Using Fields – Lab Solutions Guide

Overview

Welcome to the Splunk Education lab environment. These lab exercises will give you some practical experience of using fields in searches.

Scenario

You will use data from the international video game company, Buttercup Games. A list of source types is provided below.

NOTE: This is a lab environment driven by data generators with obvious limitations. This is not a production environment. Screenshots approximate what you should see, not the **exact** output.

Index	Type	Sourcetype	Interesting Fields
web	Online sales	**access_combined**	action, bytes, categoryId, clientip, itemId, JSESSIONID, price, productId, product_name, referer, referer_domain, sale_price, status, user, useragent
security	Web server	**linux_secure**	action, app, dest, process, src_ip, src_port, user, vendor_action
network	Email security data	**cisco_esa**	dcid, icid, mailfrom, mailto, mid
	Web security appliance data	**cisco_wsa_squid**	action, cs_method, cs_mime_type, cs_url, cs_username, sc_bytes, sc_http_status, sc_result_code, severity, src_ip, status, url, usage, x_mcafee_virus_name, x_wbrs_score, x_webcat_code_abbr
	Firewall data	**cisco_firewall**	bcg_ip, dept, Duration, fname, IP, lname, location, rfid, splunk_role, splunk_server, Username
sales	Email security data	**cisco_esa**	dcid, icid, mailfrom, mailto, mid
	Web security appliance data	**cisco_wsa_squid**	action, cs_method, cs_mime_type, cs_url, cs_username, sc_bytes, sc_http_status, sc_result_code, severity, src_ip, status, url, usage, x_mcafee_virus_name, x_wbrs_score, x_webcat_code_abbr
	Firewall data	**cisco_firewall**	bcg_ip, dept, Duration, fname, IP, lname, location, rfid, splunk_role, splunk_server, Username

Common Commands & Functions

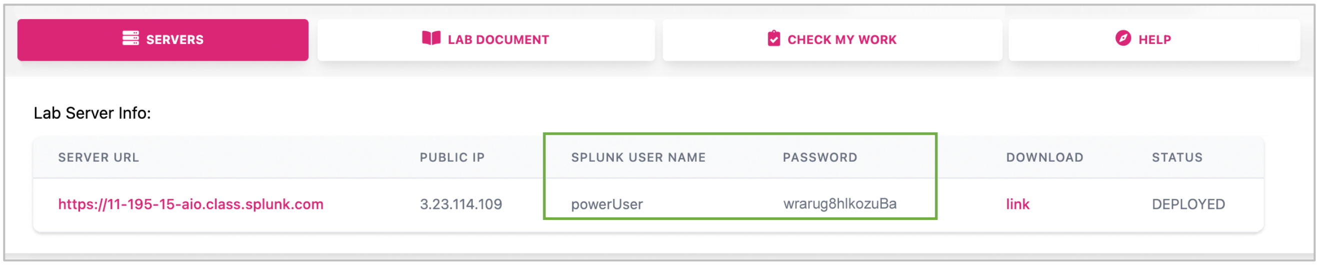
These commands and statistical functions are commonly used in searches but may not have been explicitly discussed in the module. Please use this table for quick reference. Click on the hyperlinked SPL to be taken to the Search Manual for that command or function.

SPL	Type	Description	Example
`sort`	command	Sorts results in descending or ascending order by a specified field. Can limit results to a specific number.	*Sort the first 100 `src_ip` values in descending order* `| sort 100 -src_ip`
`where`	command	Filters search results using eval-expressions.	*Return events with a `count` value greater than 30* `| where count > 30`
`rename`	command	Renames one or more fields.	*Rename `SESSIONID` to 'The session ID'* `| rename SESSIONID as "The session ID"`
`fields`	command	Keeps (+) or removes (-) fields from search results.	*Remove the `host` field from the results* `| fields - host`
`stats`	command	Calculates aggregate statistics over the results set.	*Calculate the total sales, i.e. the sum of `price` values.* `| stats sum(price)`
`eval`	command	Calculates an expression and puts the resulting value into a new or existing field.	*Concatenate `first_name` and `last_name` values with a space to create a field called "`full_name`"* `| eval full_name=first_name." ".last_name`
`table`	command	Returns a table.	*Output `vendorCountry`, `vendor`, and `sales` values to a table* `| table vendorCountry, vendor, sales`
`sum()`	statistical function	Returns the sum of the values of a field. Can be used with **`stats`**, **`timechart`**, and **`chart`** commands.	*Calculate the sum of the `bytes` field* `| stats sum(bytes)`
`count` or `count()`	statistical function	Returns the number of occurrences of all events or a specific field. Can be used with **`stats`**, **`timechart`**, and **`chart`** commands.	*Count all events as "events" and count all events that contain a value for `action` as "action"* `| stats count as events, count(action) as action`

Refer to the Search Reference Manual for a full list of commands and functions.

Lab Connection Info

Access labs using the server URL, user name, and password shown in your lab environment.



Lab Server Info:

SERVER URL	PUBLIC IP	SPLUNK USER NAME	PASSWORD	DOWNLOAD	STATUS
https://11-195-15-aio.class.splunk.com	3.23.114.109	powerUser	wrarug8hlkozuBa	link	DEPLOYED

Lab Exercise 1 – Use Fields in Searches

Description

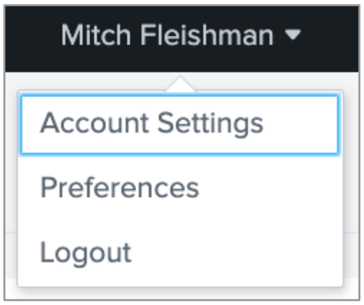
Configure the lab environment user account. Then, explore how using fields and fields with operators can change search results. Additional tasks will test your knowledge of the **`rename`** and **`fields`** commands.

Steps

Task 1: Log into Splunk and change the account name and time zone.

Set up your lab environment to fit your time zone. This also allows the instructor to track your progress and assist you if necessary.

1. Log into your Splunk lab environment using the username and password provided to you.
2. You may see a pop-up window welcoming you to the lab environment. You can click **Continue to Tour** but this is not required. Click **Skip** to dismiss the window.
3. Click on the username you logged in with (at the top of the screen) and then choose **Account Settings** from the drop-down menu.
4. In the **Full name** box, enter your first and last name.
5. Click **Save**. (Do not change the password)
6. Reload your browser to reflect the recent changes to the interface. (This area of the web interface will be referred to as ***user name***.)

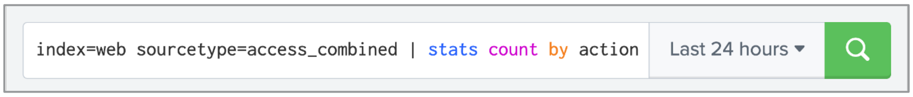


After you complete step 6, you will see your name in the web interface.

NOTE: Sometimes there can be delays in executing an action like saving in the UI or returning results of a search. If you are experiencing a delay, please allow the UI a few minutes to execute your action.

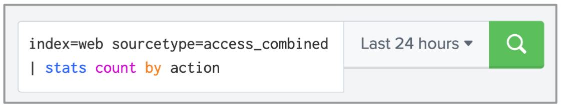
7. Navigate to ***user name*** **> Preferences.**
8. Choose your local time zone from the **Time zone** drop-down menu.
9. Click **Apply**.

10. (Optional) Navigate to ***user name* > Preferences > SPL Editor > Search auto-format** and click on the toggle to activate auto-formatting. Then click **Apply**. When the pipe character is used in search, the SPL Editor will automatically begin the pipe on a new line.



```
index=web sourcetype=access_combined | stats count by action
```

Search auto-format disabled.



```
index=web sourcetype=access_combined
| stats count by action
```

Search auto-format enabled.

Task 2: Use the Fields sidebar to examine search results.

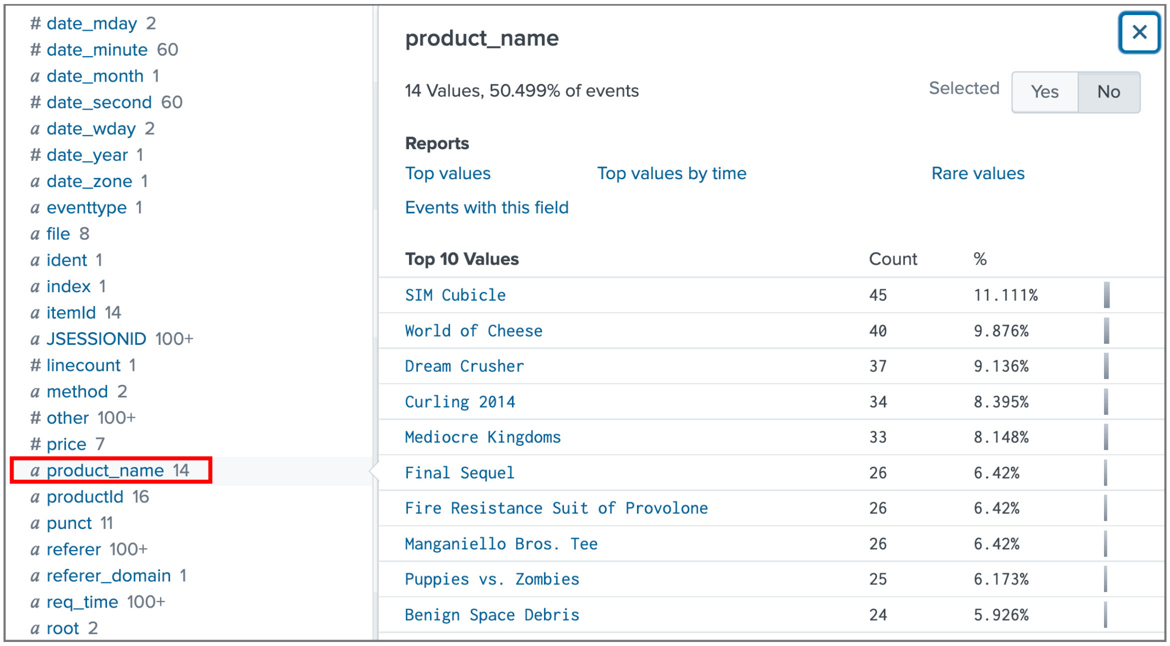
11. In the top left corner of Splunk Web, select **Apps** > **Search & Reporting**. This sets our app context to the search app.
12. Search online sales data (**`index=web sourcetype=access_combined`**) for all events containing a purchase action (**`action=purchase`**.) Execute this search over the **Last 24 hours**.
    `index=web sourcetype=access_combined action=purchase`

NOTE: After the search finalizes, verify that the search executed in Smart Mode. The search mode is located under the time range picker. If the search did not execute in Smart Mode, change it to Smart Mode, and then re-execute the search.

13. Examine the **Interesting Fields** list to the left of your events. Notice that the **`product_name`** is one of the fields returned by Splunk.

NOTE: To find some less common fields, you may need to open the **All Fields** window from the link at the top of the Fields sidebar.

14. In the Fields sidebar, under **Interesting Fields**, click **`product_name`**. Notice the pop-up window shows the top ten purchased products. Close the window by clicking the **X** in the upper-right corner.



date_mday 2
date_minute 60
a date_month 1
# date_second 60
a date_wday 2
# date_year 1
a date_zone 1
a eventtype 1
a file 8
a ident 1
a index 1
a itemId 14
a JSESSIONID 100+
# linecount 1
a method 2
# other 100+
# price 7
a product_name 14
a productId 16
a punct 11
a referer 100+
a referer_domain 1
a req_time 100+
a root 2

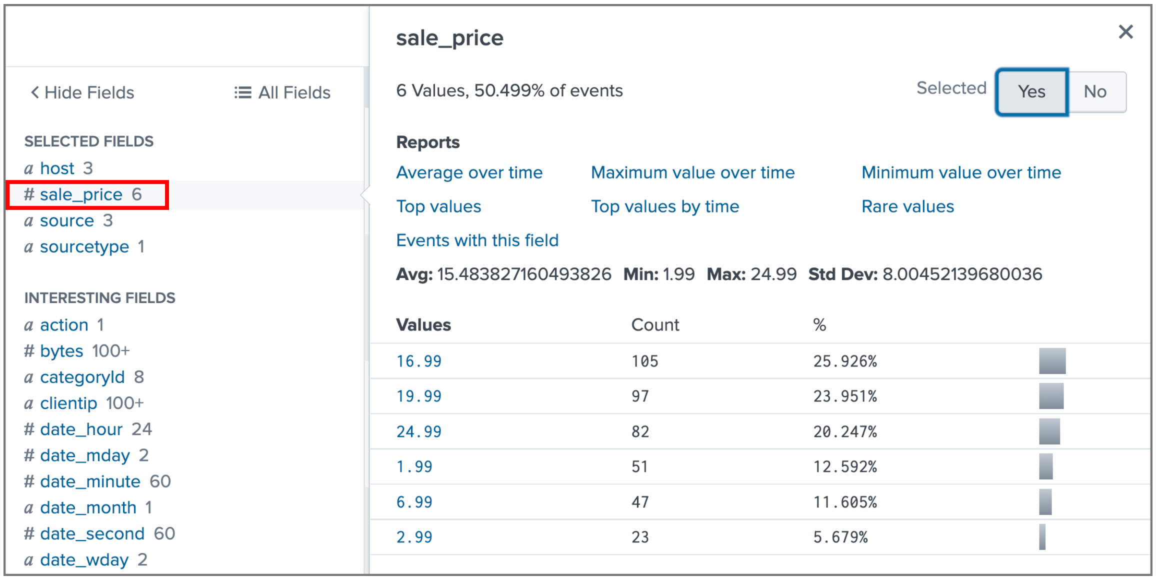
product_name

14 Values, 50.499% of events

Reports

Top 10 Values	Count	%
SIM Cubicle	45	11.111%
World of Cheese	40	9.876%
Dream Crusher	37	9.136%
Curling 2014	34	8.395%
Mediocre Kingdoms	33	8.148%
Final Sequel	26	6.42%
Fire Resistance Suit of Provolone	26	6.42%
Manganiello Bros. Tee	26	6.42%
Puppies vs. Zombies	25	6.173%
Benign Space Debris	24	5.926%

15. In the Fields sidebar, under **Interesting Fields**, click **`sale_price`**. This field contains the product's discounted price for each purchase event.
    a. Make the **`sales_price`** field a selected field. From the **`sale_price`** field window, click **Yes** in the upper right corner next to **Selected**. Close the **`sale_price`** field window by clicking the **X** in the upper-right corner.
    b. Notice **`sale_price`** is now a selected field in the Fields sidebar.
    c. Now, each event with a value present for **`sale_price`** will have **`sale_price=<value>`** in the last line of the event.



SELECTED FIELDS
a host 3
# sale_price 6
a source 3
a sourcetype 1

INTERESTING FIELDS
a action 1
# bytes 100+
a categoryId 8
a clientip 100+
# date_hour 24
# date_mday 2
# date_minute 60
a date_month 1
# date_second 60
a date_wday 2

sale_price

6 Values, 50.499% of events

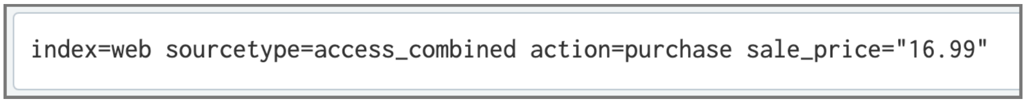
Reports

Avg: 15.483827160493826 **Min:** 1.99 **Max:** 24.99 **Std Dev:** 8.00452139680036

Values	Count	%
16.99	105	25.926%
19.99	97	23.951%
24.99	82	20.247%
1.99	51	12.592%
6.99	47	11.605%
2.99	23	5.679%

16. In the Fields sidebar, under **Selected Fields**, click the **`sale_price`** field.

a. From the field window, click the value with the highest number of purchases (listed at the top.) Notice the field and value have been added to the search criteria in the search bar. Also, this selection causes a new search to execute using the new search criteria.



```
index=web sourcetype=access_combined action=purchase sale_price="16.99"
```

b. Remove **`sale_price=<value>`** from the search criteria (by deleting it from the search text) and re-execute the search by pressing ENTER or by clicking the magnifying glass to the right of the search bar.

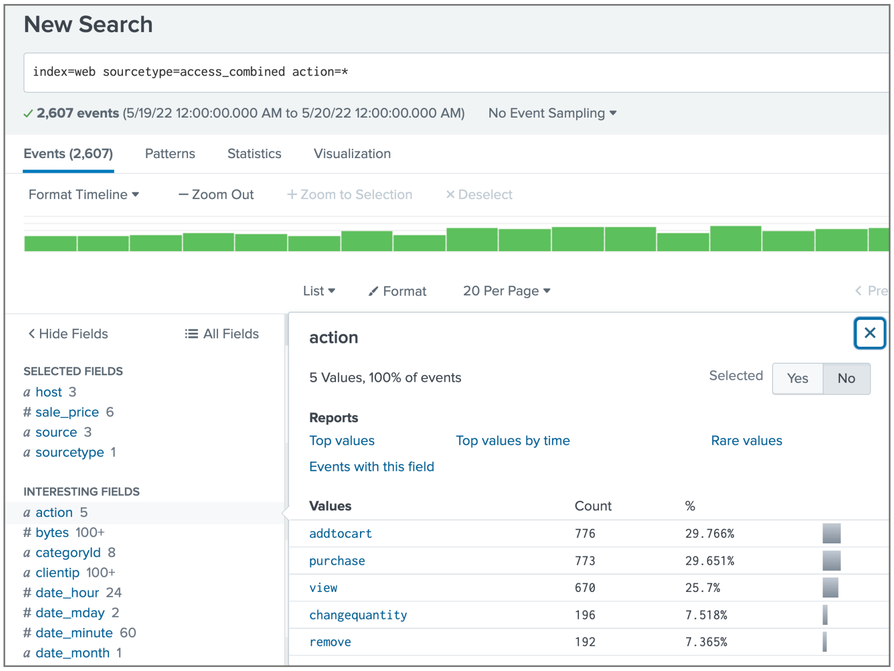
17. In the Fields sidebar, under **Interesting Fields**, click **`categoryId`** to see which types of products make up the most purchases. Close the window by clicking the **X** in the upper-right corner.

Task 3: Compare results from searches using the `!=`, `NOT`, and `=*` field expressions.

18. Search for **`index=web sourcetype=access_combined`** with a time range of **Yesterday**. Note the number of returned events.
19. Edit your search to find only events that have a value present for the **`action`** field. Run the search again. Again, note the number of return events.

    ```
    index=web sourcetype=access_combined action=*
    ```

    This search will only find events that have some value present for the **action** field. Therefore, this search should return the same or fewer events than your previous search.
20. In the Fields sidebar, under **Interesting Fields**, click **`action`**. Notice that the events contain five different values for **`action`**. Close the window by clicking the **X** in the upper-right corner.



New Search

```
index=web sourcetype=access_combined action=*
```

✓ 2,607 events (5/19/22 12:00:00.000 AM to 5/20/22 12:00:00.000 AM) No Event Sampling ▾

SELECTED FIELDS
a host 3
# sale_price 6
a source 3
a sourcetype 1

INTERESTING FIELDS
a action 5
# bytes 100+
a categoryId 8
a clientip 100+
# date_hour 24
# date_mday 2
# date_minute 60
a date_month 1

action ✕

5 Values, 100% of events

Selected Yes No

Reports
Top values
Top values by time
Rare values
Events with this field

Values	Count	%
addtocart	776	29.766%
purchase	773	29.651%
view	670	25.7%
changequantity	196	7.518%
remove	192	7.365%

21. Edit your search to find events that do not have a value present for the **action** field. Run the search again. Note the number of returned events.

    ```
    index=web sourcetype=access_combined NOT action=*
    ```

    This search will find events that do not have some value in the action field.
22. In the Fields sidebar, under **Interesting Fields**, try to find the **action** field.

    You should not see the action field because none of the returned events should contain that field.
23. Add the number of events that were returned from your last two searches—the events that contain an **action** value and the events that don't. Does the sum equal the total number of events returned from your first search? (Hint: If this is not the case, try running all three searches again and be sure the time range is set to **Yesterday** for each search.)
24. Edit the search to find only those events where the **action** field contains the value, **purchase**.

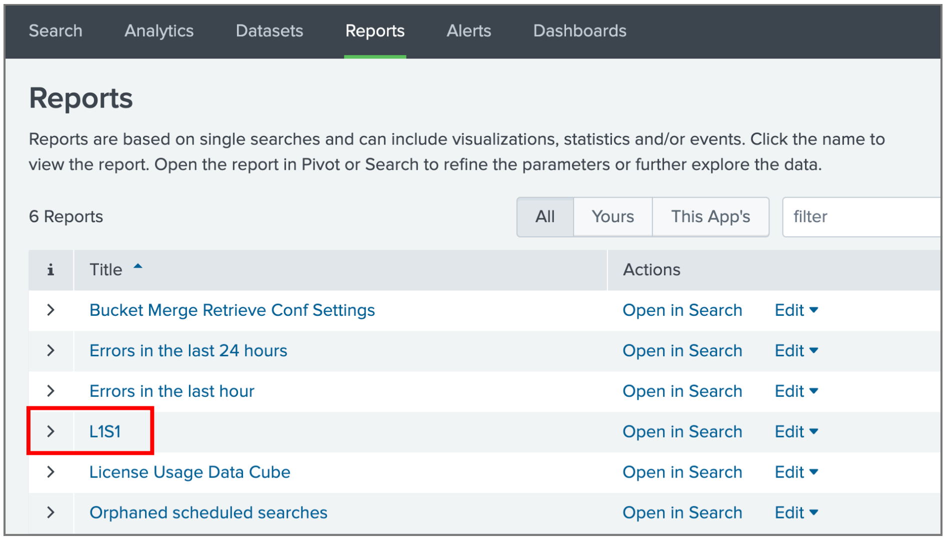
    ```
    index=web sourcetype=access_combined action=purchase
    ```
25. In the Fields sidebar, under **Interesting Fields**, click **action**. Notice that you now see only one possible value**,** **purchase**. Close the window by clicking the **X** in the upper right corner.
26. Edit the search to find events where the **action** field contains some value other than **purchase**. Note the number of returned events.

    ```
    index=web sourcetype=access_combined action!=purchase
    ```
27. In the Fields sidebar, under **Interesting Fields**, click **action**. Notice that you now see all possible values except **purchase**. Close the window by clicking on the **X** in the upper right corner.
28. Edit the search to find events where:
    a. The **action** field contains some value other than **purchase**.
    b. The **action** field contains no value at all (See step 21 above).

    Note the number of returned events.

    ```
    index=web sourcetype=access_combined NOT action=purchase
    ```

    The number of events returned from this search should be greater than the number of events returned from the previous search. If this is not the case, you should check your syntax, run the searches again, and be sure the time range is set to **Yesterday** for each search.
29. Save your search as a report with the name **L1S1**.
    a. Click **Save As** > **Report**
    b. For **Title**, enter L1S1.
    c. **Save**.
    d. You can **View** your report or exit out of the **Your Report Has Been Created** window by clicking the **X** in the upper-right corner.
    e. You can access your saved reports using the **Reports** tab in the application bar.



Reports

Reports are based on single searches and can include visualizations, statistics and/or events. Click the name to view the report. Open the report in Pivot or Search to refine the parameters or further explore the data.

6 Reports

i	Title	Actions	
>	Bucket Merge Retrieve Conf Settings	Open in Search	Edit ▾
>	Errors in the last 24 hours	Open in Search	Edit ▾
>	Errors in the last hour	Open in Search	Edit ▾
>	L1S1	Open in Search	Edit ▾
>	License Usage Data Cube	Open in Search	Edit ▾
>	Orphaned scheduled searches	Open in Search	Edit ▾

*Your recently saved **L1S1** report will be visible in the **Reports** tab.*

Scenario: SecOps wants a list of authentication failure events associated with admin roles over the last 60 minutes.

Task 4: Use keywords, field expressions, and the `fields` command to filter for specific events.

30. Search the web server (**`index=security sourcetype=linux_secure`**) for events during the **Last 60 minutes**.

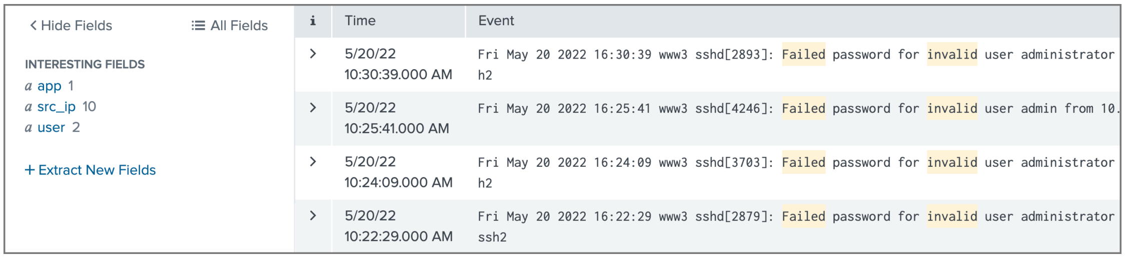
    ```
    index=security sourcetype=linux_secure
    ```

31. Modify your search to include the following:
    a. Failed password attempts by invalid users by adding **`failed invalid`** to your basic search.
    b. Events associated with the administrator user, i.e. user accounts that begin with **`admin`**.

    ```
    index=security sourcetype=linux_secure failed invalid user=admin*
    ```

32. Use the **`fields`** command to extract only the **`user`**, **`src_ip`**, and **`app`** fields.

    ```
    index=security sourcetype=linux_secure failed invalid user=admin*
    | fields user, src_ip, app
    ```



i	Time	Event
>	5/20/22 10:30:39.000 AM	Fri May 20 2022 16:30:39 www3 sshd[2893]: Failed password for invalid user administrator h2
>	5/20/22 10:25:41.000 AM	Fri May 20 2022 16:25:41 www3 sshd[4246]: Failed password for invalid user admin from 10.
>	5/20/22 10:24:09.000 AM	Fri May 20 2022 16:24:09 www3 sshd[3703]: Failed password for invalid user administrator h2
>	5/20/22 10:22:29.000 AM	Fri May 20 2022 16:22:29 www3 sshd[2879]: Failed password for invalid user administrator ssh2

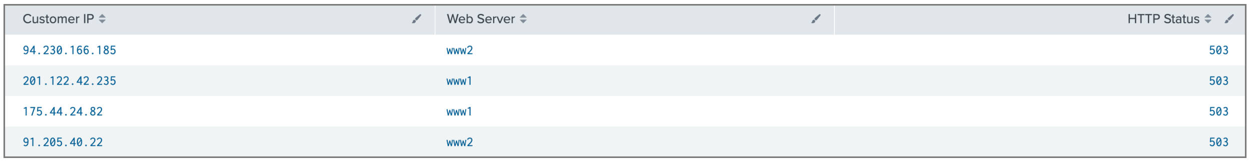
33. Save your search as a report with the name **L1S2**.

Task 5: Complete the missing portion of a search with the rename command.

34. This search finds purchase events from the online sales data that encountered a server problem (**`status>399`**.) Complete the **`<missing>`** portion of this search so that the **`clientip`** field is renamed to "Customer IP", the **`host`** field is renamed to "Web Server", and the **`status`** field is renamed to "HTTP Status." Run this search over the **Last 4 hours**.

```
index=web sourcetype=access_combined action=purchase status>399
| table clientip host status
| <missing>
```

```
index=web sourcetype=access_combined action=purchase status>399
| table clientip host status
| rename clientip as "Customer IP", host as "Web Server", status as "HTTP Status"
```



Customer IP	Web Server	HTTP Status
94.230.166.185	www2	503
201.122.42.235	www1	503
175.44.24.82	www1	503
91.205.40.22	www2	503

35. Save your search as a report with the name **L1S3**.

Lab Exercise 2 – Compare Temporary vs Persistent Fields

Description

Perform search-time field extractions using the **erex** and **rex** commands.

Steps

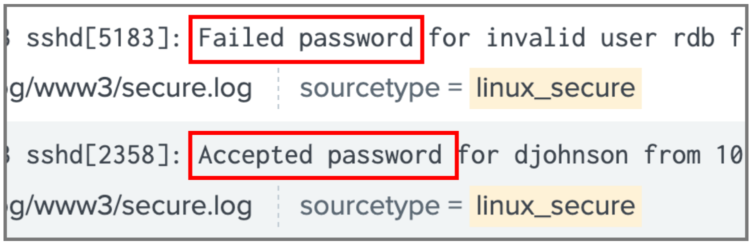
Scenario: SecOps wants to see a count of event descriptions by port from all web server events over the past 7 days.

Task 1: Use the erex command to extract temporary fields and include events based on pattern matching.

1. Search for all web server events (**index=security sourcetype=linux_secure**) over the **Last 7 days** that contain the keyword "port".

   ```
   index=security sourcetype=linux_secure port
   ```

2. Scroll through the list of events. Notice how many events have "Accepted password for…" and "Failed password for…".



```
 sshd[5183]: Failed password for invalid user rdb f
g/www3/secure.log   sourcetype = linux_secure
 sshd[2358]: Accepted password for djohnson from 10
g/www3/secure.log   sourcetype = linux_secure
```

3. Use the **erex** command to create a field called **event_description**. Provide the phrases "Accepted password " and "Failed password " as examples.

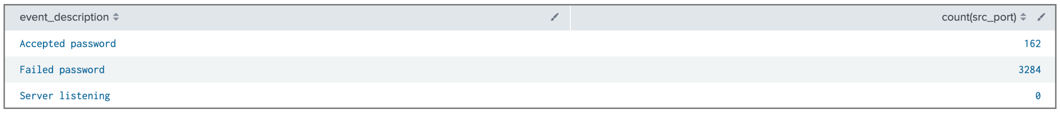
   ```
   index=security sourcetype=linux_secure port
   | erex event_description examples="Failed password , Accepted password "
   ```

4. Pipe your search to the following **stats** command:

   | stats count(src_port) by event_description

   The **stats** command uses the **count** function to count the number of ports (**src_port**) for each value of **event_description**.

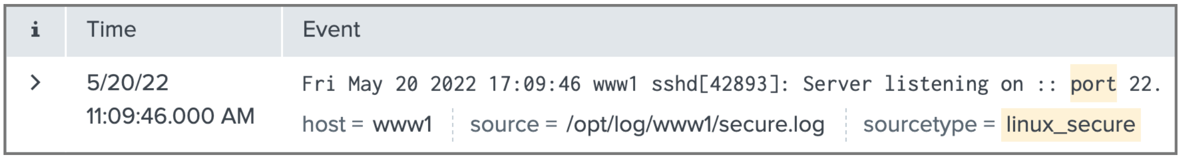
   ```
   index=security sourcetype=linux_secure port
   | erex event_description examples="Failed password , Accepted password "
   | stats count(src_port) by event_description
   ```



event_description	count(src_port)
Accepted password	162
Failed password	3284
Server listening	0

5. Observe your results. There appears to be no results for "Server listening". Why?

   When you view events for "Server listening" (click on **Server listening** > **View events**) you will see that the associated port is a two-digit number. If you look at the **Interesting Fields** sidebar, you will also notice that there is no **`src_port`** field indicating that Splunk does not recognize **`22`** as a port number. (NOTE: "port" is highlighted because it shows up in the basic search.)



i	Time	Event

>	5/20/22
	11:09:46.000 AM
		`Fri May 20 2022 17:09:46 www1 sshd[42893]: Server listening on :: port 22.`
		host = www1 ¦ source = /opt/log/www1/secure.log ¦ sourcetype = linux_secure

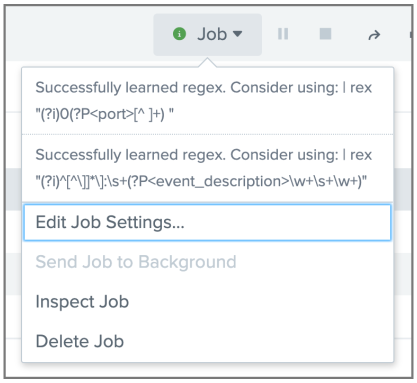
6. Save your search as a report with the name **L2S1**. In Task 2, you will fix your search.

Task 2: Use the `rex` command to improve your search results from Task 1.

7. Insert an **`erex`** command after the basic search that will create a new field called "port". Provide it with three port examples including **`22`**. Edit the **`stats`** command so that it now counts **`port`** values instead of **`src_port`** values.

```
index=security sourcetype=linux_secure port
| erex port examples="22,1229,1268"
| erex event_description examples="Failed password, Accepted password"
| stats count(port) by event_description
```

8. Click on the **Job** dropdown and view the messages. You will see that Splunk is recommending you use the **`rex`** command with regex it has automatically generated. (Note: Your regex may be slightly different for **`port`**.)

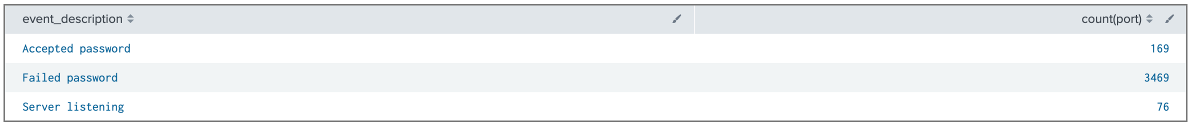


Successfully learned regex. Consider using: | rex "(?i)0(?P<port>[^]+) "

Successfully learned regex. Consider using: | rex "(?i)^[^\]]*\]:\s+(?P<event_description>\w+\s+\w+)"

9. Replace your two **`erex`** commands with the suggested **`rex`** commands.

```
index=security sourcetype=linux_secure port
| rex "(?i)0(?P<port>[^ ]+)"
| rex "(?i)^[^\]]*\]:\s+(?P<event_description>\w+\s+\w+)"
| stats count(port) by event_description
```



event_description	count(port)
Accepted password	169
Failed password	3469
Server listening	76

10. Save your search as a report with the name **L2S2**.