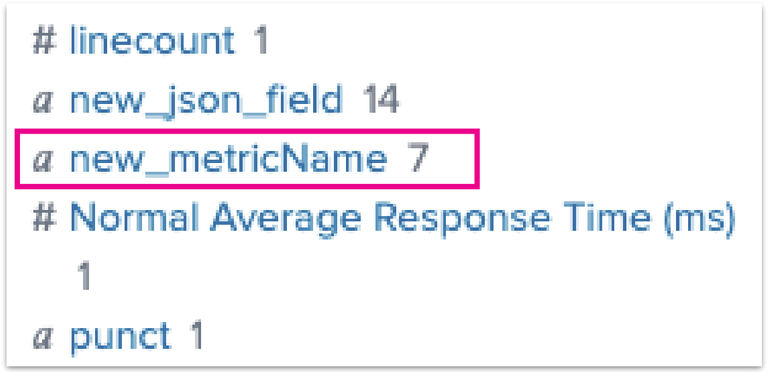
SPL# > The mvexpand Command

Expand and extract the field

Solution:

```
index=sample_data application_performance
| spath input=_raw output=new_json_field
path=application_performance{}
| mvexpand new_json_field
| eval new_metricName=spath(new_json_field,"metricName")
```

Did the SPL **extract** the new_metricName field?



SPL# >

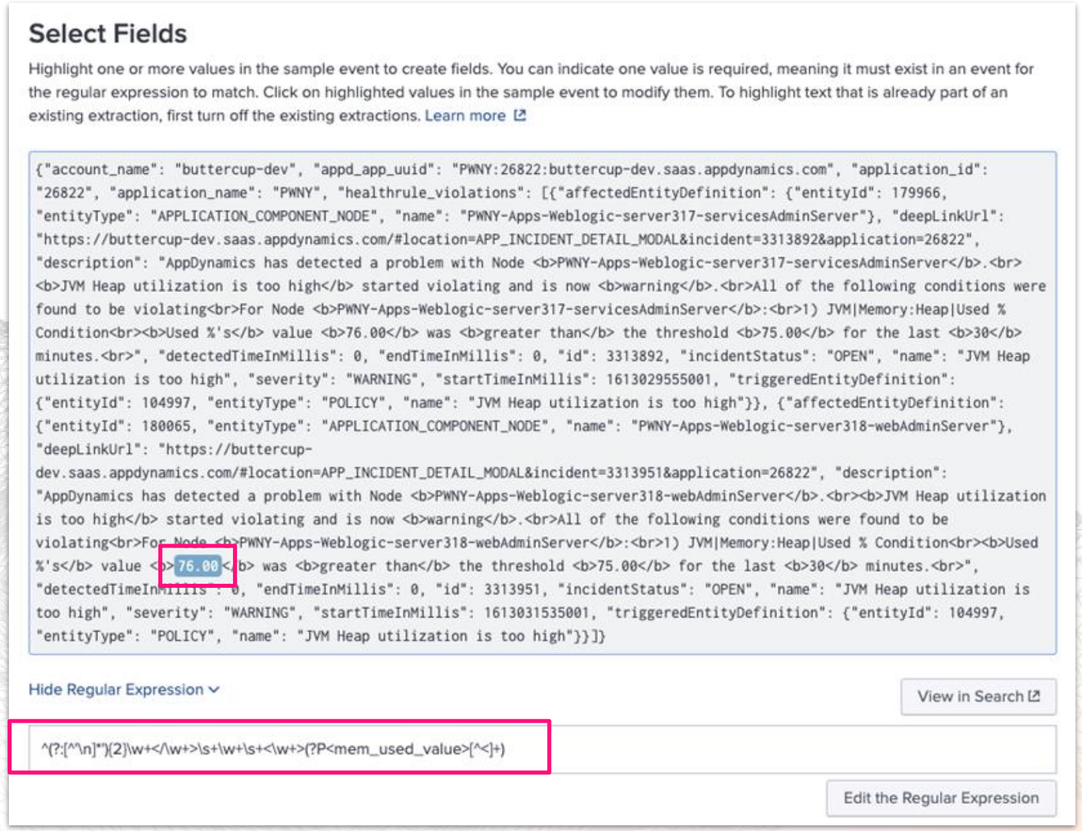
Introducing the rex Command

- Improperly formatted data
- multi format events
- field extractions
- data transformation

Field Extraction and Regex Refresher

Extracting the value of the Heap Memory usage from the raw data

- After **extraction**, Splunk provides the Regular Expression used to provide the **instructed field**
- The previous example shows how to incorporate the **rex** command (regular expression) within the **SPL**



SPL# > Introducing the rex command

Rex Command Syntax:

```
| rex [field=<field>] [max_match=<int>] [offset_field=<string>]
( <regex-expression> | mode=sed <sed-expression> )
```

Today's focus:

- `| rex field=<field> "<regex-expression>"`

- `| rex field=<field> mode=sed "<sed-expression>"`

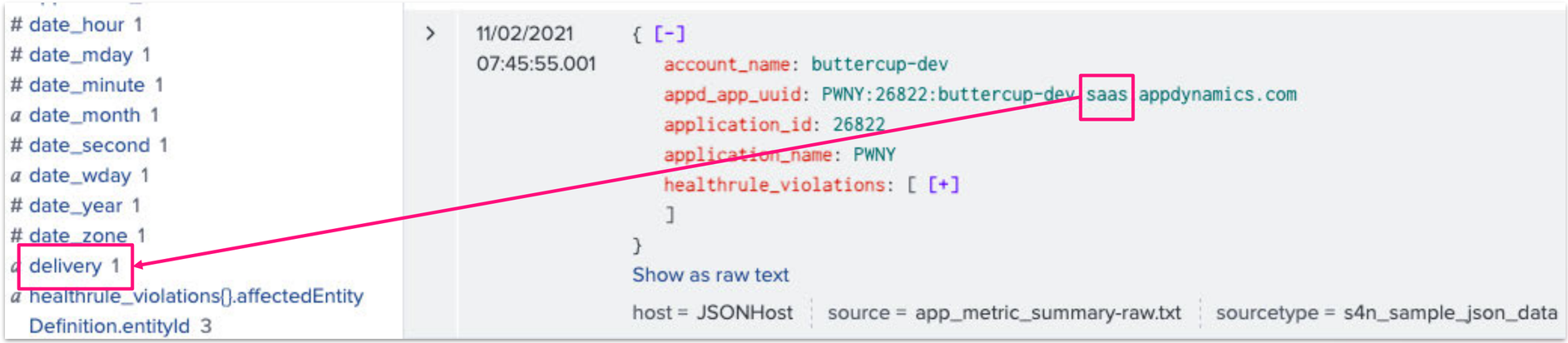
SPL# > Introducing the rex command continued

Example: Extracting the **delivery** method (saas) value from the **healthrule_violations** **events** in the **sample_data** index

```
index=sample_data healthrule_violations
| rex field=appd_app_uuid "^\w+\:\d+\:[\w\-]+\.(?<delivery>\w+)\."
```

JSON field which contains the **value** we need

Name of **new field**



SPL# > Introducing the rex command

Working with multiformat events

Use Case: From **health rule violation events** (json), extract "**Memory Heap used % value**" (xml)

Use the search string "**index=sample_data healthrule_violations**" to get relevant **events.**

Event


```
{ [-]
   account_name: buttercup-dev
   appd_app_uuid: PWNY:26822:buttercup-dev.saas.appdynamics.com
   application_id: 26822
   application_name: PWNY
   healthrule_violations: [ [-]
     { [-]
       affectedEntityDefinition: { [+]
       }
       deepLinkUrl: https://buttercup-dev.saas.appdynamics.com/#location=APP_INCIDENT_DETAIL_MODAL&incident=3313892&application=26822
       description: AppDynamics has detected a problem with Node <b>PWNY-Apps-Weblogic-server317-servicesAdminServer</b>.<br><b>JVM Heap utilization is too high</b>
started violating and is now <b>warning</b>.<br>All of the following conditions were found to be violating<br>For Node <b>PWNY-Apps-Weblogic-server317-
servicesAdminServer</b>:<br>1) JVM|Memory:Heap|Used % Condition<br><b>Used %'s</b> value <b>76.00</b> was <b>greater than</b> the threshold <b>75.00</b> for the last
<b>30</b> minutes.<br>
       detectedTimeInMillis: 0
       endTimeInMillis: 0
       id: 3313892
       incidentStatus: OPEN
       name: JVM Heap utilization is too high
       severity: WARNING
       startTimeInMillis: 1613029555001
       triggeredEntityDefinition: { [+]
       }
     }
     { [-]
       affectedEntityDefinition: { [+]
```


The required **value** is not extracted and is within the "**description**" field under "**healthrule_violations**" **JSON** object

SPL# > Introducing the rex challenge

Challenge: **Calculate** the **average** **Memory Heap Usage**, and **display** it next to a list of values by **Application ID**, as **exemplified** in the following table:

```
index=sample_data healthrule_violations
| rex field=healthrule_violations{}.description "Used\s\%\'s\<\/b\>\svalue\s\<b\>(?<mem_used_value>(.+?))\<"
| stats list(mem_used_value) AS "List of Memory Heap Values", avg(mem_used_value) AS "Average Memory Heap Used"
  BY application_id
| rename application_id AS "Application ID"
```

Application ID	List of Memory Heap Values	Average Memory Heap Used
26822	76.00 76.00 81.00 76.00 76.00	77

Hints:

- Run the search against **All Time**
- Use the **rex** command to extract the **Memory Heap Used %** value (this can be found in the **healthrule_violations{}.description** field)
- An example of the regular expression is: **Used\s\%\'s\<\/b\>\svalue\s\<b\>(?<mem_used_value>(.+?))\<**

SPL# >

Using rex command with SED Mode

SPL# > Using the rex command with SED Mode

Let's consider we want to anonymize the **last two** digits of the application_id in our table. To achieve this, we can use the rex command with the mode=**sed** option. One of the **most common** use cases for this is **data** anonymization at **ingest time**.

Application ID	List of Memory Heap Values	Average Memory Heap Used
26822	76.00 76.00 81.00 76.00 76.00	77

```
...
| rex mode=sed field=application_id "s/(\d{3})(\d{2})/\1xx/g"
...
```

Application ID	List of Memory Heap Values	Average Memory Heap Used
268xx	76.00 76.00 81.00 76.00 76.00	77

Good Rex / Bad Rex

A.k.a “Who’s been a good boy?”

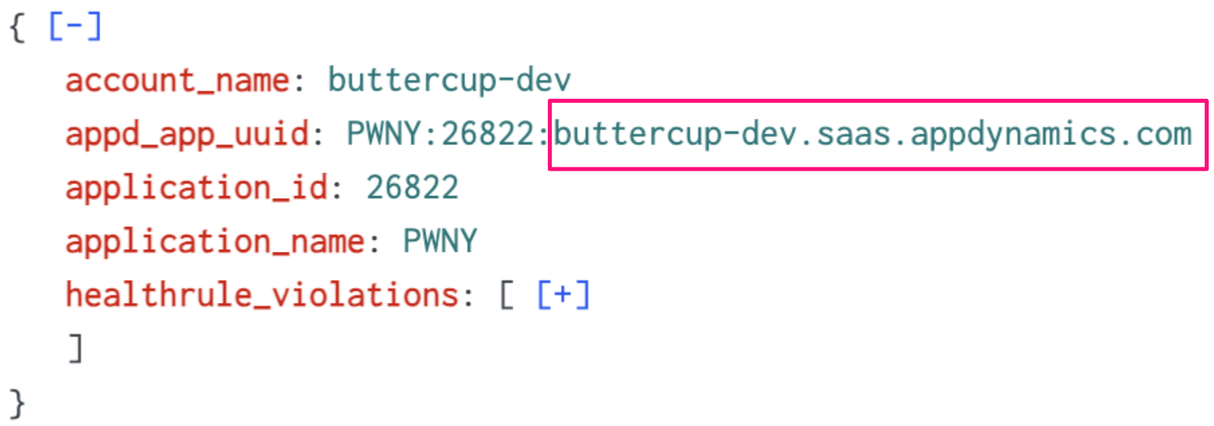
Good Rex / Bad Rex

The scene

Considering our healthrule violations data

```
index=sample_data healthrule_violations earliest=0
```

We want to get the Controller FQDN value:



Good Rex / Bad Rex - The Bad Way

```
appd_app_uuid: PWNY:26822:buttercup-dev.saas.appdynamics.com
```

The bad Regex

```
| rex "\w+:.*?:(?<FQDN>([^\n]*)?)"
```

Why is it bad?

- Lazy wildcard (.*?) scan the entire text looking for matches, increasing backtracking.
- Non-matching characters [^\n] look for characters that do not match \n
- Greedy quantifier (*) matches 0 or more occurrences of a character
- No specification (field=<value>) will run on the entire raw data.

As a result, our field extraction is not only performing poorly, but it's also not extracting what we need.

buttercup-dev.saas.appdynamics.com", "application_id": "26822", "application_name": "PWNY", "healthrule_violations": [{"affectedEntityDefinition": {"entityId": 179966, "entityType": "APPLICATION_COMPONENT_NODE", "name": "PWNY-Apps-Weblogic-server317-servicesAdminServer"}, "deepLinkUrl": "https://buttercup-dev.saas.appdynamics.com/#location=APP_INCIDENT_DETAIL_MODAL&incident=3313892&application=26822", "description": "AppDynamics has detected a problem with Node PWNY-Apps-Weblogic-server317-servicesAdminServer
JVM Heap utilization is too high started violating and is now warning
All of the following conditions were found to be violating
For Node PWNY-Apps-Weblogic-server317-

Good Rex / Bad Rex - The Good Way

```
appd_app_uuid: PWNY:26822:buttercup-dev.saas.appdynamics.com
```

The good Regex

```
| rex field=appd_app_uuid "\w{4}:\d{5}:(?<FQDN>[\w\-\.]+)"
```

Why is it good?

- Specific matching of pattern prefix \w{4}:\d{5}: Splunk knows as precisely as possible what to look for before the extraction
- Inclusion rather than exclusion (\w) in most cases, inclusion will be slightly better than exclusion
- No greedy/ undefined quantifiers ({4}) tell Splunk exactly how many characters to expect
- Specification (field=appd_app_uuid) avoids scanning the entire _raw data

As a result, our field extraction is now optimized and extracting exactly what we need

```
buttercup-dev.saas.appdynamics.com
```

Good Rex / Bad Rex - additional considerations

- There is no “one size fits all”. Always make sure that the expression matches your needs. Greedy quantifiers, source field specifications, etc can’t always be avoided/ specified
- Be as specific/ explicit as you can
- Don’t need the field? Don’t extract it
- Always need the field? Extract it at search time
- Only looking for 1 match? Use the option max_match=1
- The rex command has several options. Make sure to read through the documentation to find one that helps you

Learn more: SPL Command - "rex"

Before we close this session…

There’s something we should really talk about…

SPL2 when, what, where?

When do I need to use SPL or SPL2?

- If you are working with data management, for example building Edge Processor pipelines, SPL2 is the language to use. However, for your search queries, alerts, reports, dashboards and more, SPL is still the preferred language.

What is SPL2?

- Product-agnostic, intuitive language that includes the best of both query and scripting languages.
- Supports both SPL and SQL syntax patterns.
- Designed to work with the variety of runtimes in the Splunk portfolio.
- Fully backwards compatible with SPL, and can operate in parallel with SPL.

Where is SPL2 used?

- Currently, SPL2 is aimed at **system administration**. It can be used in both splunkd and non splunkd environments. Examples of non-splunkd environments are O11y metrics, Ingest Processor and Edge Processor

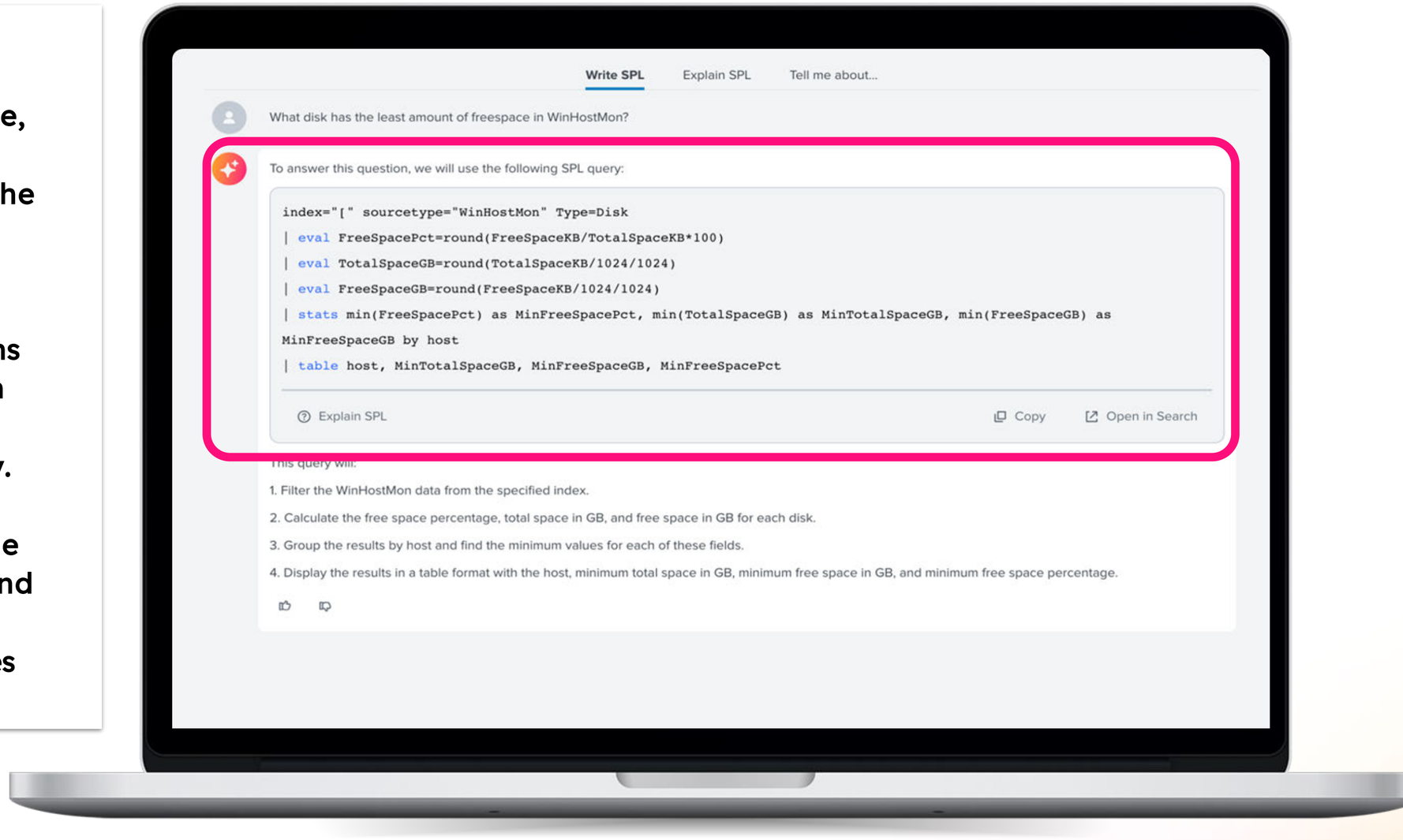
Differences Between SPL and SPL2

AI Assistant for SPL - Is it useful? YES !

Natural Language to SPL Translation: Users can input tasks in plain language, and the assistant converts them into executable SPL searches, simplifying the query creation process.

SPL Explanation and Learning: The assistant provides detailed breakdowns of existing SPL queries, aiding users in understanding and learning SPL by explaining each component of a query.

Adaptive Query Recommendations: The AI assistant suggests improvements and alternative SPL queries based on best practices, helping users refine searches for better performance and accuracy.



[Splunk AI Assistant for SPL]

Since SAIA 1.4, an SPL optimization feature is available !

Splunk AI Assistant for SPL features

You can complete the following tasks with Splunk AI Assistant for SPL:

- Write a task in plain, natural language and convert this task into a usable SPL search.
- Copy and paste an SPL search and convert this search into a detailed breakdown in plain language.
- Optimize a new or existing SPL search by applying the best Splunk practices in the context of your environment.
- Input a plain, natural language question, or a Splunk platform term or product name and have the app provide information on Splunk product concepts and product functionality, sourced from Splunk documentation, community forums, and other Splunk training materials and resources.
- Iterate on task responses with a conversational user experience.
- Accelerate these tasks within a familiar Splunk interface.

Optimization in Splunk AI Assistant for SPL

So what can it do?

3 "optimization strategies" are available (as of SAIA 1.4):

- Choosing the right index
- Using tstats
- Eliminating unnecessary wildcards

While the use cases are still specific, this is useful already.
Ex: Converting an existing search to tstats for example, can be a real time saver.

Between SAIA and the built-in search optimizations, writing production grade SPL searches has never been easier.

What it cannot do just yet is to construct complex multi-step searches (or can it?)

Optimization examples

Some examples are better than a long story

Use case	Input	GPT Output	Llama Output
Select correct index	`sourcetype=access_combined status=404 | stats count by clientip`	`index=web_logs sourcetype=access_combined status=404 | stats count by clientip`	`index=web sourcetype=access_combined status=404 | stats count by clientip`
	`search index=* error | stats count by host`	`index IN (_audit, _introspection, _cmc_summary, _telemetry, summary) message="error" | stats count by host`	`search index=main sourcetype=error | stats count by host`
	`index=* | fields _time userIdentity.arn eventName`	`index="aws" sourcetype="aws:cloudtrail" | fields _time userIdentity.arn eventName`	`search index=_internal sourcetype=stash earliest=-1h@h latest=-0h@h | fields _time userIdentity.arn eventName`
Optimize stats > tstats	`index=_internal sourcetype=* | stats count by host, sourcetype`	`| tstats count FROM index=_internal WHERE sourcetype IN ("splunkd", "splunk_web_access") BY host, sourcetype`	`| tstats count WHERE index=_internal BY host, sourcetype`

Optimization examples

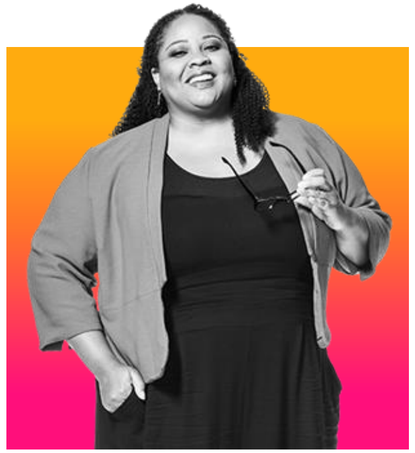
Splunk Resources

Where to go after today's workshop

Our world-class community is here to help.

Splunk community
Splunk's user community is 230,000 members strong and they have answered 125K+ product questions with 150+ user groups worldwide.

Partner network
Splunk partners help deliver complete solutions and accelerate time to value for customers.



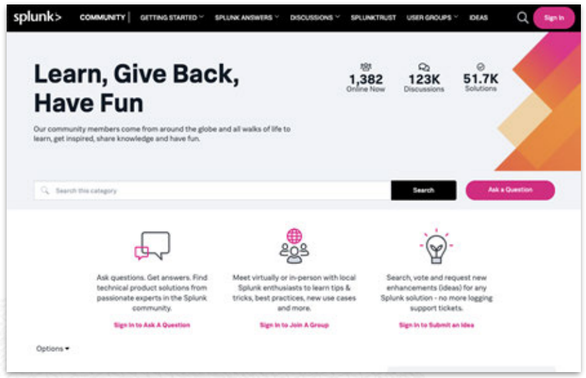
Customer success and education
Our support experts can help optimize your environment and our education resources can help equip teams for success.

Professional services
Splunk experts specialize in finding out what is important to you and can help make your top priorities a reality.

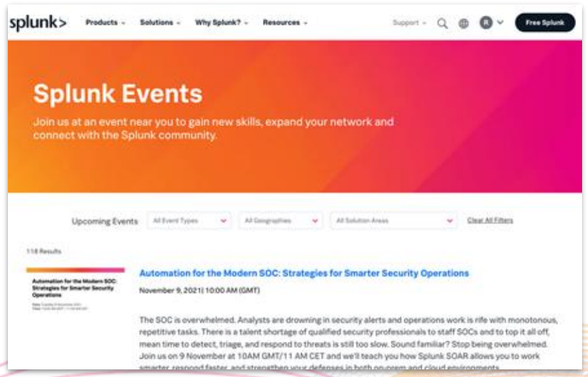
SURGe
Our security experts are dedicated to providing timely recommendations on the latest global breaking security news and how to protect your organization from evolving threats.

Splunk's Thriving Community

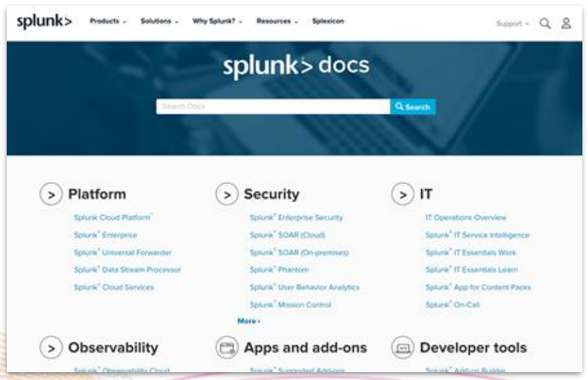
Splunk Community



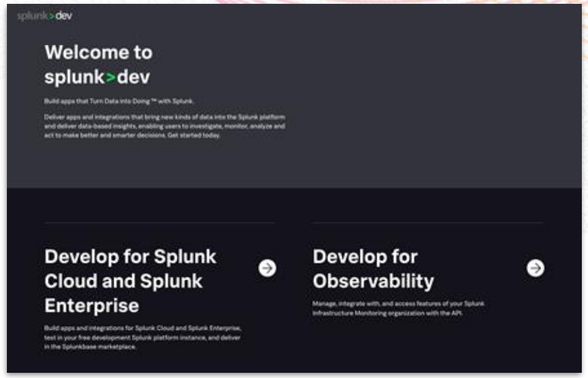
Splunk Events



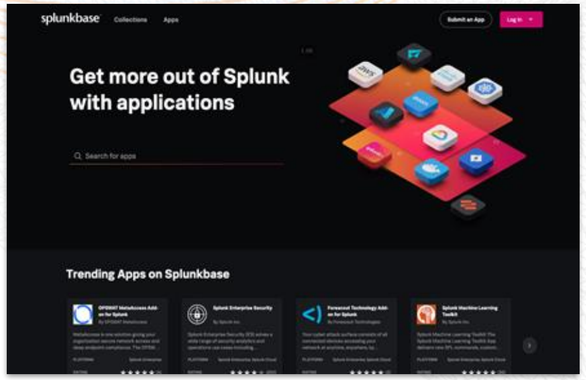
Documentation



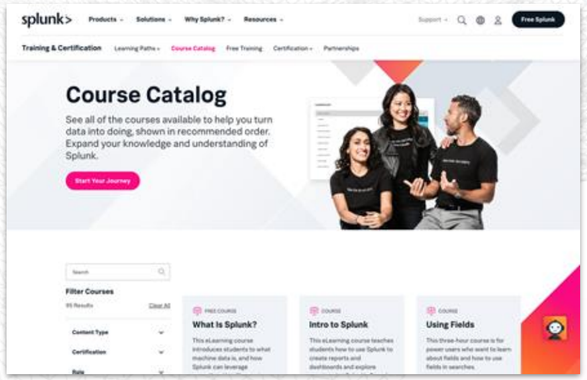
Developer Resources



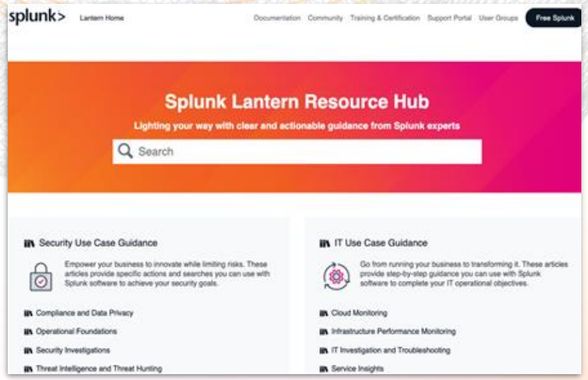
Splunkbase



Education



Splunk Lantern



Splunk Education
Courses relevant to this workshop

- Using Fields
- Search Under the Hood
- Search Optimization
- Multivalue Fields
- Data Models

Deep Dive
Self-Study

- **Tips & Tricks** for **Optimization**:
  Quick tips for optimization - Splunk Documentation
- Fields, Indexed Tokens and You (**.conf presentation**):
  - Fields, Indexed Tokens and You
  - Video
- **TSTATS** and **PREFIX** (**.conf presentation**):
  TSTATS and PREFIX
- **JSON** Functions:
  JSON functions - Splunk Documentation
- **Joining datasets**/emulating **SQL** behavior:
  - Splunk SPL for SQL users
  - Master Joining Datasets Without Using Join
  - Video

Thank you!

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