Splunk Workshop by Adrian Dolinay: Log Analysis

In this workshop we will focus on Splunk Enterprise. Splunk Enterprise is a platform to collect, analyze and visualize machine generated data. This data includes log files, application metrics, network data and industrial data to name a few.

In this workshop we will utilize Docker to run Splunk. Once Splunk it running we will upload synthetic logs to the platform and analyze the logs with Splunk commands.

Server Log

The "**`log_data.csv`**" is a synthetic log that contains data on server events. The log is saved as a comma separated values (csv) format. There are four fields in the log: **`timestamp`** (date/time the event occurred), **`host`** (server or device for the event), **`event_type`** (login, logout, error) and **`event_description`** (description of the event). We will upload this log into Splunk and analyze the data.

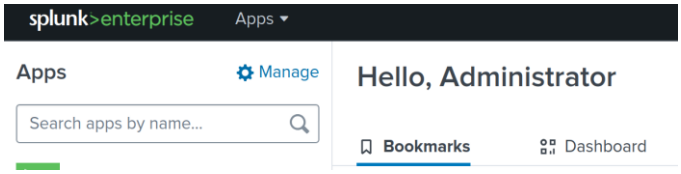
1. **PULLING THE DOCKER IMAGE AND RUNNING SPLUNK**

- To pull and run the Splunk image in a container use the command "**`docker run -d -p 8000:8000 -p 8088:8088 -p 9997:9997 -e SPLUNK_START_ARGS="--accept-license" -e SPLUNK_PASSWORD="password" --name splunk splunk/splunk:latest`**" in your terminal. Docker pulls down the Splunk image, it will take a few minutes.
- Run "**`docker ps -a`**". You should see a Splunk container running. Under the "**`status`**" header, once the status displays as "**`Up (healthy)`**" you can access Splunk. If you see "**`health: starting`**", then Splunk has not fully started yet.

2. **ACCESSING SPLUNK**

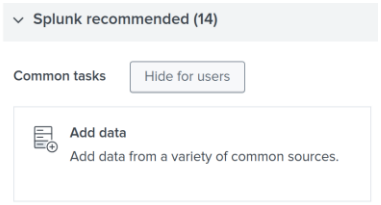
- Bring up a web browser and in the search bar run "**`http://localhost:8000/`**".
- The Username is "**`Admin`**" and the password is "**`password`**".

- Once logged in you will be brought to the Splunk Enterprise homepage.

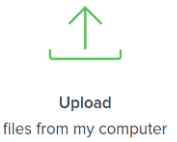


3. ADDING DATA TO SPLUNK

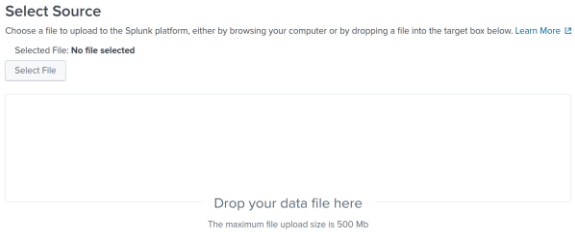
- On the homepage select "**`Add Data`**".



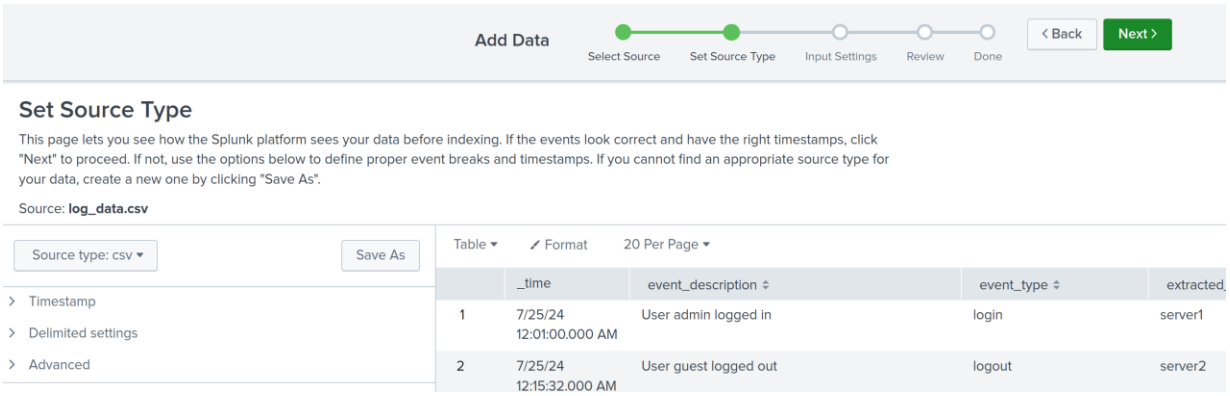
- On the next page select "**`Upload files from my computer`**".



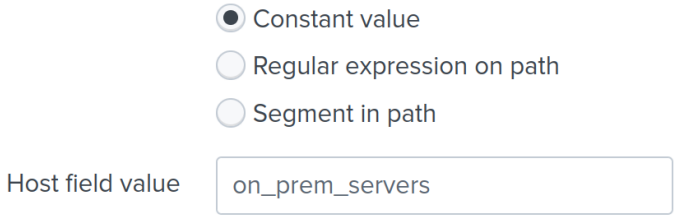
- Select "**`Choose File`**" and upload the "**`log_data.csv`**" file or drag and drop the file into the page.



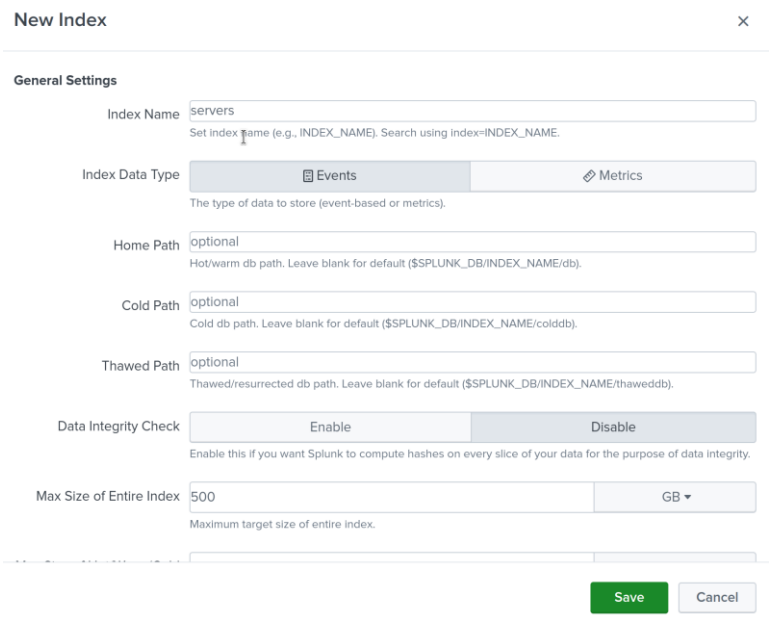
- On the "**`Set Source Type`**" page, ensue that the "**`Source type`**" is set as a CSV. Select next.



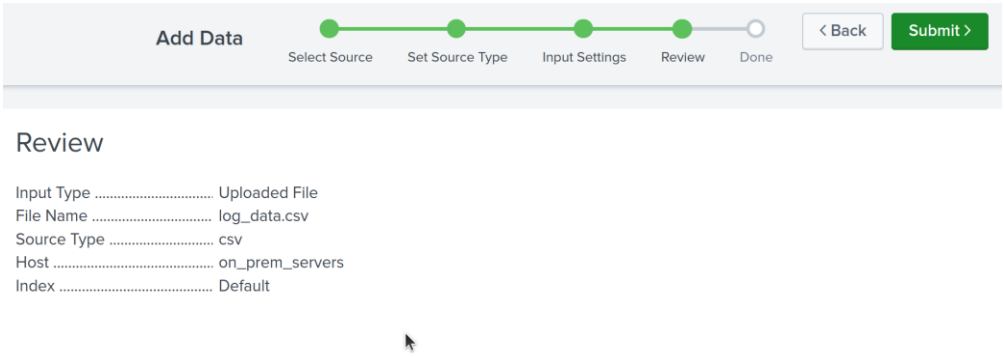
- On the "**`Input Settings`**" in the "**`Host field value`**" type "**`on_prem_servers`**". The "**`Host field value`**" denotes the machine where the uploaded log came from.



- Still on the "**`Input Settings`**" page select "**`Create a new index`**". Type "**`servers`**" for the Index Name. Use the default setting for the rest of the fields and select "**`Save`**". Select "**`Review`**".



- Select "**`Submit`**" on the "**`Review`**" page.



4. BASIC SPLUNK SEARCHES

- Go back to the home page by selecting the "**`Splunk Enterprise`**" logo.
- Under "**`Apps`**" select "**`Search and Reporting`**".
- Next to the magnifying glass icon, select the "**`Last 24 hours`**" and change it to "**`All time`**" under "**`Other`**".
- Run the command "**`index=servers`**" in the search. This search retrieves all events that are stored in the "**`servers`**" index. It does not apply any additional filters or constraints, so it will return every event in the "**`servers`**" index.
- For the next search run "**`index= servers | stats count by event_type`**". This search will bucket all of the "**`events`**" by their corresponding "**`event types`**". Within our log we have 37 "**`errors`**", 72 "**`logins`**" and 38 "**`logouts`**". To look further into a specific event, select the event type and select "**`View Events`**".

5. CREATING GRAPHS

- To visualize all of the events in the given log we can search for "**`index=servers earliest="07/25/2024:00:00:00" latest="07/30/2024:23:59:59" | timechart span=1d count`**". To visualize the search select the "**`Visualization`**" tab. This will list out all the dates from July 25th to the 30th in single day intervals.

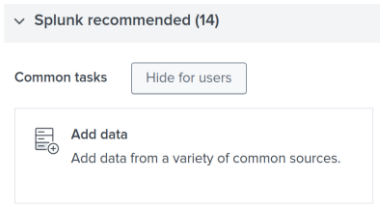
- We can breakout the bar charts by event type (login, logout, error) by searching the command "**`index=servers earliest="07/25/2024:00:00:00" latest="07/30/2024:23:59:59" | timechart span=1d count by event_type`**".
- Under the same search, change the chart type by selecting "**`Column Chart`**" and select the "**`Line Chart`**".
- To get the proportions of events by type we can run "**`index=servers earliest="07/25/2024:00:00:00" latest="07/30/2024:23:59:59" | stats count by event_type | sort -count`**". Change the chart type by selecting "**`Line Chart`**" and select the "**`Pie Chart`**".

Azure Cloud Log

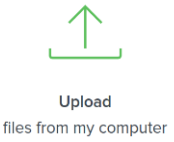
The "**`azure_log.json`**" is a synthetic log that contains events for Microsoft Azure cloud activities. The log includes a range of information about operations and activities that occur within an Azure subscription, such as resource modifications, service health events, and other management operations. The log is formatted as a JavaScript Object Notation (JSON) file. We will upload this log into Splunk and analyze the data.

1. ADD AWS DATA TO SPLUNK

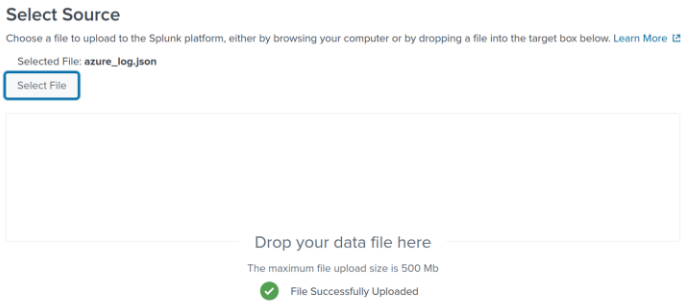
- On the homepage select "**`Add Data`**".



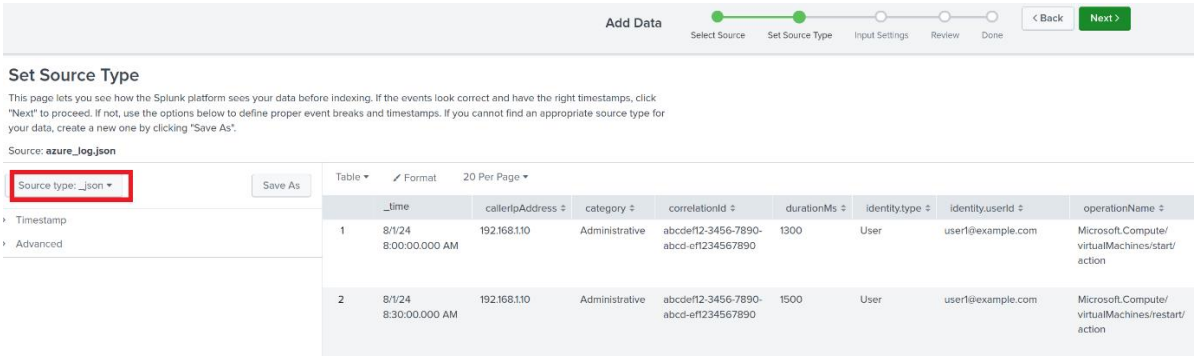
- On the next page select "**`Upload files from my computer`**".



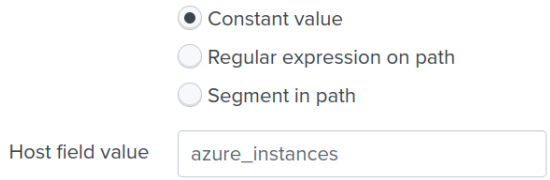
- Select "**`Choose File`**" and upload the "**`azure_log.json`**" file or drag and drop the file into the page.



- On the "**`Set Source Type`**" page, ensue that the "**`Source type`**" is set as "**`_json`**". Select next.



- On the "**`Input Settings`**" in the "**`Host field value`**" type "**`azure_instances`**". The "**`Host field value`**" denotes the machine where the uploaded log came from.



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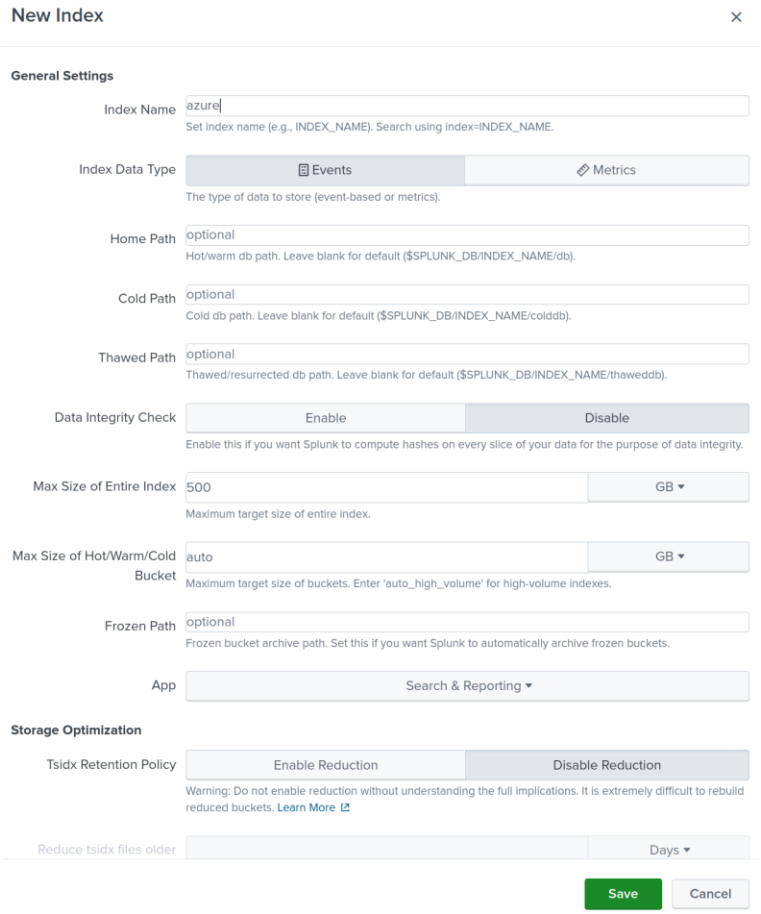
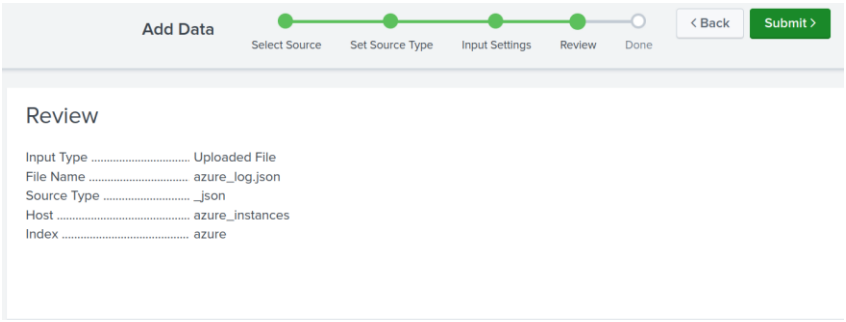
- Still on the "**`Input Settings`**" page select "**`Create a new index`**". Type "**`azure`**" for the Index Name. Use the default setting for the rest of the fields and select "**`Save`**". Select "**`Review`**".



- Select "**`Submit`**" on the "**`Review`**" page.



2. Splunk Searches For Azure Log

- Go back to the home page by selecting the "**Splunk Enterprise**" logo.
- Under "**Apps**" select "**Search and Reporting**".
- Next to the magnifying glass icon, select the "**Last 24 hours**" and change it to "**All time**" under "**Other**".
- Run the command "**index=azure**" in the search. This search retrieves all events that are stored in the "**azure**" index. It does not apply any additional filters or constraints, so it will return every event in the "**azure**" index.
- Run the command "**index="azure " earliest="08/01/2024:00:00:00" latest="08/05/2024:23:59:59"**". This will retrieve all of the logs for a certain date range.

3. Splunk Advanced Searches For Azure Log

- Run "**index="azure" | stats count by operationName**". This retrieves the count of each operation performed. To explain some events, the "**Microsoft.Compute/virtualMachines/restart/action**" is when a virtual machine restarts. The "**Microsoft.Network/networkSecurityGroups/securityRules/delete**" is when a security rule is deleted.
- Run "**index="azure" | stats count by callerIpAddress | sort -count**". This command identifies which IP addresses are most active within the Azure environment by counting how many events are associated with each IP address.
- Run "**index="azure_logs" operationName="Microsoft.Storage/storageAccounts/delete"**". The command is used in identifying specific events where storage accounts were deleted within an Azure environment. It helps in monitoring and auditing Azure resources. Running "**index="azure_logs" operationName="Microsoft.Storage/storageAccounts/delete" | sort -time**" sorts the storage account deletions by time.

4. Creating Graphs

- To visualize the activties by resource type, run "**index="azure" | rex field=resourceId "(?<resourceType>Microsoft\.\w+/\w+)" | stats count by resourceType | sort -count**". Select the "**Visualization**" tab and select "**Bar Chart**". From the charts we can see that there have been a high number of events for Azure Virtual Machine and a single event for the Azure Network Interface resource.
- To visualize the number of operations by IP Address, run "**index="azure" | stats count by callerIpAddress | sort -count**" and make sure the "**Bar Chart**" graph is selected.