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Regex in Your SPL

An Easy Introduction

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Basics of Regular Expressions

What is this Regex thing all about?

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Regex in Splunk SPL

What's in it for me?

1. Filtering. Eliminate unwanted data in your searches
2. Matching. Advanced pattern matching to find the results you need
3. Field Extraction on-the-fly

What Is Regex?

What People Say

"A regular expression is an object that describes a pattern of characters. Regular expressions are used to ***perform pattern-matching and 'search-and-replace' functions on text.***"

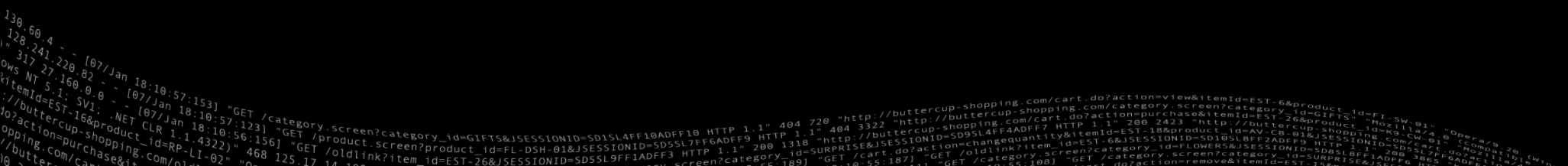
– *w3schools.com*

"Regular expressions are an extremely powerful tool for manipulating text and data…
If you don't use regular expressions yet, you will..."

– *Mastering Regular Expressions, O'Rielly, Jeffery E.F. Friedl*

"A regular expression is a special text string for describing a search pattern. You can think of regular expressions as ***wildcards on steroids***."

– *Regexbuddy.com (and others – Original source unknown)*



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Regex Basics

The Main Elements

Control Characters:
^ Start of a Line
$ End of a Line

Character Types:
\s White Space
\S Not white space
\d Digit
\D Not Digit
\w Word Character (letter, #, or _)
\W Not a Word Character

Operators:
* Zero or More
+ One or More
? Zero or One

These elements work together to specify a pattern

Regex Basics

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\D Not Digit
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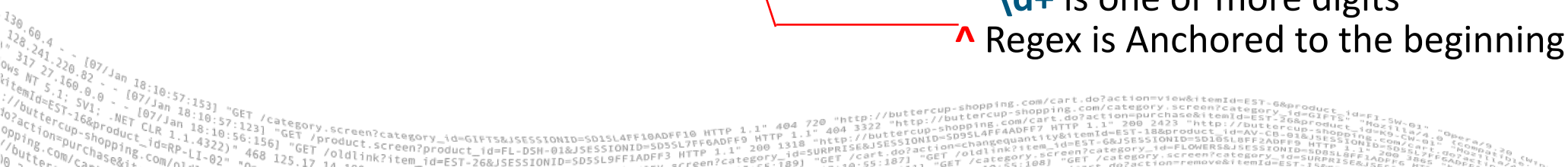
\W Not Word Characters

Operators:
* Zero or More
+ One or More
? Zero or One

Sample Regex: ^\d+\s\w+\d+\s\d+:\d+:\d+

: is the literal character colon
\s without a + or * is a single space
\w+ is one or more word characters
\d+ is one or more digits
^ Regex is Anchored to the beginning of the line



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Regex Basics

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\W Not Word Characters

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* Zero or More
+ One or More
? Zero or One

Sample Regex: ^\d+\s\w+\d+\s\d+:\d+:\d+

Matching String: 22 Aug 2017 18:45:20 On this date, Michael made BBQ references

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Regex Basics

To Protect and Give Options

Control Characters:
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$ End of a Line

Special Characters:
| Alternative / “or”

Character Types:
\s White Space
\S Not white space
\d Digit
\D Not Digit
\w Word Character
\W Not Word Characters

Protection Characters:
\ The next character is a literal

Special Characters:
To give multiple options: |
The pipe character
(also called “or”)

Protecting Characters:
To escape or protect special characters: \
The Backlash or back-whack

Protect periods, [],(),{}, etc when you want to use the literal character

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Regex Basics

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\ The next character is a literal

Regex: **Indiana|Purdue**

Purdue 8w 3l .727 19w 5l .792
Indiana 5w 4l .500 15w 8l .652

Regex: **\d+\.\d+\.\d+\.\d+**

Login Failure From **192.168.12.145**
Login Success From **10.35.36.37**

(we’ll do the above a different way later)

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Regex Basics

Only Some May Pass

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\w Word Character
\W Not Word Characters

Protection Characters:
\ The next character is a literal

Inclusion Characters:
[] Include
[^] Exclude

Include Characters:
[…]

Example usage: [a-zA-Z0-9]

Exclude Characters:
[^…]

Example usage: [^]

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Regex Basics

Only Some May Pass

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Inclusion Characters:
[] Include
[^] Exclude

Regex: **server:[a-z0-9]+**

Keep going so long as you hit characters that are lowercase a-Z or 0-9

server:253fsf2,host=23423
server: 253fsf2,host=23423
server:253f sf2,host=23423

Regex: **server:[^]**

Go until you hit a space

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Regex Basics

Say What Again

Control Characters:
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Special Characters:
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Character Types:
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\D Not Digit
\w Word Character
\W Not Word Characters

Protection Characters:
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Inclusion Characters:
[] Include
[^] Exclude

Repetition:
{#} Number of Repetitions
{#,#} Range of Repetitions

Repetition is used to define the exact number of characters
Or an upper and lower boundary of acceptable characters
(or the exact number of repetitions of a pattern)

Regex Basics

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Inclusion Characters:
[] Include
[^] Exclude

Repetition:
{#} Number of Repetitions
{#,#} Range of Repetitions

Regex: IP: \d{3}\.\d{3}\.\d{3}\.\d{3}

IP: 172.106.190.100
IP: 10.24.255.2
IP: 224.252.2.52

Only 1 line matched because IP format allows 1-3 digits per octet

Regex: IP: \d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}

IP: 172.16.19.1
IP: 10.24.255.2
IP: 224.252.2.52

All 3 lines matched since we account for the IP Address format

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Repetition:
{#} Number of Repetitions
{#,#} Range of Repetitions

Logical Groupings:
() Wrap sets of the Regex

Use to specify repetition for adjacent elements in order to form patterns

Later we’ll use these as “capture groups”

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Regex Basics

To Protect and Give Options

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[^] Exclude

Repetition:
{#} Number of Repetitions
{#,#} Range of Repetitions

Revisiting the IP Matching from a couple of slides ago

Alternate Regex: **IP: (\d{1,3}\.){3}\d{1,3}**

IP: 172.16.19.1
IP: 10.24.255.2
IP: 224.252.2.52

Repeats **\d{1,3}\.** three times
Then tacks on the last **\d{1,3}**

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Regex Basics

The Last (Not so Basic) Element

Control Characters:
^ Start of a Line
$ End of a Line

Special Characters:
| Alternative / “or”

Logical Groupings:
() Wrap sets of the Regex

Character Types:
\s White Space
\S Not white space
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\W Not Word Characters

Protection Characters:
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Inclusion Characters:
[] Include
[^] Exclude

Repetition:
{#} Number of Repetitions
{#,#} Range of Repetitions

Named Capture Groups:
(?<CaptureGroupName>stuff)

This names the capture group (e.g., logical grouping).
Now when you return the capture, it has a name and not just “Capture Group 1”

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Regex Basics

The Last (Not so Basic) Element

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Protection Characters:
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Inclusion Characters:
[] Include
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Repetition:
{#} Number of Repetitions
{#,#} Range of Repetitions

Named Capture Groups:
(?<CaptureGroupName>stuff)

Regex: **user:\s**(?**<username>[^@]+**)

Log 1: blah blah **user: msimko@**splunk.com
Log 2: more blah **user: michael@**kinneygroup.com

Go until we hit an @
Capture as field username
Anchor off user:\s

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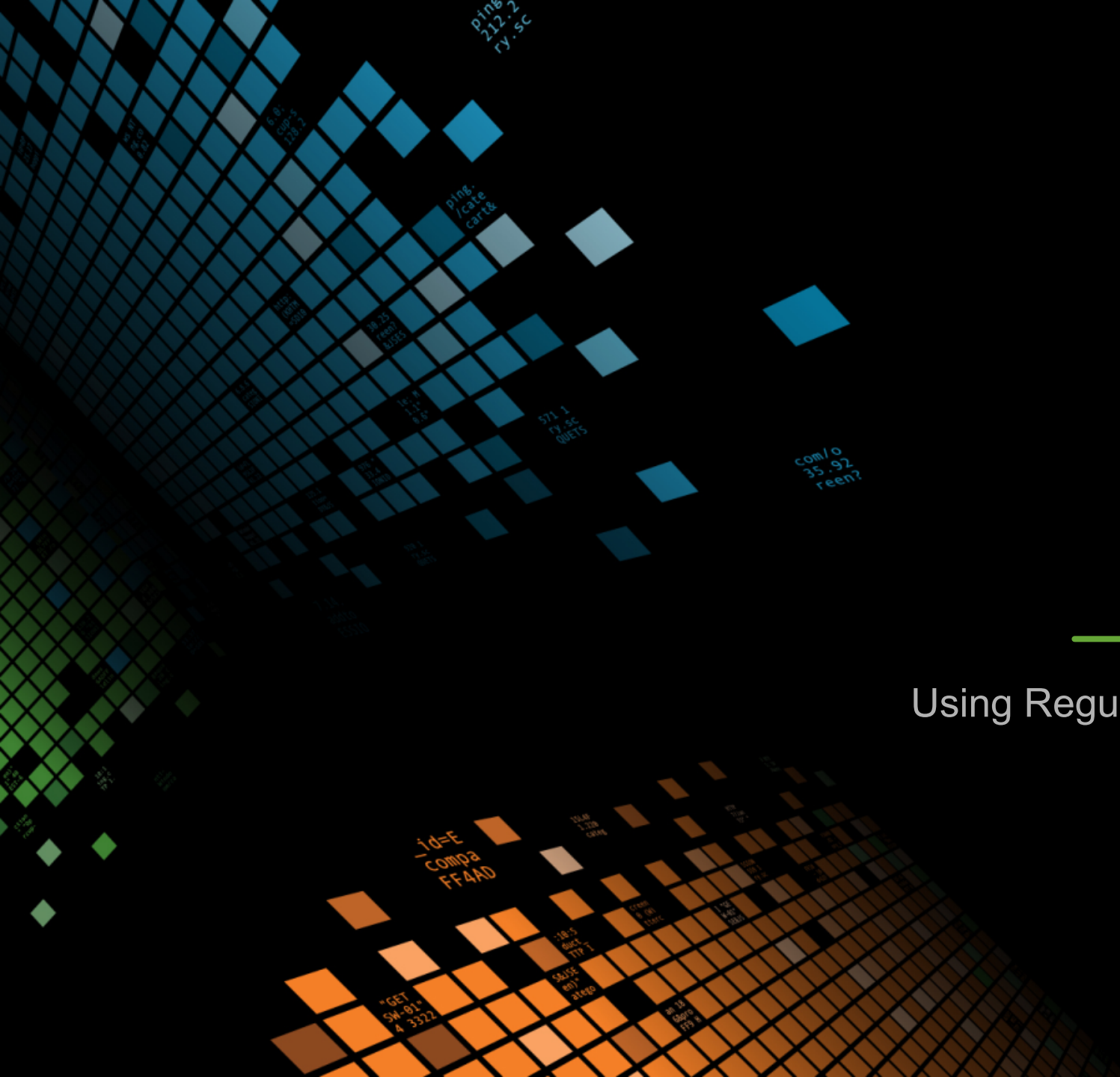

Regex in SPL

Using Regular Expressions to improve your SPL

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Regex in Your SPL

Search Time Regex

- Field Extractions
  - **erex**
  - **rex**
  - Interactive Field Extractor
  - Props – Extract
  - Transforms - Report
- Evaluation
  - **Regex**
  - **match**
  - **replace**

Fields are fundamental to Splunk Search

Regex provides granularity when evaluating data

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Field Extractions

On the fly (No need to work ahead)

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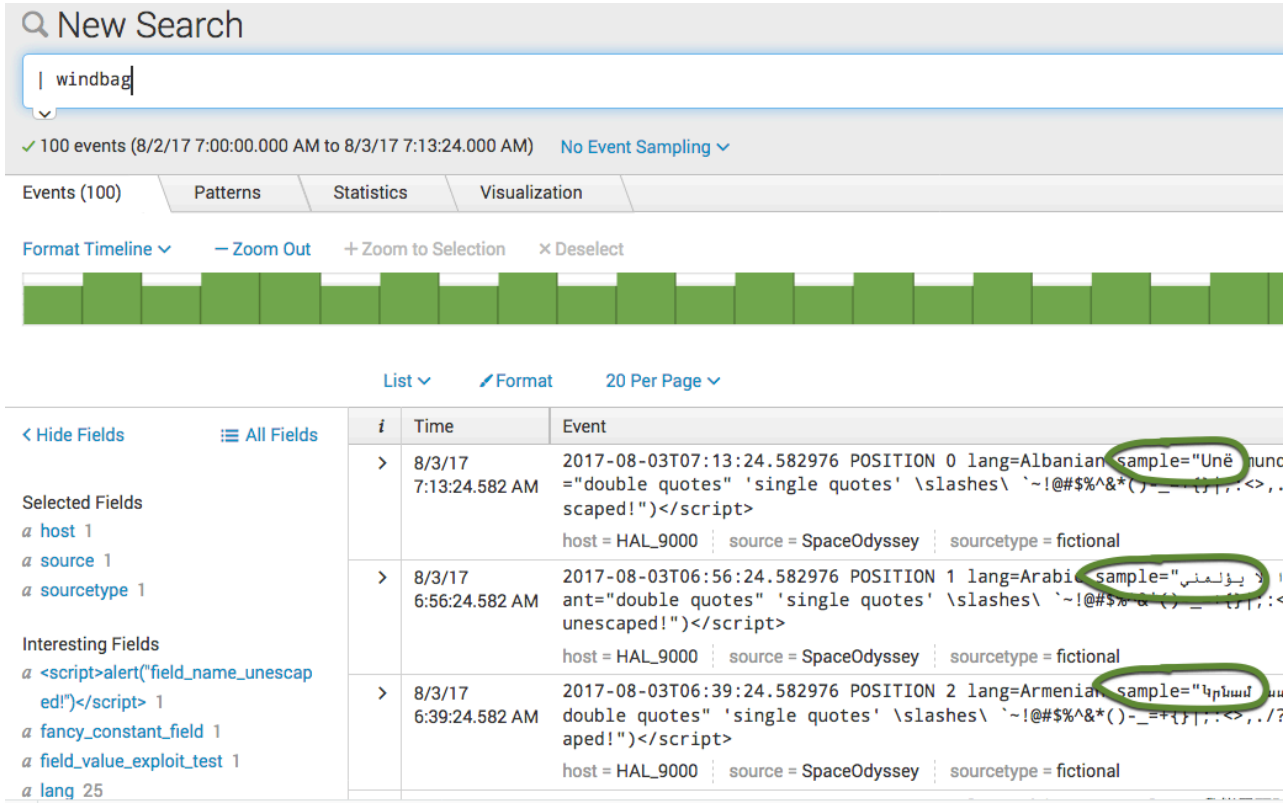
erex Command

Field Extractions Using Examples

Use Splunk to generate regular expressions by providing a list of values from the data.



- Scenario: Extract the first word of each sample phrase from | windbag
  - Step 1, find the samples
  - Step 2, extract the field

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erex Command

Field Extractions Using Examples

Erex Command: …| erex <newFieldName> examples="example1,example2"

| **windbag** | erex **firstwords** examples="**Unë, يؤلمن, Կրնամ**"

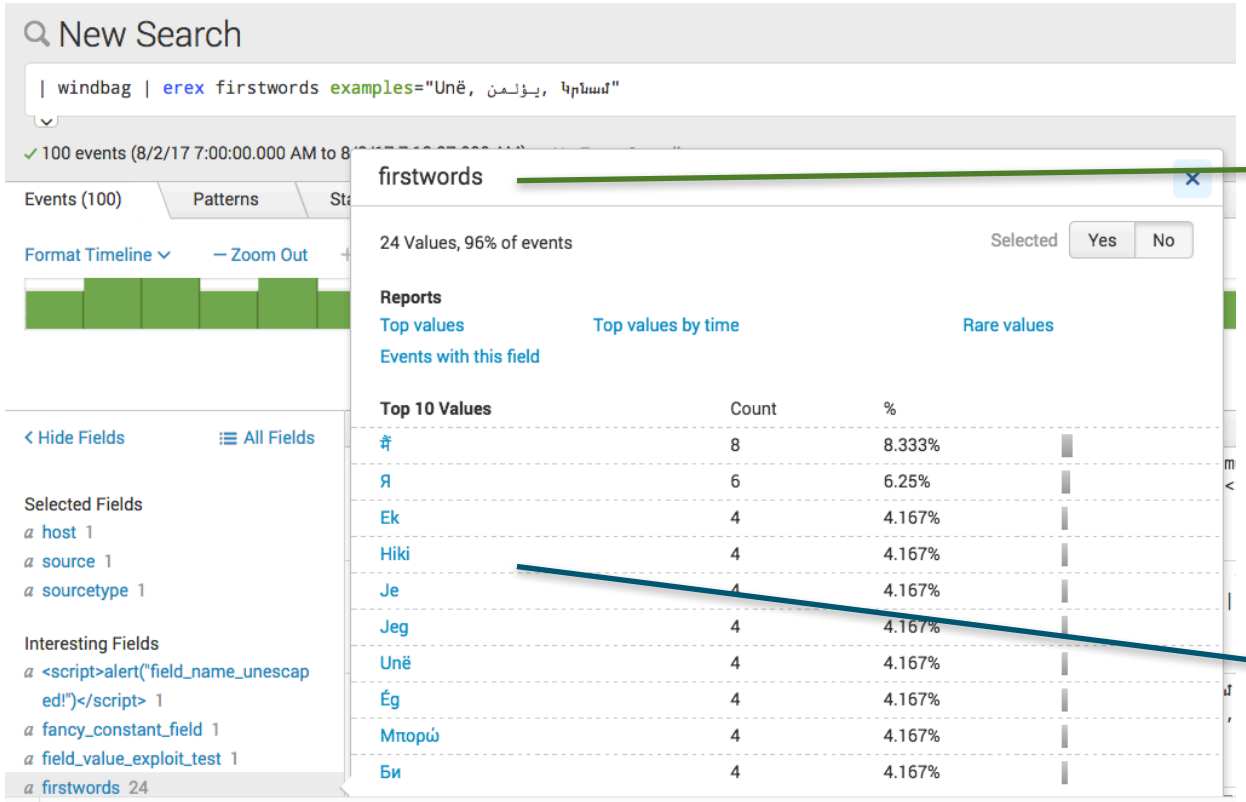
Easter egg that creates sample data

New Field to create

Examples from the data

erex Command

Field Extractions Using Examples



New Field created

| **windbag** | erex **firstwords**
examples="**Unë, يۇلمن, Կրնամ**"

The values erex generated based on the samples

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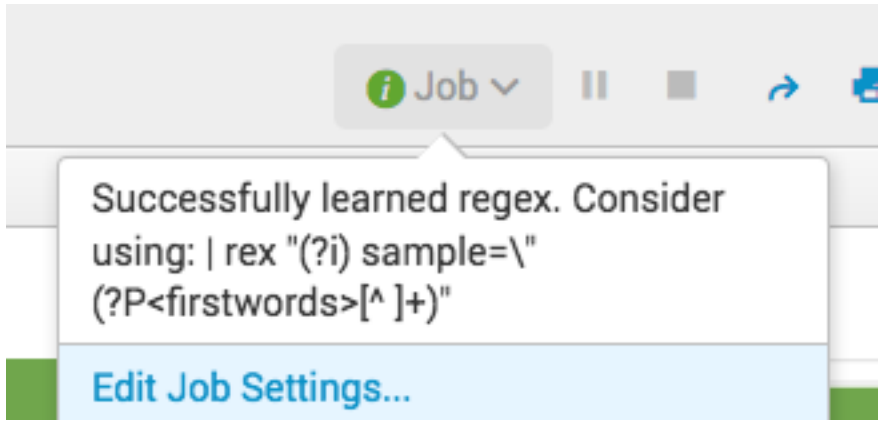
erex Command

Field Extractions Using Examples



- Erex is a great introduction to using regular expressions for field extraction.
  - Erex provides the rex that it generated
  - Going forward, use the rex in your saved searches and dashboards.
  - Rex is more efficient

rex Command

Extract Fields Using Regular Expressions at Search Time

Creates a Field Extraction

… | rex field={what_field} “FrontAnchor(?<extraction>{characters}+)BackAnchor”

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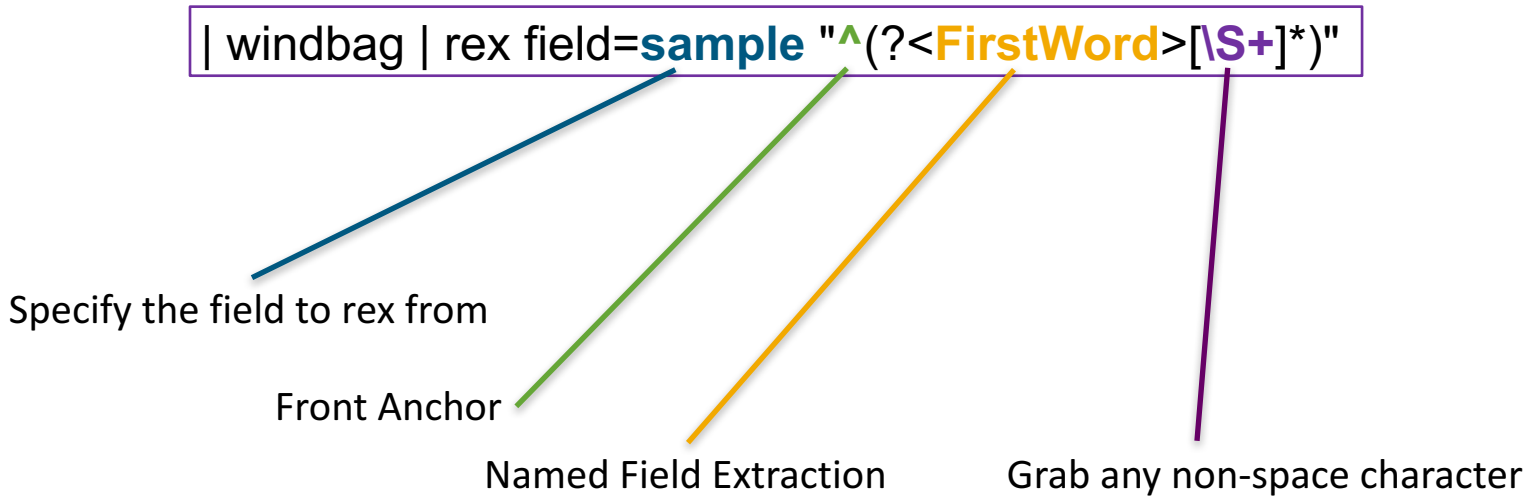
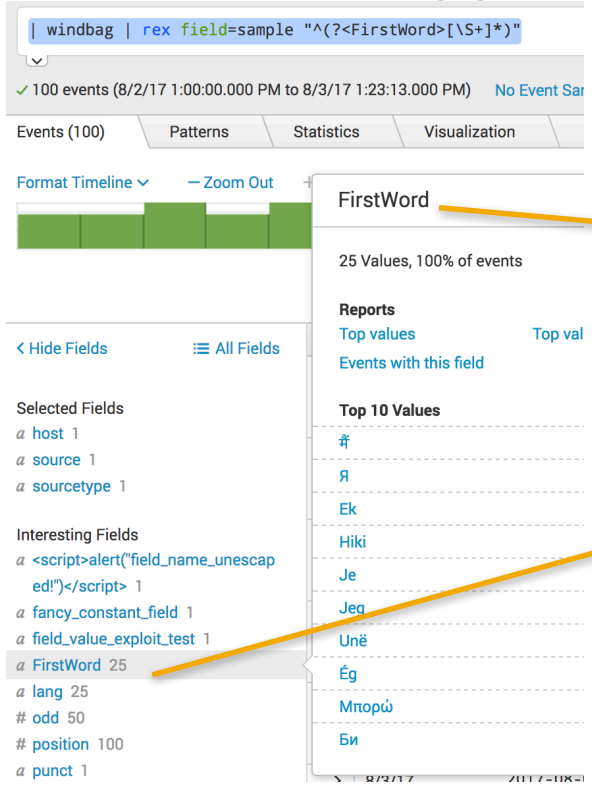
rex Command

Extract Fields Using Regular Expressions at Search Time



rex Command

Extract Fields Using Regular Expressions at Search Time




```
| windbag | rex field=sample
"^(?<FirstWord>[\S+]*)"
```

Named Field Extraction

Grab any non-space character

rex Command

Use Rex to Perform SED Style Substitutions

SED is a stream editor. It can be used to create substitutions in data.

Splunk uses the rex command to perform Search-Time substitutions.

rex Command

Use Rex to Perform SED Style Substitutions

```
| windbag | search lang="*Norse"
| rex mode=sed "s/Old (Norse)/Not-so-old \1/g"
```

Set the mode

s for substitute

() to create a capture group
\1 to paste capture group

Substitute the stuff between the first / and second / with the stuff between second / and third /

g for global
(more than once)

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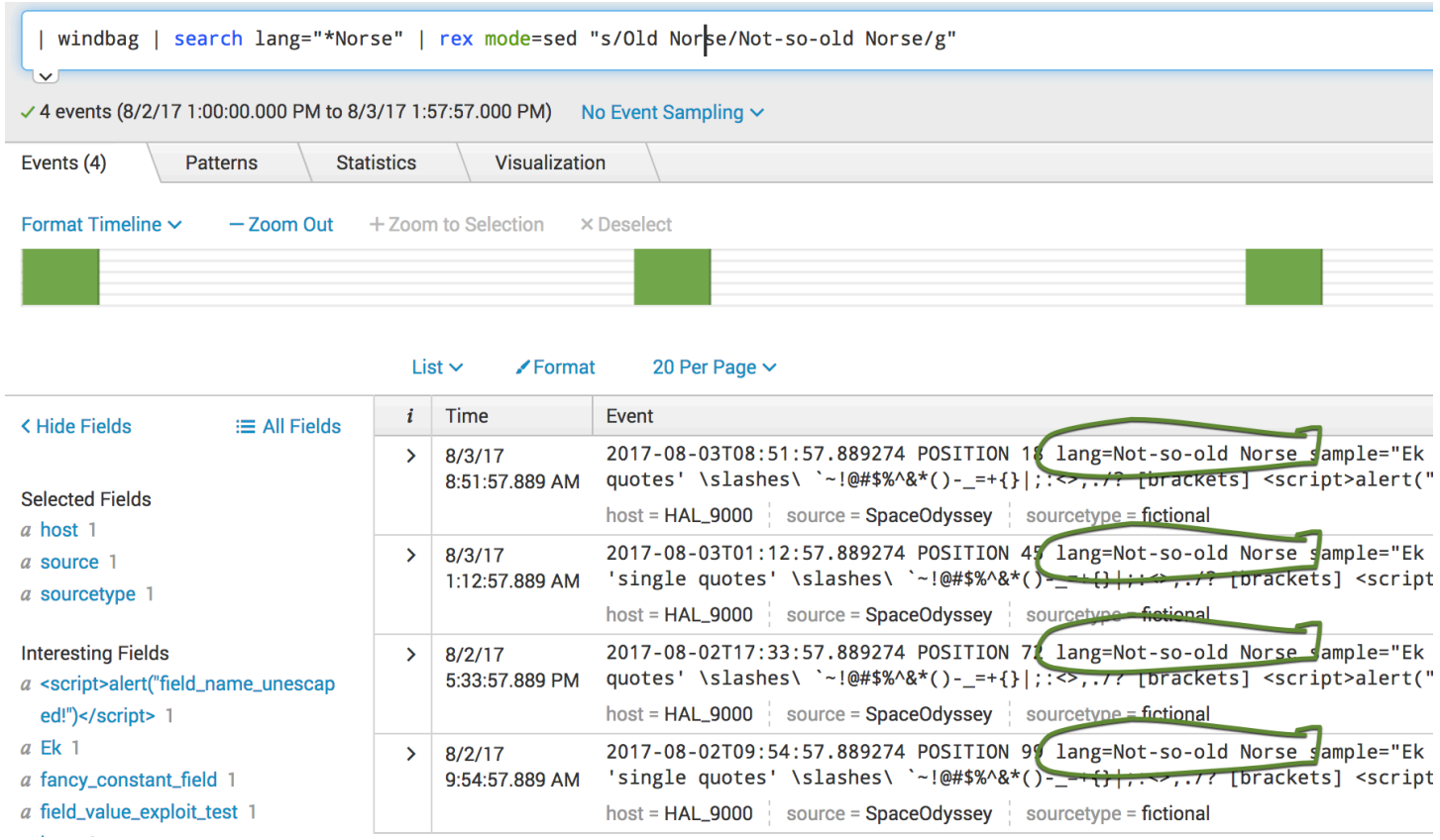
rex Command

Use Rex to Perform SED Style Substitutions



Result:

…

```
| rex mode=sed "s/Old (Norse)/Not-so-old \1/g"
```

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Evaluation

Using Regular Expressions for Pattern Matching

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Regex Command

Filter Using Regular Expressions

```
sourcetype=fs_notification | regex chgs="^modtime"
```

Field to evaluate

Regex

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Match Function

Filter Using Regular Expressions

match(SUBJECT),”REGEX”

… | eval n = if(match(field,”^MyRegex”, 1, 2)

```
sourcetype=access_combined_wcookie
| eval com = if(match(referer,"http:.*\.com"),"True","False")
```

Match. Returns 1 for it matches, 0 for not.

Field to evaluate

The Regex

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Replace Command

Switch Data at Search Time

Replace field values with the values you specify

… | replace “<whoever>” WITH “<whomever>” IN <target_field>

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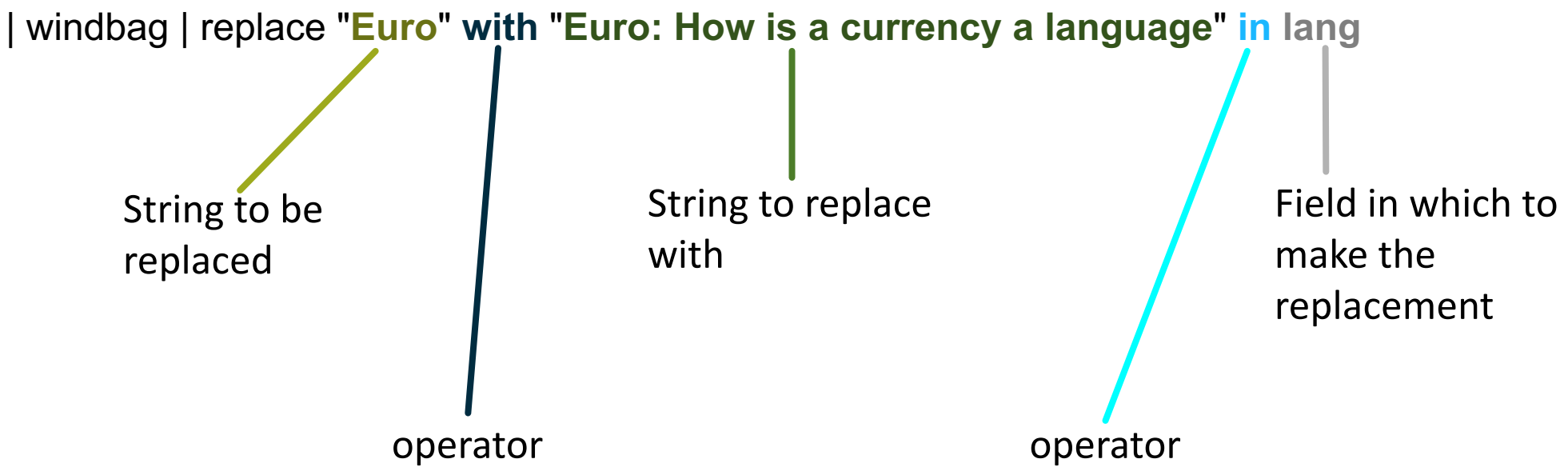
Replace Command

Switch Data at Search Time

Replace field values with the values you specify

… | replace “<whoever>” WITH “<whomever>” IN <target_field>



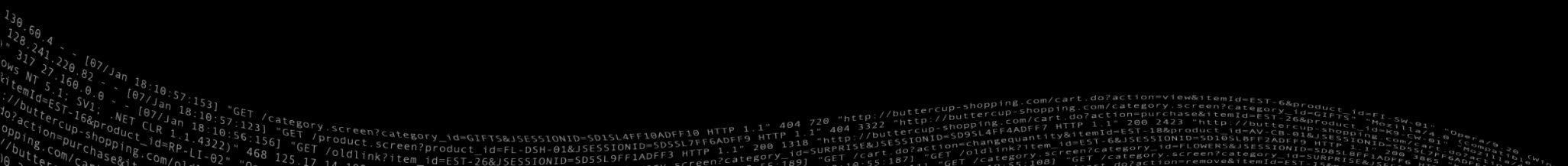
Persistence

Regular Expressions That Exist Outside Your Search

Until this point, every one of our extractions have only existed in the search. But, what if we want them to persist? Or to share them?

1. Interactive Field Extractor

2. Extractions in Props / Transforms



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Persistent Field Extractions

Comparing The Persistent Field Extractions

Interactive Field Extractor

- *Walk-through UI*
- *You may want to rewrite the generated Regex*
- *Does not require admin rights*

Extract in Props

- *Straight editing in props.conf*
- *Requires Admin Rights (or an admin to put in place)*

Report in Transforms

- *Edit directly in transforms.conf*
- *Invoked by props.conf*
- *Requires Admin Rights (or an admin to put in place)*

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Q&A

Michael Simko | Sr. Engineer/Instructor

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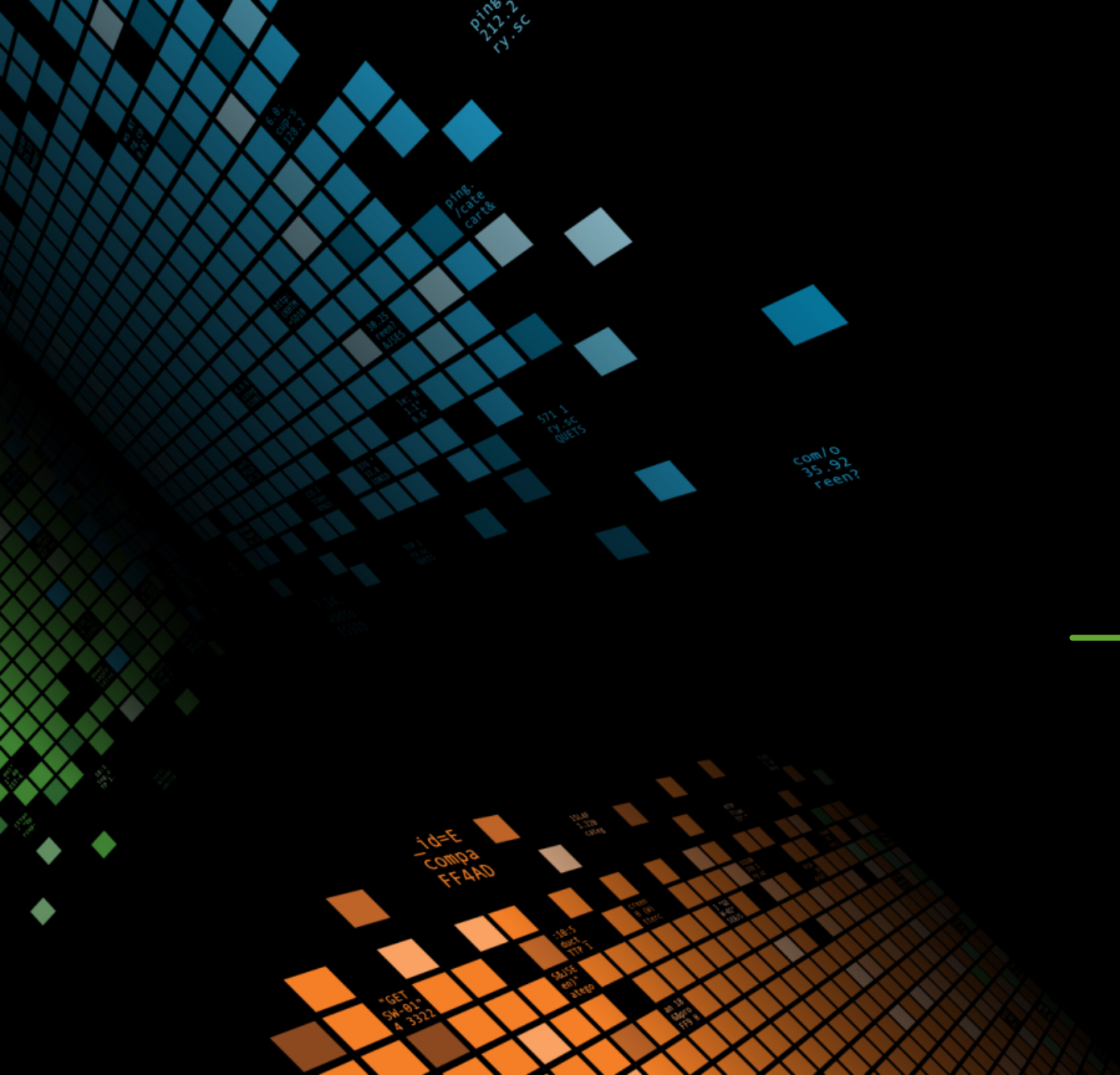
Key Takeaways

Regex in your SPL

1. Use Regex to create powerful filters in your SPL
2. Use Regex to create field extractions
3. Regex doesn't have to be hard. You can do this!

Thank You

Don't forget to rate this session in the .conf2017 mobile app



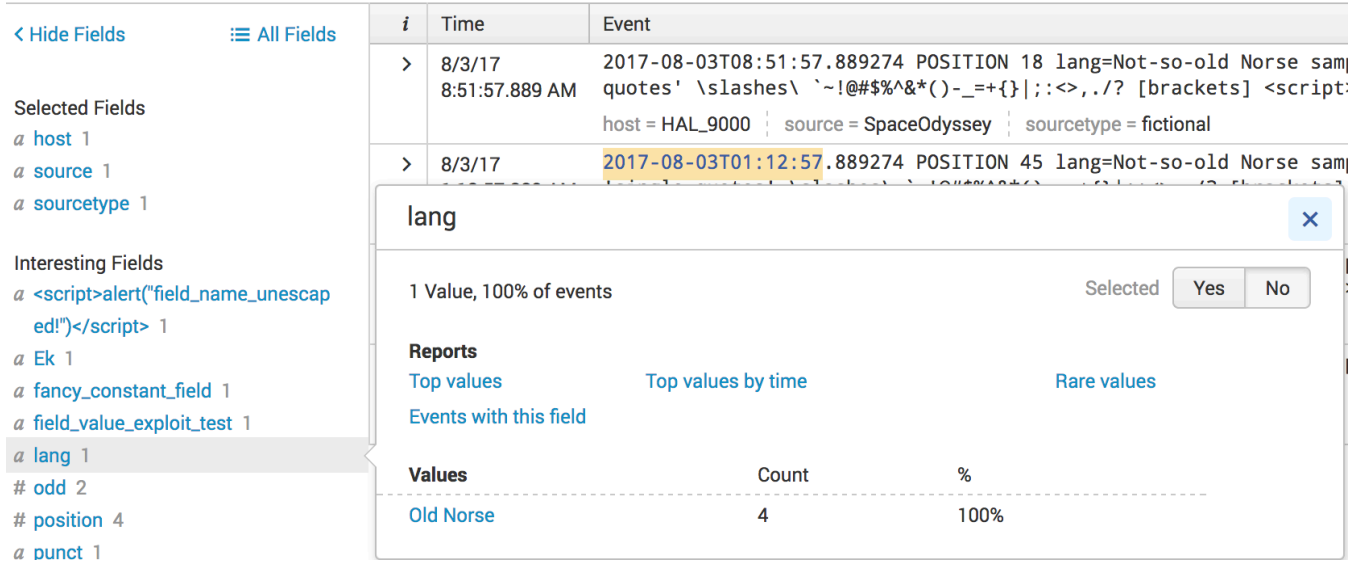
Appendix A

Caveats

rex Command – Caveat

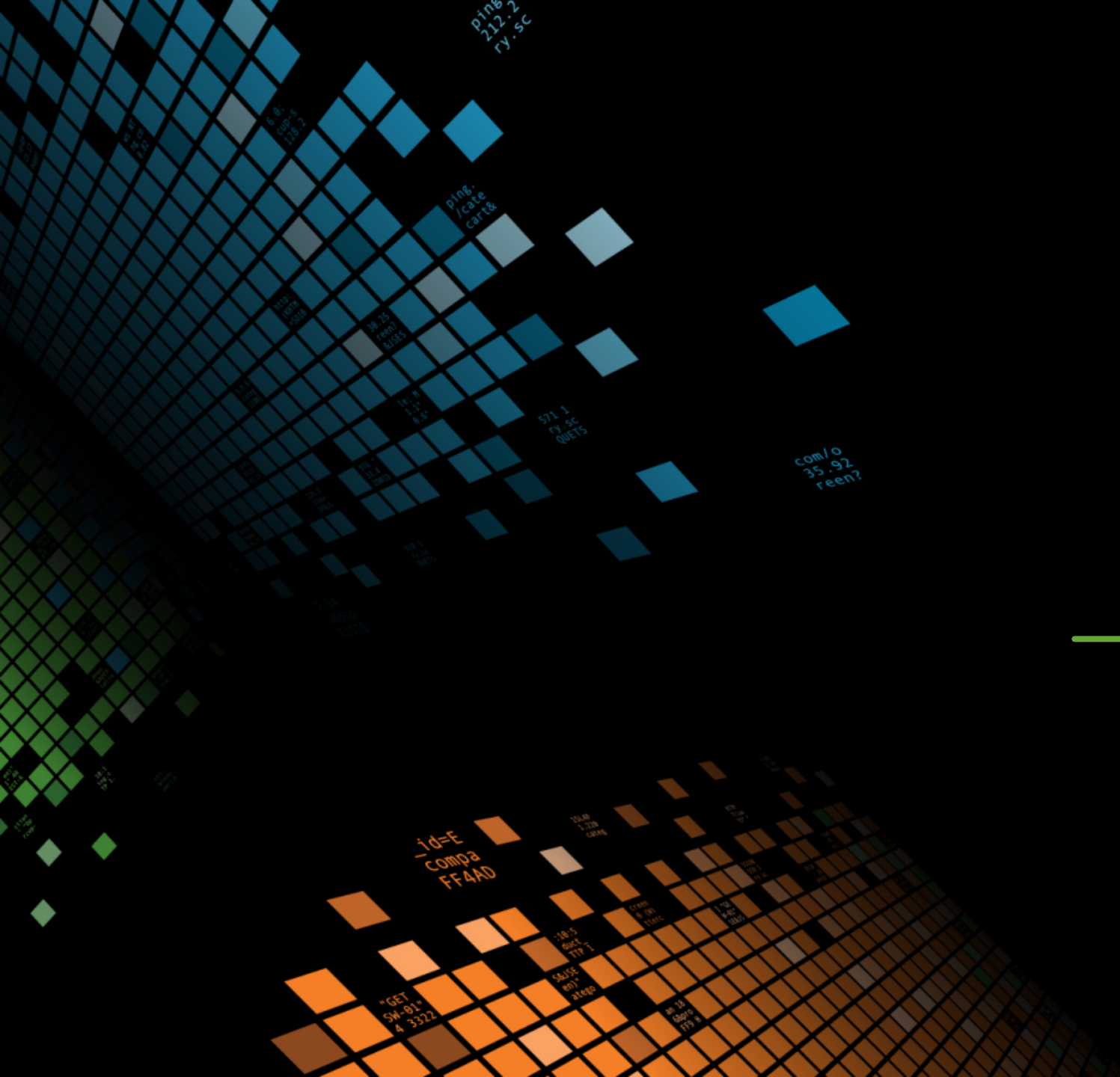
Use Rex to Perform SED Style Substitutions

```
| windbag | search lang="*Norse"
| rex mode=sed "s/Old (Norse)/Not-so-old \1/g"
```



Caveat:

The substitution from rex comes after the lang field is extracted.
So even though the event data is showing us the substitution, the field lang is showing the original value.



Appendix B

Exercises to Practice With

Regex Basics

The Main Elements

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Character Types:

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\d Digit

\D Not Digit

\w Word Character

\W Not Word Characters

Operators:

* Zero or More

+ One or More

? Zero or One

Learn by Fire:
Which of these will the sample Regex match?

Scenario Regex: ^\d+\s\w+\d+\s\d+:\d+:\d+

A. 002421 Februari 1083 1:242525:22352
B. 07 Feb 17 12:53:36AM
C. Feb 13 2017 18:46:56
D. 14 February 2017 07:45:47Z

(answers on next slide)

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Learn by Fire:

Which of these will the sample Regex match?

Scenario Regex: ^\d+\s\w+\d+\s\d+:\d+:\d+

A. 002421 Februari 1083 1:242525:22352
B. 07 Feb 17 12:53:36AM
C. Feb 13 2017 18:46:56
D. 14 February 2017 07:45:47:46

Regex doesn't care if it looks wrong, It only cares if it matches the pattern

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\w Word Character

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Operators:

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+ One or More

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Practice: Create **a** Regex that describes all three of the following strings

06 February 2017 192.168.1.2
05 Apr 2014 10.2.1.150
31 July 2020 19..15.63

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\w Word Character

\W Not Word Characters

Operators:

* Zero or More

+ One or More

? Zero or One

Scenario: Create **a** Regex that describes the following strings

A solution:

\d+\s**\w+**\s**\d+**\s**\d***\.**\d***\.**\d***\.**\d***

06 February 2017 192.168.1.2

05 Apr 2014 10.2.1.150

31 July 2020 19..15.63

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Regex Basics

The Main Elements

1. Open up your Splunk
2. | windbag | head 20 | table _raw
3. Copy the _raw data
4. Paste the data in Regex101.com

Goals: Extract the following fields for each event:
lang
sample
The Date without Time
The Time

Perform these as “named” extractions

Replace Command

Switch Data at Search Time

Silly version to try on your own

| windbag | head 20 | replace "1" WITH "Uno" in odd

Try it, then click the down chevron to see the results