

# ThreatQuotient



## ThreatQuotient App for Splunk Guide

Version 2.6.0

May 23, 2023

**ThreatQuotient**

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ThreatQ Supported

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# Support

This integration is designated as **ThreatQ Supported**.

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# App Details

Current App Version	2.6.0
Current Add-on Version	2.6.0
Compatible with ThreatQ Versions	>= 4.16.0
Compatible with Splunk Versions	9.0.x, 8.2.x
Python Version	3
Support Tier	ThreatQ Supported
Splunkbase Entries	App: <a href="https://splunkbase.splunk.com/app/4418/">https://splunkbase.splunk.com/app/4418/</a> Add-on: <a href="https://splunkbase.splunk.com/app/4419/">https://splunkbase.splunk.com/app/4419/</a>

## Features

The ThreatQuotient App for Splunk provides the following capabilities:

- [Distributed Deployment](#)
- [Support for Splunk's Common Information Model \(CIM\) and Enterprise Security \(ES\)](#)
- [Export Indicators from ThreatQ using Score and Status Filters](#)
- [Detect Sightings and Return to ThreatQ](#)
- [Contextualize ThreatQ Data](#)
- [Workflow Actions in Splunk to Interact with ThreatQ Data](#)

- 
- [Dashboard Visualization](#)

## Distributed Deployment

The ThreatQ Splunk App consists of two separate Splunk packages:

PACKAGE	DESCRIPTION
ThreatQuotient Add-on for Splunk	Deployed on Splunk heavy forwarder. It can optionally be deployed on the search head and IDM.
ThreatQuotient App for Splunk	Deployed on Splunk search head.

## Support for Splunk's Common Information Model (CIM) and Enterprise Security (ES)

SUPPORT	DESCRIPTION
<b>CIM Support</b>	For users who map third party data (firewall events, logs for example) to Splunk's data models in CIM. The App provides optimized performance by leveraging those data models.
<b>ES Support</b>	Indicator data exported from ThreatQ is mapped to lookup tables native to Splunk ES. Threat Intelligence support for Enterprise Security is provided using its REST APIs.

## Export Indicators from ThreatQ using Score and Status Filters

PACKAGE	DESCRIPTION
<b>Score Filter</b>	You can choose to export indicators with scores greater than or equal to the value configured in the score filter.
<b>Status Filter</b>	You can choose to export indicators with statuses matching the ones configured in the status filter.



## Detect Sightings and Return to ThreatQ

PACKAGE	DESCRIPTION
Detect Sightings	Indicators from ThreatQ are matched against raw events in Splunk looking for evidence of sightings.
Report Sightings	Sightings are reported back to ThreatQ as events that contain the most up to date information.

## Contextualize ThreatQ Data

All data exported from ThreatQ is highly contextualized for Splunk. Context provided for exported indicators includes:

- Indicator Sources
- Indicator Adversaries
- Indicator Attributes
- Indicator Status
- Indicator Score
- Indicator Type

# Workflow Actions in Splunk to Interact with ThreatQ Data



Workflow actions are only available for fields that are configured to be extracted. Additional fields can be configured for extraction by clicking **Event Actions -> Extract Fields**.

The ThreatQ Splunk App provides the following workflow actions to allow an analyst to interact with ThreatQ:

- Add an Indicator to ThreatQ.



The user provides indicator type, status and source.

- Update indicator statuses. This action supports all statuses, including custom, that exist on the ThreatQ instance.
- Look up an indicator in ThreatQ.



Additional context is fetched if this indicator exists in ThreatQ.

- Mark an indicator **False Positive** in ThreatQ.
- Mark an indicator **True Positive** in ThreatQ.

See the [Workflow Actions](#) chapter for more details.

## Dashboard for Visualization

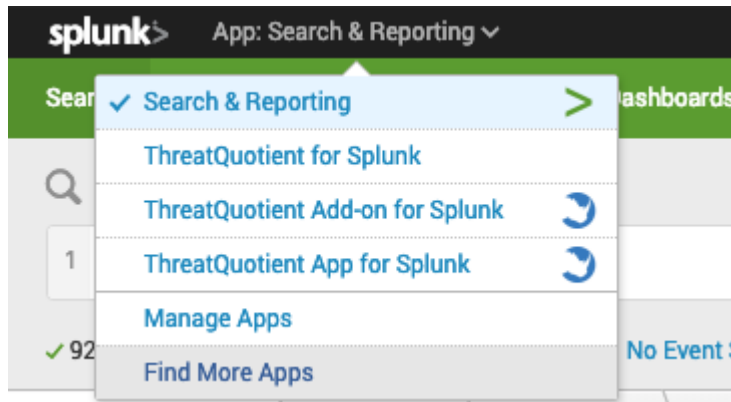
The dashboard provides a rich set of real time updated widgets and tables to summarize information, including (but not limited to):

- Total exported indicators and sightings filtered by time range, type and score.
- Top 10 indicators with sightings.
- Top 10 sources and adversaries (due to the context available from ThreatQ) with sightings.
- Static tables summarizing indicators and sightings filtered by time range, type and score.

See the [Dashboards](#) section of the [Scaling the App](#) chapter for more details.

# Installation

1. Click on the **Down** arrow on the Apps menu located in the main navigation bar.
2. Select the **Find More Apps** option.



3. Search for “**ThreatQuotient**” and follow the onscreen prompts to install the **ThreatQuotient App** and **ThreatQuotient Add-on**.

# Upgrading

Review the following important upgrade notes before upgrading the app.

## Version 2.6.0



The Verify SSL Certificate checkbox option, previously located under the Configuration page, has been removed to meet Splunk Cloud Validation requirements with version 2.6.0.

### App

1. Follow the standard Splunkbase upgrade steps to upgrade the app.

Wait for the upgrade process to complete before proceeding with the next step.

2. Navigate to Info > Edit App Configuration > Account.
3. Configure the account for the app to perform workflow actions and AR actions.
4. Review and configure the Proxy and a Logging settings if needed.



Version 2.6.0 removed the Verify SSL Certificate option under the Configuration page. The following steps can be used if certificate validation is not required.

Navigate to the following file:

```
$SPLUNK_HOME/etc/apps/ThreatQAppforSplunk/bin/threatq_const.py
```

5. Change the `VERIFY_SSL` to **False**.

### Add-on

1. Navigate to the **ThreatQuotient Add-on for Splunk**.
2. Navigate to the **Inputs** page and disable any existing inputs.
3. Navigate to **Settings > Searches, Reports, and Alerts**.
4. Delete any existing alerts.
5. Follow the standard Splunkbase upgrade steps to upgrade the Add-on.

Wait for the upgrade process to complete before proceeding with the next step.

6. Navigate back to the **ThreatQuotient Add-on for Splunk**.
7. Navigate to the **Inputs** page and enable any existing inputs or create a new inputs in the fields supplied.



Version 2.6.0 removed the Verify SSL Certificate option under the Configuration page. The following steps can be used if certificate validation is not required.

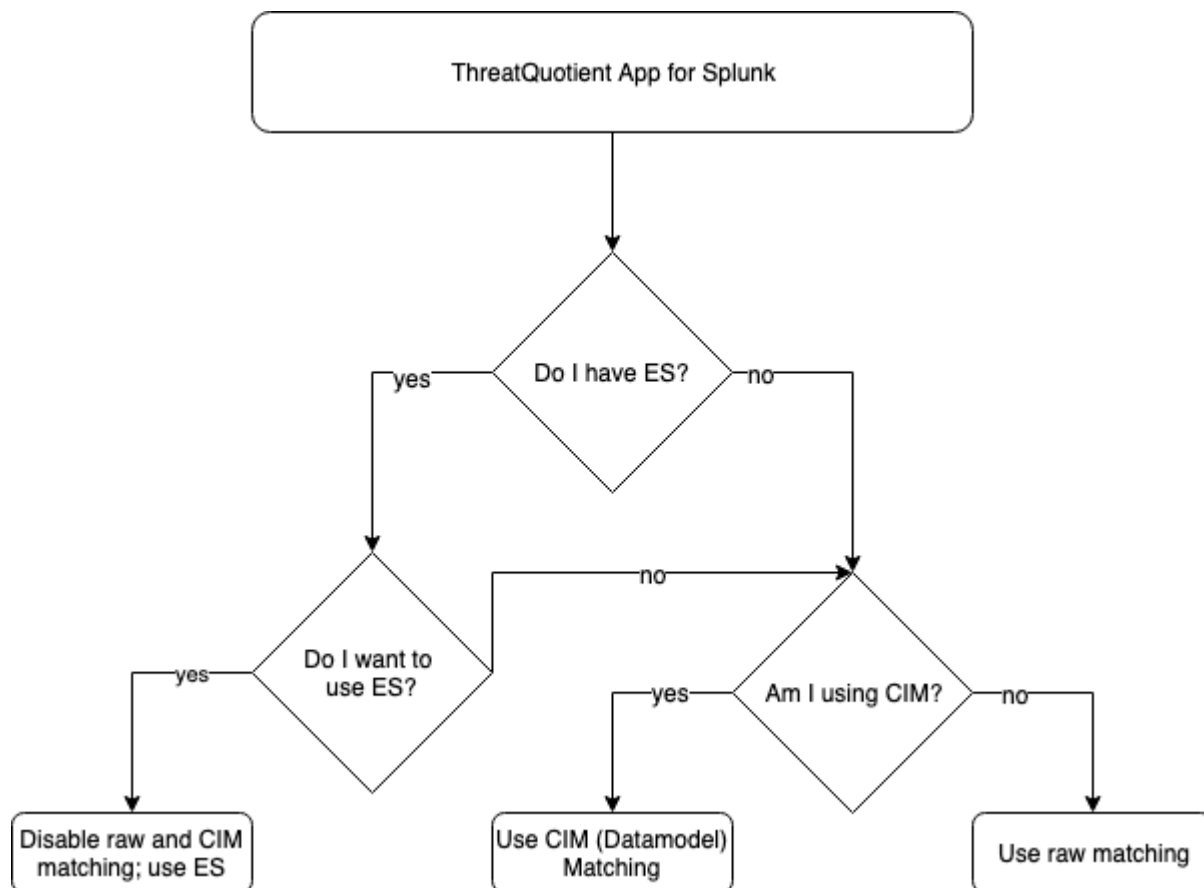
8. Navigate to the following file:

```
$SPLUNK_HOME/etc/apps/TA-threatquotient-add-on/bin/threatq_const.py
```

9. Change the `VERIFY_SSL` to **False**.

## App Usage

The ThreatQuotient App for Splunk can be used in one of three possible modes. Follow the flow diagram below to determine which mode to use.



MODES	DESCRIPTION
Raw Matching Mode	Raw Matching Mode is applicable if you do not have Splunk Enterprise Security (ES) and do not map your traffic to Splunk's CIM. In this mode, the App treats all events as raw binary data and looks for evidence of sightings inside said data using optimized regexes. See the tables in the <a href="#">Performance</a> chapter for the expected performance data.
CIM Matching Mode	CIM Matching Mode, sometimes referred to as <b>Datamodel Match Mode</b> , should be used if you want to amp your traffic using Spunk's CIM but do not wish to use Enterprise Security (ES). In this mode, the app uses the mapping table described in <a href="#">CIM Support</a> section to find evidence of sightings and report back matches. This form of matching is more optimized since the algorithm can now reference well known fields in standard data models instead of looking for matches in the whole binary data.
Enterprise Security	Enterprise Security Mode is applicable if you use Enterprise Security for your end-to-end workflow, and want to get the threat data in ES. In this mode, you do not use any capability of the ThreatQuotient App, and instead rely on Enterprise Security to find and report on evidence of sightings.

## Deployment

The ThreatQ Splunk app requires two packages to be deployed:

PACKAGE	DESCRIPTION
TA-threatquotient-add-on	<p>This package needs to be deployed on the Splunk heavy forwarder.</p> <ul style="list-style-type: none"><li>On the heavy forwarder, the add-on App extracts indicators from the ThreatQ appliance and forwards them to the configured Splunk index.</li></ul>



With previous releases, the Add-on was required to be installed on the Search Head as a dependency for the app. With the version 2.6.0 updates, the add-on is no longer required to be installed on the search header. The add-on must still be deployed in your environment (heavy forwarder, search head, or IDM) in order to pull data from ThreatQ.

### ThreatQAppforSplunk

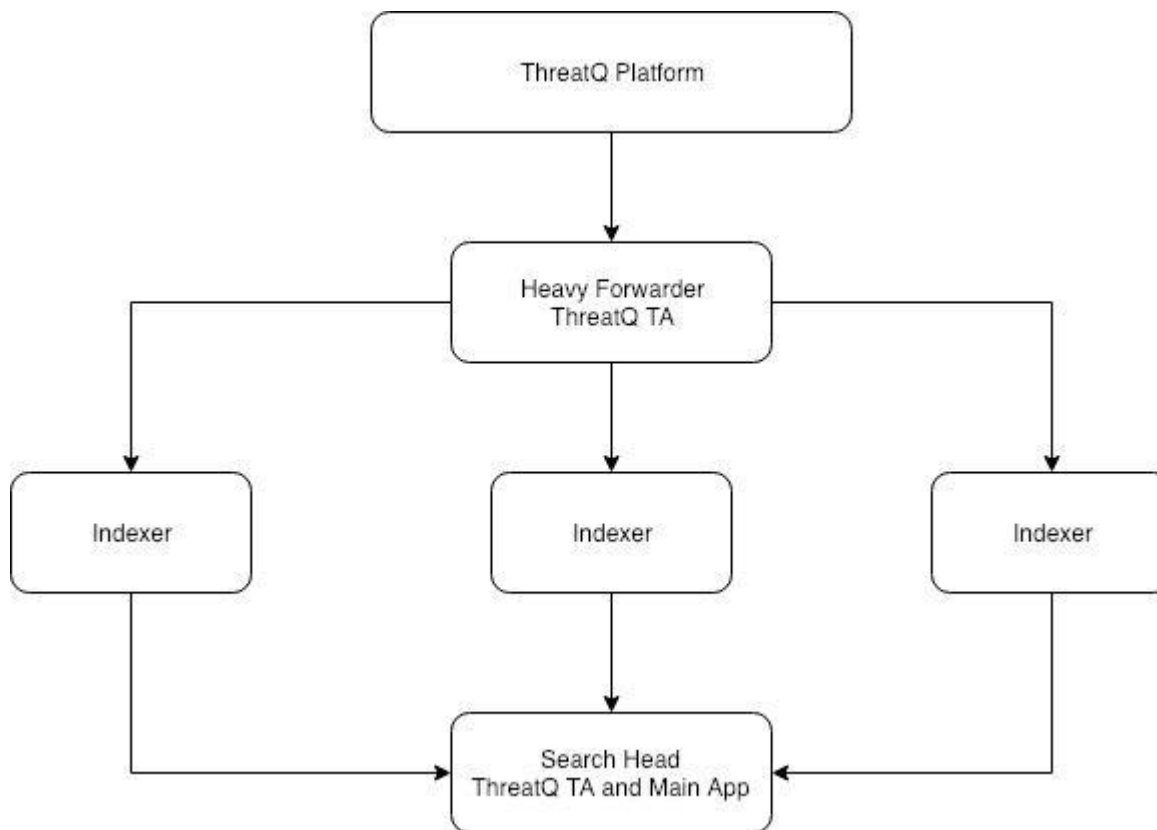
This package needs to be deployed only on the Splunk search head.

## Deployment Methods


There are two ways in which both Apps can be deployed in Splunk:

METHOD	DESCRIPTION
<b>Standalone Mode</b>	In this mode, both Apps are deployed and configured on the same machine.
<b>Distributed Mode</b>	In this mode, deployment is done as described in the image below.

## Deployment of Splunk App in Distributed Environment



For a distributed environment with a **cluster of search heads**, you will need to configure the ThreatQuotient Add-on App on the master node and use the Splunk App deployer to propagate that configuration to all nodes.

 For the heavy forwarder, it is **not recommended** that you deploy the Add-on app on a cluster, since the data extraction takes place with a custom script, and works the best with a single node. See the [Advanced Configuration](#) section for more details regarding heavy forwarders.

The table below summarizes the deployment in the distributed Splunk environment:



## Deployment Matrix for Distributed Environment

APP	HEAVY FORWARDER	INDEXER	SEARCH HEAD
ThreatQuotient Add-on	Yes <ul style="list-style-type: none"><li>• Requires configuration with ThreatQuotient credentials.</li><li>• Requires creating the data collection job.</li></ul>	No	No
ThreatQuotient App	No	No	Yes <ul style="list-style-type: none"><li>• Requires configuration with ThreatQuotient credentials</li></ul>

## Advanced Configuration

Configuring multiple heavy forwarders for a single ThreatQ Splunk App is not typical as the indicators exported from ThreatQ do not exceed a few thousand at most. If you intend to have multiple heavy forwarders, you will have to make multiple copies of the default ThreatQ Splunk Export using a different Export ID on each heavy forwarder. This will allow the ThreatQ server to keep track of incremental indicator changes as seen by each distinct export.

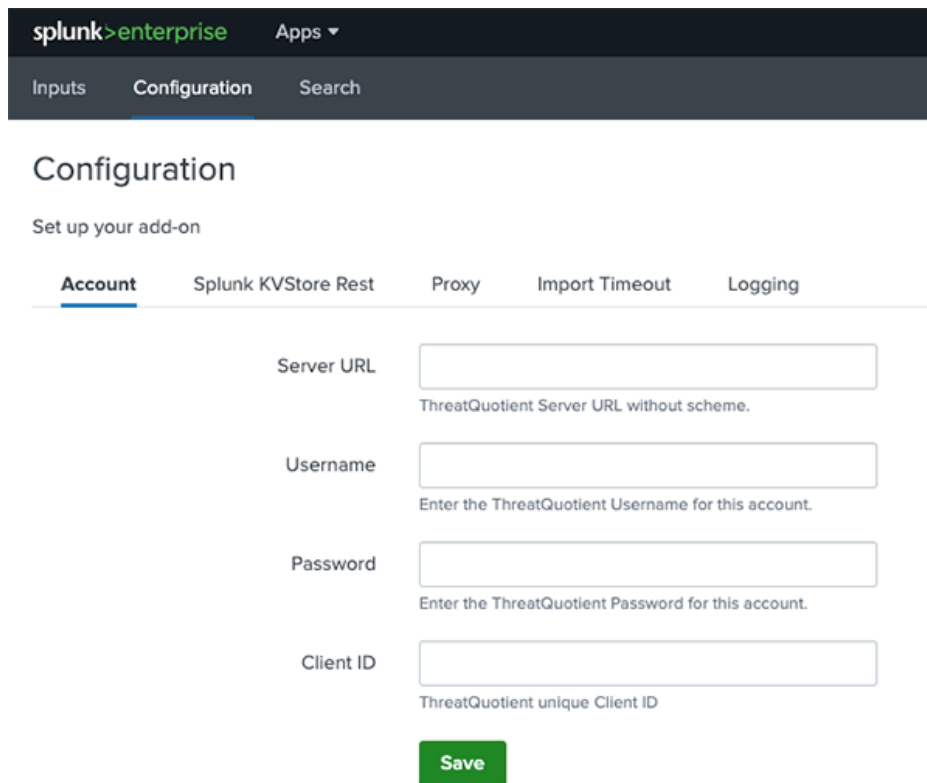
## Configuration

### ThreatQuotient Add-on

The following section provides steps on authenticating **ThreatQuotient add-on** with the ThreatQ platform.

## Authentication with ThreatQ

On the Configuration tab, fields are presented to configure the ThreatQ account authentication as shown below.



Upon clicking the **Save** button, you can see the status of the Authentication action. If the ThreatQuotient appliance is down, and/or the authentication parameters are invalid, an error message will be displayed. Unless the appliance is up and the authentication parameters are valid, this App will not work.

## Disable Verify SSL Certification

The Verify SSL Certificate checkbox option has been removed to meet Splunk Cloud Validation requirements with version 2.6.0. Perform the following steps to disable the Verify SSL Certification:

1. Navigate to the following file:

```
$SPLUNK_HOME/etc/apps/TA-threatquotient-add-on/bin/threatq_const.py
```

2. Change the `VERIFY_SSL` to **False**.

# Authentication with the Use of Self-Signed Certificates in ThreatQ

It is common for many ThreatQuotient users to leverage self-signed certificates. If this is the case, you must perform the following additional configuration steps in the Splunk Add-On App.

In `${SPLUNK_HOME}/etc/apps/TA-threatquotient-add-on/default/ta_threatquotient_add_on_settings.conf`, make the following configuration change:

## Splunk Search for Listing TQ Indicators

```
<> [additional_parameters]
verify_cert = false
```

## Splunk KVStore Rest

The App Key Value Store, commonly referred to as the **Splunk KVStore**, is a Splunk Enterprise feature that allows you to save/retrieve data within Splunk apps.


You can read more about the KVStore Splunk feature in Splunk's Developer documentation:

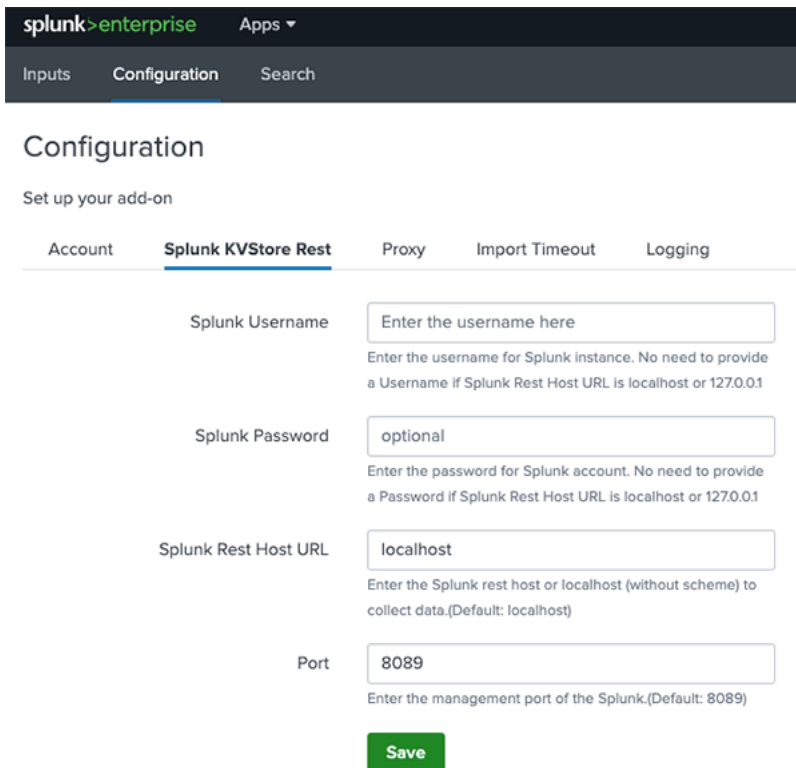
<https://dev.splunk.com/enterprise/docs/developapps/manageknowledge/kvstore/>

The Splunk KVStore Rest configuration should be updated for distributed setups to ensure data is saved into the KVStore.

Click on the **Splunk KV Store Rest** tab and complete the following fields:

FIELD	DESCRIPTION
Splunk Username	Your username for your Splunk instance.
Splunk Password	The password for your Splunk user account.

FIELD	DESCRIPTION
Splunk Rest Host URL	<p>The Splunk rest host or localhost (without scheme) to collect data.</p> <div>  This is the Splunk Management Host, commonly the Search Head or Cluster member.         </div>
Port	The Management port for Splunk.



The screenshot shows the Splunk Configuration interface for the 'Splunk KVStore Rest' app. The 'Configuration' tab is selected, and the 'Splunk KVStore Rest' sub-tab is active. The form includes fields for 'Splunk Username', 'Splunk Password', 'Splunk Rest Host URL', and 'Port'. The 'Splunk Rest Host URL' field is set to 'localhost', and the 'Port' field is set to '8089'. A 'Save' button is at the bottom.

**Configuration**

Set up your add-on

Account **Splunk KVStore Rest** Proxy Import Timeout Logging

Splunk Username   
Enter the username for Splunk instance. No need to provide a Username if Splunk Rest Host URL is localhost or 127.0.0.1

Splunk Password   
Enter the password for Splunk account. No need to provide a Password if Splunk Rest Host URL is localhost or 127.0.0.1

Splunk Rest Host URL   
Enter the Splunk rest host or localhost (without scheme) to collect data.(Default: localhost)

Port   
Enter the management port of the Splunk.(Default: 8089)

**Save**

## Proxy

Click on **Proxy** tab to set proxy settings if required.

The following parameters are available:

PARAMETER	DESCRIPTION
Enable	Use the checkbox to enable or disable the proxy.
Proxy Type	Select the type of proxy. Options include: <ul style="list-style-type: none"><li>• http</li><li>• socks4</li><li>• socks5</li></ul>
Host	Enter the proxy server URL.
Port	Enter the proxy server port.
Username	Enter the proxy server username.
Password	Enter the password associated with the username above.
Remote DNS Resolution	Use this check box to enable remote DNS resolution.

## Configuration

Set up your add-on

Account

Splunk KVStore Rest

**Proxy**

Import Timeout

Logging

Enable

☐

Proxy Type

http ▾

✕

Host

Proxy Server URL.

Port

Proxy Server Port.

Username

Proxy Server Username.

Password

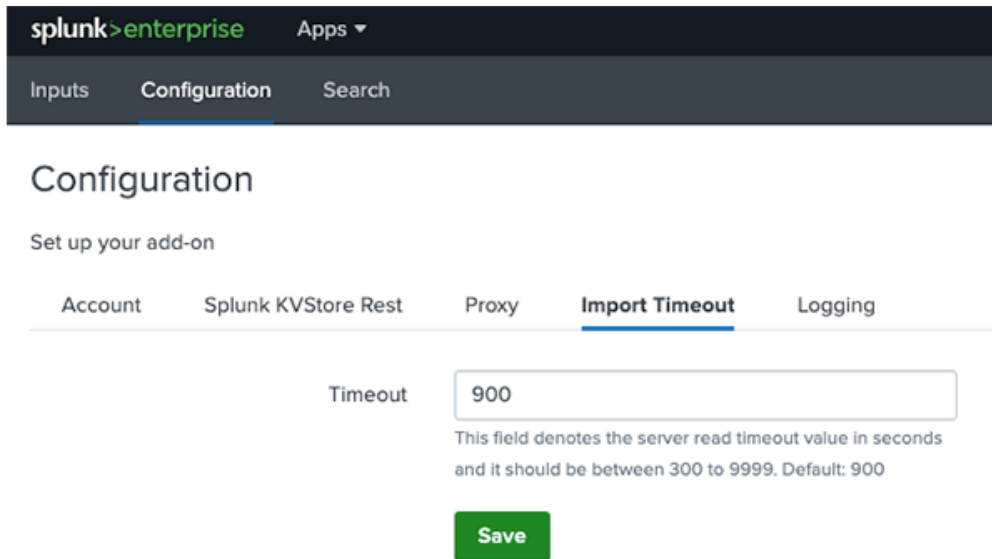
Proxy Server Password.

Remote DNS resolution

☐**Save**

## Import Timeout

Click on the Import Timeout tab to set server read timeout value in seconds.



The screenshot shows the Splunk web interface. At the top, there's a navigation bar with 'splunk>enterprise' and 'Apps' with a dropdown arrow. Below this is a secondary navigation bar with 'Inputs', 'Configuration' (which is underlined), and 'Search'. The main content area is titled 'Configuration' with the subtitle 'Set up your add-on'. Below this, there are five tabs: 'Account', 'Splunk KVStore Rest', 'Proxy', 'Import Timeout' (which is selected and underlined), and 'Logging'. In the 'Import Timeout' tab, there is a 'Timeout' label next to a text input field containing the value '900'. Below the input field, a note states: 'This field denotes the server read timeout value in seconds and it should be between 300 to 9999. Default: 900'. At the bottom of the form is a green 'Save' button.

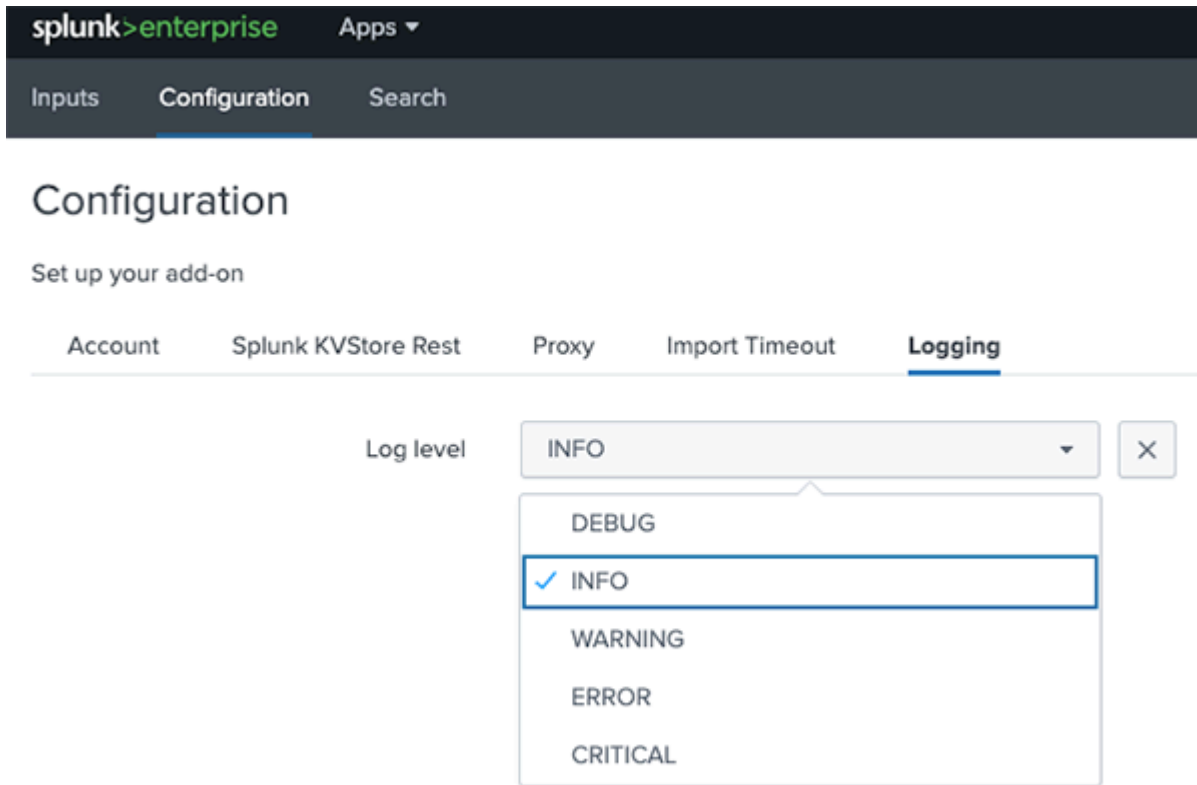


The default value is 900 seconds. The minimum value allowed is 300 seconds.

## Logging

Click on the Logging tab to set the Log level. Log level options include:

- Debug
- Info
- Warning
- Error
- Critical



The screenshot shows the Splunk web interface. At the top, the header includes 'splunk>enterprise' and 'Apps' with a dropdown arrow. Below this is a navigation bar with 'Inputs', 'Configuration', and 'Search'. The 'Configuration' tab is active. Under 'Configuration', there's a sub-header 'Set up your add-on'. Below this are several tabs: 'Account', 'Splunk KVStore Rest', 'Proxy', 'Import Timeout', and 'Logging'. The 'Logging' tab is selected and underlined. In the center, there's a 'Log level' label next to a dropdown menu. The dropdown is open, showing a list of log levels: 'DEBUG', 'INFO' (which is selected with a blue checkmark and a blue border), 'WARNING', 'ERROR', and 'CRITICAL'. There is also a close button (X) next to the dropdown.

## Data Extraction from ThreatQ

On the **Inputs** tab, you can click **Create New Input** to add a data collection job as shown below.



Add ThreatQ indicators
✕

Name

Enter a unique name for the data input

Interval

Time interval of input in seconds between 60 and 7200.  
Default: 900

Enable Index
☒

Select the checkbox to enable the data collection in index.

Index

Export ID

The ThreatQ export ID to use for data collection. Default: splunk

Export Token

The ThreatQ export token to use for data collection.

Export Hash

The ThreatQ export hash to use for data collection. Default: 1

Indicator Status

Indicator status for collecting indicators. Indicators with provided status will only be collected. Values must be separated by a single comma. Default: Active




Pull All Indicators
☒

Enabling this checkbox will force pull all data on input edit. On input creation it is mandatory to enable this checkbox before saving. Enable this when changing status or score value for any input.

Cancel
Add

ThreatQ instances, starting with version 4.16.0, are shipped with an **Export** that this App uses. Upon the first execution of this job, it results in the export of all indicators. Every subsequent run of this job only results in getting new indicators as well as previously exported indicators that have since changed. Various configuration parameters are described below.

PARAMETER	DESCRIPTION
Interval	The frequency of this job. This value can be reduced for faster detection and response. Minimum allowed is 60 seconds.

PARAMETER	DESCRIPTION
Enable Index	<p>Enabling this option will result in data being saved to the designated index. Unchecking this option will result in data being saved directly to the KVStore.</p> <div>  <p>This option is enabled by default as previous app versions required ThreatQ data to be saved to the index. You must first complete the Splunk KVStore Rest configuration tab before disabling index storage. See the <a href="#">Authentication with the Use of Self Signed Certificates in ThreatQ</a> section for more details.</p> </div>
Threshold Indicator Score	<p>Any indicator below this score is not indexed in Splunk. This threshold is very useful to reduce the data being indexed in the ThreatQuotient App. The default value is 8.</p>
Pull All Indicators	<p>Enabling this checkbox will force pull all data on input edit.</p> <div>  <p>The checkbox must be selected, upon input creation, before saving. This option should be utilized when changing the status or score of any input.</p> </div>
Indicator Status	<p>Similar to the score threshold, any indicator not matching the status configured here is not indexed in Splunk. This technique is useful for reducing indexed data. The default values are <b>Active</b>.</p>
Export ID	<p>Defaults to splunk. Use this value when using the default splunk export in ThreatQ (Splunk Indicators Export). If you make a copy of the export, you must configure the ID of the export in this field as seen on the ThreatQ instance.</p>
Export Token	<p>On the ThreatQ instance, find the export named as Splunk Indicators Export and click Connection Settings. The token is available in the following configuration screen. See the picture below for reference.</p> <div>  </div>

---

PARAMETER	DESCRIPTION
Export Hash	Defaults to 1. In the event you want to re-export all indicators from ThreatQ for any reason (such as installing a new Splunk instance), use this con-figuration. You can configure a different alphanumeric value of length up to 32 and cause exporting all indicators from ThreatQuotient again.

## Pagination Support

Initial import of ThreatQ data will now be performed using the pagination feature which imports a maximum of 10,000 records at once. After the initial import is complete, the import will revert to the differential method of pulling data. This will be the default behavior whenever a new input is created. The following commands can be used to view, add or update the pagination setting on the inputs:



The following actions can be performed through the app UI via the Pull All Indicators option –see the Pull All Indicators option in the [Data Extraction from ThreatQ](#) section. The commands below are CLI alternatives to the UI option.

ACTION	COMMAND
View the pagination setting for each input	<pre>curl -k -u username:password https://localhost:8089/servicesNS/nobody/TA-threatquotient-add-on/storage/collections/data/TA_threatquotient_add_on_checkpointer</pre>
Update the pagination setting for an input	<pre>curl -k -u username:password https://localhost:8089/servicesNS/nobody/TA-threatquotient-add-on/storage/collections/data/TA_threatquotient_add_on_checkpointer/ {input_name} -H 'Content-Type: application/json' -d '{"state" : " {\\"pull_all_iocs\\": true false}"}'</pre>
Add a pagination setting for an input	<pre>curl -k -u user:password https://localhost:8089/servicesNS/nobody/TA-threatquotient-add-on/storage/collections/data/TA_threatquotient_add_on_checkpointer -H 'Content-Type: application/json' -d '{"_key": "&lt;input_name&gt;", "state" : "{\\"pull_all_iocs\\": &lt;true false&gt;}"}'</pre>
Delete the pagination setting for an input	<pre>curl -k -u username:password -X DELETE https://localhost:8089/servicesNS/nobody/TA-threatquotient-add-on/storage/collections/data/TA_threatquotient_add_on_checkpointer/ {input_name}</pre>

## ACTION

## COMMAND



Whenever a new input is created, the pagination setting (`pull_all_iocs`) will default to true and will be automatically set to false after the initial import is completed.

## Limitations

- Reducing the set of indicators in Splunk comes at the expense of inability to detect change of scores and/or statuses in indicators. We recommend that users use the "Whitelisted" status in ThreatQ to mark indicators as false positives rather than reducing the indicator score or using custom statuses.



It is possible to configure custom indicator statuses (other than Active and Whitelisted) and use those statuses in the workflow for interaction with the ThreatQuotient Add-on.

- If you want to use advanced filters (such as adversaries, attributes or sources) to export only a subset of indicators from ThreatQuotient to Splunk, there are two ways to do it:
  - Duplicate the default export and configure advanced filters. On the Splunk Add-On App, configuring the scoring filter in such a way that all indicators are accepted (i.e. value of 0).
  - Configure a scoring policy to influence indicator scores on certain adversaries, sources or attributes only. On the Splunk Add-On App, configure the scoring filter to accept only certain scores (i.e. value  $\geq 8$  for example).

## Exporting a Large Number of Indicators from ThreatQ

It is not recommended that you export an exceptionally large number of indicators from ThreatQ to Splunk. We recommend that at any one time, users export no more than 500K indicators. If this limit is not observed, you may encounter problems including loading the data to Splunk, and assuming the data was loaded correctly anyway, with the performance of your Splunk deployment itself.



If there is a need to re-import the data from ThreatQ, revert the pagination setting for the input to True. This will ensure that the data is imported in batches of 10,000 records at a time.

The default export shipped with the ThreatQ appliance does not apply any filters on the indicators to restrict the set of data being exported. However, you may make a copy of this export and specify any additional filters under Special Parameters. An example is shown in the picture below in which a user has configured a filter with score > 5.

Output Format

Type of information you would like to export?

Indicators

Output type

text/plain

Special Parameters (optional)

indicator.deleted=N&indicator.score>5

Provide URL Parameters to further refine information being exported: [See examples.](#)

Insert Variable

Output Format Template

```
{* $indicator.id $indicator.value $indicator.score $indicator.type
$indicator.status $indicator.updated_at $indicator.adversaries
$indicator.attributes $indicator.sources *}
[
{foreach $data as $indicator}
{$indicator|json_encode}{if !$indicator.last},{/if}
{/foreach}
]
```

Save Settings

Cancel

## Data Loading in Splunk

As shown in image above, the Index parameter allows you to map the data extracted from a job in a predetermined Splunk index. You can create multiple jobs and map them to different Splunk indexes as desired.

# ThreatQuotient App

You can configure the app to authenticate with the ThreatQ platform as well as the three modes of operation and related settings.

## Accessing App Configuration Page

The App's configuration page can be accessed by clicking on the **Info** dropdown and selecting **Edit App Configuration**.

## Account

The Account tab allows you connect your app to your ThreatQ instance.

The following parameters are available:

PARAMETER	DESCRIPTION
Server URL	Enter your ThreatQ server URL without the scheme.
Username	Enter your ThreatQ username.
Password	Enter your ThreatQ password.
Client ID	Enter your ThreatQ user Client ID.
Splunk Web URL	Enter the Splunk URL that will be provided in the Matched Indicators Events description in ThreatQ. The hypertext for the link will read as <b>Splunk URL</b> .

## Configuration

Set up your ThreatQ Account and App

Account

App Settings

Proxy

Import Timeout

Logging

Server URL

ThreatQuotient Server URL without scheme.

Username

Enter the ThreatQuotient Username for this account.

Password

Enter the ThreatQuotient Password for this account.

Client ID

ThreatQuotient unique Client ID

Splunk Web URL

This URL will be shown as 'Splunk URL' in Matched Indicator Events' description on ThreatQ Portal.

Save

## Disable Verify SSL Certification

The Verify SSL Certificate checkbox option has been removed to meet Splunk Cloud Validation requirements with version 2.6.0. Perform the following steps to disable the Verify SSL Certification:

1. Navigate to the following file:

```
$SPLUNK_HOME/etc/apps/ThreatQAppforSplunk/bin/threatq_const.py
```


2. Change the `VERIFY_SSL` to **False**.



## App Settings

The App Settings tab allows you to select datamodels, search matching algorithm, macro configurations.

The following parameters are available:

PARAMETER	DESCRIPTION
Hostname Configuration	The Hostname will be used as a Source Name when Splunk updates attributes on the ThreatQ platform.
Macro Configuration	ThreatQ indicators will be matched against the events from the selected indexes.
Sighting Event	Configuration option for event creation in ThreatQ for sighted indicators.
Enable Splunk ES savedsearches	Enable this option to upload ThreatQ indicators in Splunk ES Threat Intelligence Lookup. This option can be used with either <b>Raw Search</b> or <b>Datamodel Search</b> .
Search Matching Algorithm	<p>You can select either <b>Raw Search</b>, <b>Datamodel Search</b>, or <b>Datamodel tstats Search</b>.</p> <p>At the initial setup, you do not have to select <b>Raw Search</b>, <b>Datamodel Search</b>, or <b>Datamodel tstats Search</b> modes. This disables the matching algorithm completely and gives you the opportunity to determine the right scale of data your installation can handle. See the <a href="#">Performance</a> chapter for more details.</p> <div> Attempting to search too much data may result in some saved searches being skipped based on your Splunk deployment type and hardware specification.</div>
Select Datamodels	Select the datamodels to be used.

## Custom Attributes

Include custom attributes that will be exported from ThreatQ using a comma-separated list.



This configuration option requires that you create a custom export. This can be achieved by making a copy of the default Splunk export and adding the required fields. Contact ThreatQ Support for further guidance on this process.

## Custom Fields

Include custom fields that will be exported from ThreatQ using a comma-separated list.



This configuration option requires that you create a custom export. This can be achieved by making a copy of the default Splunk export and adding the required fields. Contact ThreatQ Support for further guidance on this process.

## Configuration

Set up your ThreatQ Account and App

Account

**App Settings**

Proxy

Import Timeout

Logging

Hostname Configuration

Splunk

Enter the unique Splunk Hostname

Macro Configuration

Enter the comma separated indexes here

Enter comma separated Index Names

Sighting Event

Single Event(Default, recommended for larg... ▾)

×

Enable Splunk ES savedsearches ?

☐

Search Matching Algorithm

Datamodel Search ▾

×

Select Datamodels

Network Traffic ×

Incident Management ×

Malware ×

Updates ×

Select the data models

Custom Attributes

Enter the custom attributes here

Enter comma separated Attributes Names

Custom Fields

Enter the custom fields here

Enter comma separated Field Names

Save

## Proxy

Click on **Proxy** tab to set proxy settings if required.

The following parameters are available:

---

PARAMETER	DESCRIPTION
Enable	Use the checkbox to enable or disable the proxy.
Proxy Type	Select the type of proxy. Options include: <ul style="list-style-type: none"><li>• http</li><li>• socks4</li><li>• socks5</li></ul>
Host	Enter the proxy server URL.
Port	Enter the proxy server port.
Username	Enter the proxy server username.
Password	Enter the password associated with the username above.
Remote DNS Resolution	Use this check box to enable remote DNS resolution.

## Configuration

Set up your ThreatQ Account and App

[Account](#)[App Settings](#)**[Proxy](#)**[Import Timeout](#)[Logging](#)

Enable

☐

Proxy Type

http ▾

✕

Host

optional

Port

optional

Username

optional

Password

optional

Remote DNS resolution

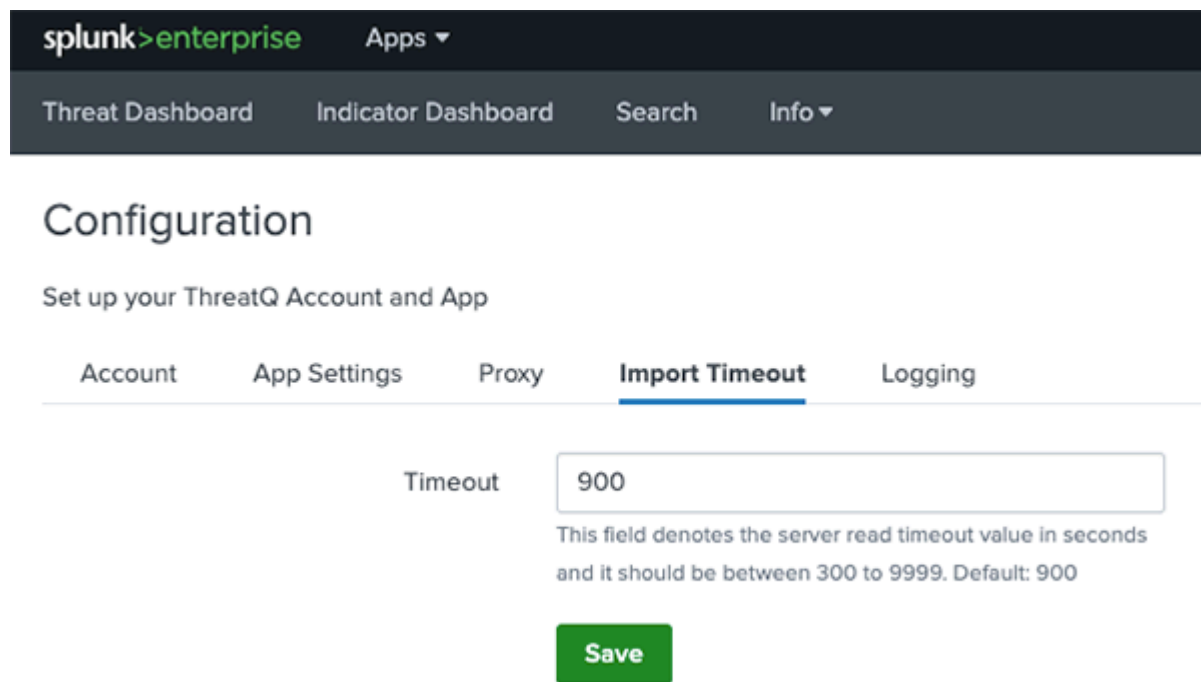
☐**Save**

## Import Timeout

Click on the **Import Timeout** tab to set server read timeout value in seconds.



The default value is 900 seconds. The minimum value allowed is 300 seconds.



The screenshot shows the Splunk ThreatQ configuration interface. At the top, there's a navigation bar with 'splunk > enterprise' and 'Apps' with a dropdown arrow. Below this is a secondary navigation bar with links: 'Threat Dashboard', 'Indicator Dashboard', 'Search', and 'Info' with a dropdown arrow. The main section is titled 'Configuration' and has a subtitle 'Set up your ThreatQ Account and App'. There are five tabs: 'Account', 'App Settings', 'Proxy', 'Import Timeout' (which is selected and underlined), and 'Logging'. In the 'Import Timeout' tab, there is a 'Timeout' label next to a text input field containing the value '900'. Below the input field, a note states: 'This field denotes the server read timeout value in seconds and it should be between 300 to 9999. Default: 900'. At the bottom of the configuration area is a green 'Save' button.

## Logging

Click on the Logging tab to set the Log level. Log level options include:

- Debug
- Info
- Warning
- Error
- Critical

## Configuration

Set up your ThreatQ Account and App

Account App Settings Proxy Import Timeout **Logging**

Log level

INFO

×

DEBUG

✓ INFO

WARNING

ERROR

CRITICAL

## Sightings and Feedback to ThreatQ

One of the primary features of this solution is to identify sightings and report them back to ThreatQ.

Sighting in this context is defined as evidence that a ThreatQ Indicator was discovered in one or more of the events in Splunk collected via other sources. Recording these sightings and reporting them back to ThreatQ provides analysts with important context around indicators included in their threat intelligence holdings.

This section describes various user configurations (in form of macros and saved searches) available to the user to achieve this and concludes with a summary diagram that describes the whole process.

## Separation of Data

ThreatQ indicator data is separated from the rest of the data in this App using a specific sourcetype. You can use the following Splunk search query to discover all indicators exported from ThreatQuotient.

---

## Splunk Search for Listing TQ Indicators

`sourcetype="threatq:indicators"`

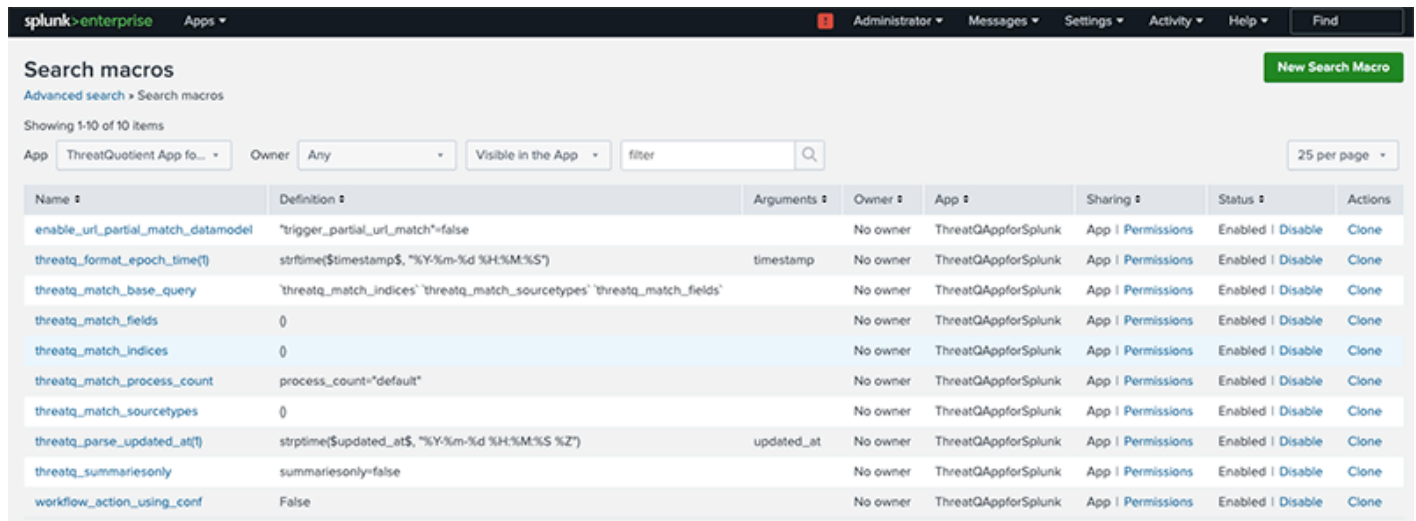


The same indicator can be exported multiple times if it experienced a change of status and/or score.



# Macros


The following macros are used in most of the saved searches this App is configured with (available under Settings > Advanced Search > Search Macros).



The screenshot shows the 'Search macros' page in the Splunk interface. It includes a header with navigation links (Administrator, Messages, Settings, Activity, Help, Find) and a 'New Search Macro' button. Below the header, there are filters for 'App' (ThreatQuotient App for Splunk), 'Owner' (Any), and 'Visible in the App'. A search bar and a '25 per page' dropdown are also present. The main content is a table listing 10 macros.

Name	Definition	Arguments	Owner	App	Sharing	Status	Actions
enable_url_partial_match_datamodel	"trigger_partial_url_match"=false		No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone
threatq_format_epoch_time(t)	strftime(timestamp\$, "%Y-%m-%d %H:%M:%S")	timestamp	No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone
threatq_match_base_query	"threatq_match_indices" "threatq_match_sourcetypes" "threatq_match_fields"		No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone
threatq_match_fields	()		No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone
threatq_match_indices	()		No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone
threatq_match_process_count	process_count="default"		No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone
threatq_match_sourcetypes	()		No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone
threatq_parse_updated_at(t)	strftime(updated_at\$, "%Y-%m-%d %H:%M:%S %Z")	updated_at	No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone
threatq_summariesonly	summariesonly=false		No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone
workflow_action_using_conf	False		No owner	ThreatQAppforSplunk	App   Permissions	Enabled   Disable	Clone

The description of some of these search macros is below.

SAVED SEARCH MACRO	DESCRIPTION
threatq_index	Configures the name of the Splunk index that all ThreatQ indicators are mapped to.
threatq_match_indices	Configures which Splunk indices are considered for matching. The users can apply more specific filters here.
threatq_match_sourcetypes	Configures which sourcetypes should be <b>excluded</b> from matching (the sourcetype <b>threatq:indicators</b> is automatically excluded).
threatq_match_process_count	Determines the number of cpu cores utilized for processing the saved searches that are responsible for finding evidence of sightings.
enable_url_partial_match_datamodel	<p>Configures partial URL indicator matching for the <b>Datamodel</b>. The default setting is <b>False</b>.</p> <p>This macro should be set to <b>True</b> if URL indicators are sent to Splunk with a scheme.</p> <div>  http://, https:// </div>
threatq_match_base_query	<p>Allows you to alter the base query used for matching.</p> <p>Sub macros included are:</p> <ul style="list-style-type: none"> <li>• threatq_match_indices</li> <li>• threatq_match_sourcetypes</li> <li>• threatq_match_fields</li> </ul>
threatq_match_fields	Allows you to match based on specific fields.

## Saved Searches

The Splunk App uses saved searches for discovering sightings and reporting them back to ThreatQ. The App is preconfigured with saved searches, which are periodic processes (registered to the crontab) designed to map indicators to specific Splunk indices and match these indicators to events. Saved search processes also move older indicators out of the main lookup tables and for ES customers, move indicators to specific ES lookup tables according to the mapping described in this document.

The table below describes some of the saved searches with which this App is preconfigured. This table displays two searches applicable only for Raw Matching Mode. Equivalent searches are available for each data model in the Datamodel Matching Mode.



ThreatQuotient does not recommend setting the frequency to less than 30 minutes, the application default for `threatq_match_` indicator saved searches, if using the configuration option for creating multiple events for each sighted indicator.

SAVED SEARCH	DESCRIPTION	DEFAULT PERIOD
<code>threatq_consume_indicators_new</code>	Post matched indicators to the consume endpoint of ThreatQ and create atomic events. This search will only be enabled if using the "Create multiple events for each sighted indicator" configuration.	30 minutes
<code>threatq_match_indicators (Raw Matching Mode only)</code>	Finds evidence of sightings for all indicators in the master lookup table. If sightings are detected, indicators are moved to the match lookup table.	30 minutes
<code>threatq_match_indicators</code>	Finds evidence of sightings for all indicators in the match lookup table.	30 minutes
<code>threatq_update_matched_indicators</code>	Finds evidence of sightings for all indicators in the match lookup table.	30 minutes

SAVED SEARCH	DESCRIPTION	DEFAULT PERIOD
threatq_consume_indicators	Creates events in ThreatQ for all newly detected sightings.	15 minutes
threatq_update_retired_indicators	Clean up indicators that haven't been matched on in the last 90 days from both master lookup table and match lookup table.	1,440 minutes

**Edibility Rules:** Because of the way sightings are found in Splunk using two saved searches (threatq\_match\_indicators and threatq\_update\_matched\_indicators), their frequency must be the same if edited. The default frequency for both saved searches is 30 minutes.

# Saved Searches Documentation

The following table documents the macros for saved searches as configured by default on the ThreatQuotient App.

SAVED SEARCH	DEFAULT MACRO
threatq_consume_indicators_new	inputlookup threatq_matched_indicators   eval start_time=relative_time(now(), "-35m")   where match_time > start_time   sort 10000 -num(score), -num(match_count)   threatqconsumeindicatorsnew
threatq_cleanup_indicators_on_indicators_change	inputlookup master_lookup   search NOT [search `threatq_index` sourcetype="threatq:indicators"   dedup value   search [  inputlookup master_lookup   table ioc_value   rename ioc_value as value   format] NOT (`threatq_score_filter` `threatq_status_filter`)   table value   rename value as ioc_value   format]   outputlookup master_lookup   join ioc_value [  inputlookup threatq_matched_indicators   table ioc_value, match_time, first_seen, last_seen, match_count, sid]   outputlookup threatq_matched_indicators
threatq_match_indicators (only Raw Matching Mode)	`threatq_match_indices` `threatq_match_sourcetypes` sourcetype!="threatq:indicators"   threatqmatchiocs
threatq_update_matched_indicators (only Raw Matching Mode)	`threatq_match_indices` `threatq_match_sourcetypes` sourcetype!="threatq:indicators"   threatqmatchiocs is_update=true
threatq_consume_indicators	inputlookup threatq_matched_indicators   eval start_time=relative_time(now(), "-16m")   where last_seen > start_time   threatqconsumeindicators
threatq_update_retired_indicators	inputlookup master_lookup   search NOT [  inputlookup master_lookup   search NOT [  inputlookup threatq_matched_indicators   search NOT [  inputlookup threatq_matched_indicators   eval threshold_time=now()-7776000, value=ioc_value   where last_seen < threshold_time   outputlookup key_field=value threatq_retired_matched_indicators   table ioc_value   format]   outputlookup threatq_matched_indicators   table ioc_value   format]   eval threshold_time=now()-7776000, updated_at_epoch=`threatq_parse_updated_at(updated_at)`, value=ioc_value   where updated_at_epoch < threshold_time   outputlookup key_field=value threatq_retired_indicators   table ioc_value   format]   outputlookup master_lookup

As described above, two of the saved searches are applicable only for the Raw Matching Mode. If you select **Datamodel Matching Mode** from the configuration as described in the [Configuration](#) section, the above two saved searches for **Raw Matching Mode** will disable automatically, and the equivalent saved searches for the **Datamodel Matching Mode** will be enabled.

## Chunking

You can apply chunking to your datamodel searches using the following option:

`chunk_size=<value>`



Default chunk size is 50,000.

### Example

Edit Search

Title

threatq\_match\_indicators\_authentication

Description

Match indicators from the master\_lookup which are not in the threatq\_match\_indicators against Authentication events

Search

```
| datamodel Authentication Authentication search | fillnull value=""  
Authentication.src_user, Authentication.user | stats count by Authentication  
.src_user, Authentication.user | threatqfieldsmatchiocs indicator_types  
="Username" match_fields="Authentication.src_user, Authentication.user"  
chunk_size=10000 process_count=1
```

Earliest time

-35m

Time specifiers: y, mon, d, h, m, s [Learn More](#)

Latest time

now

Time specifiers: y, mon, d, h, m, s [Learn More](#)

Cancel

Save

# Reporting Sightings in ThreatQ

A sighting in Splunk is evidence that an indicator from ThreatQ was seen in one or more events in Splunk. This is important information for an analyst that can be reported back in form of an Event.

## Single Event for Each Sighted Indicator

ThreatQ captures all sightings for an indicator in a single event. When more sightings are detected for the same indicator, certain attributes for that event are updated. This allows the analyst to gather context on sightings for that indicator.

## Multiple Events for Each Sighted Indicator

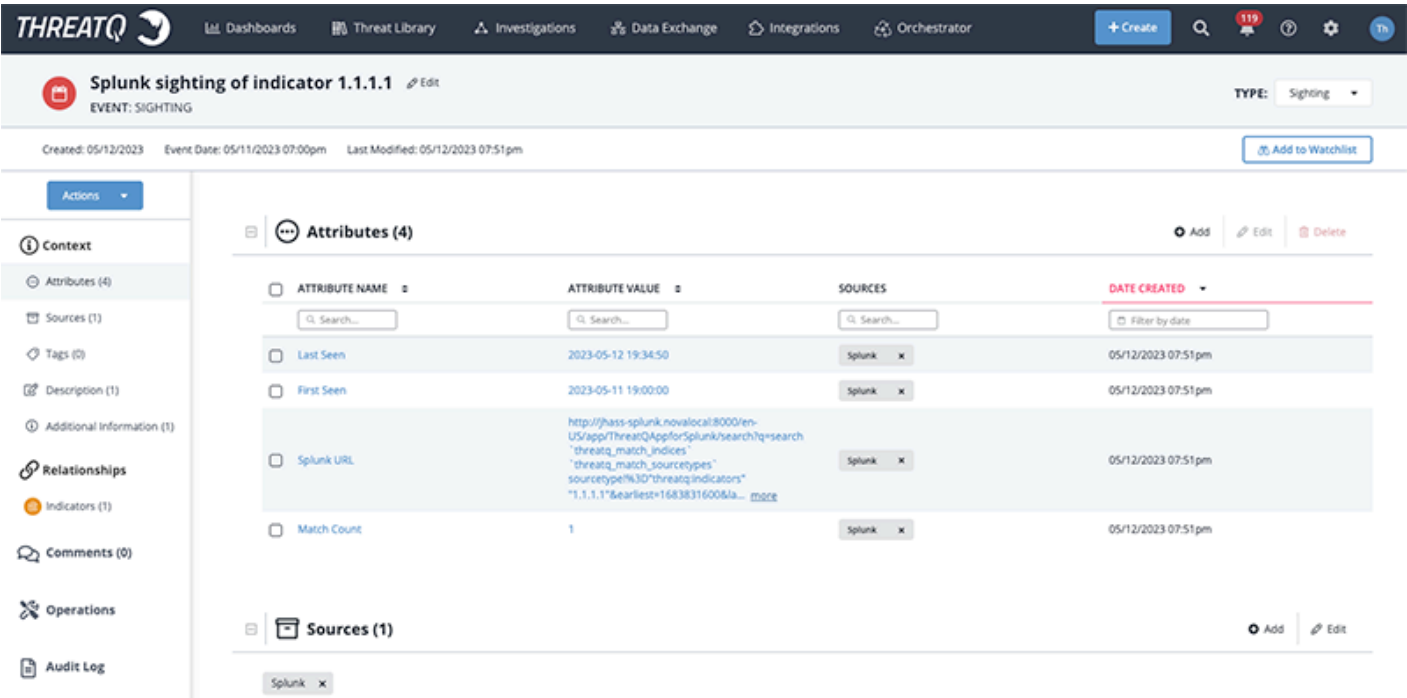
If multiple sightings for the event are seen during the same time period, all sightings will be captured in a single event. However, if more sightings are seen in the future for the same indicator, a new event will be created in ThreatQ.

See the **Sighting Event Configuration** instructions under the [ThreatQuotient App](#) section for more details.

The following 4 attributes are recorded for the event.

ATTRIBUTE	DESCRIPTION
First Seen	Timestamp when the first sighting for this indicator was recorded in Splunk. This attribute does not change.
Last Seen	Timestamp when the latest sighting for this indicator is recorded in Splunk. This attribute updates as newer sightings are detected.
Count	The total count of all sightings recorded for this indicator starting from the time First Seen until Last Seen.
Splunk URL	The URL that allows the analyst to view all sightings for this indicator in Splunk starting from First Seen until Last Seen.

The screen capture below shows an example event recorded in ThreatQuotient by the Splunk App.



The following contextual data are added to the indicator:

ATTRIBUTE	DESCRIPTION
Splunk Sighting Timestamp	When the latest sighting for this indicator was recorded in Splunk.
Match Count	The total count of all sightings recorded for this indicator.
Source	Splunk will be added as the <b>Source</b> for this indicator.

## Putting Everything Together

The following steps summarize how indicators are stored in Splunk and how sightings are reported back to ThreatQ.

1. The Input job configured on **ThreatQuotient Add-on** (on the heavy forwarder) pulls indicators from ThreatQ.



- The heavy forwarder sends the indicators to the indexer which indexes the indicators to the **default** index (user can override) or KVStore.



You can configure how data is saved, to the designed index or KVStore, via the Enable Index checkbox on the Add ThreatQ Indicators form. See the [Data Extraction from ThreatQ](#) section of this guide for more details.

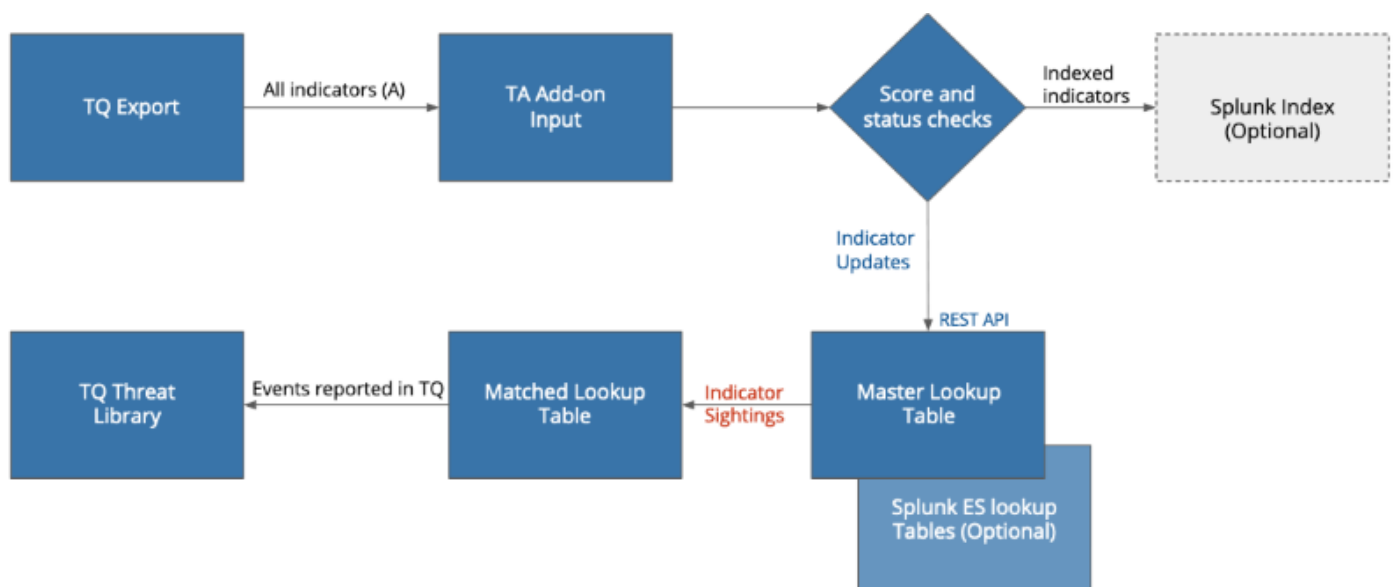
- The periodic saved search job `threatq_match_indicators` finds evidence of sightings of all indicators in the **master lookup table** against all events in Splunk (as filtered via various configurable macros described above in this section).




If evidence of sightings is found for a specific indicator, it is moved to the **match lookup table**.

- Simultaneously, another periodic saved search job `threatq_update_matched_indicators` finds more sightings for all indicators from the match lookup table against all events in Splunk (as filtered by the same configurable macros).
- A periodic saved search `threatq_consume_indicators` will create events in ThreatQ to represent evidence of sightings in Splunk.
- The periodic saved search job `threatq_update_retired_indicators` takes all indicators that are not updated in the past 90 days out of both the master lookup table and matched lookup table.

The following diagram summarizes this process.





ACTION	DESCRIPTION
	completion of this workflow action results in the indicator being successfully added to the ThreatQ Threat Library.
<b>ThreatQ: Lookup Indicator</b>	This workflow action searches for an indicator in ThreatQ and pulls additional context for that indicator. If the indicator does not exist in ThreatQ, an error is reported.
<b>ThreatQ: Mark as False Positive</b>	This workflow action adds the attribute key-value <code>False Positive: True</code> to the indicator in ThreatQ. If the indicator does not exist in ThreatQ, an error is reported.
<b>ThreatQ: Mark as True Positive</b>	This workflow action adds the attribute key-value <code>True Positive: True</code> to the indicator in ThreatQ. If the indicator does not exist in ThreatQ, an error is reported.
<b>ThreatQ: Update Indicator Status</b>	This workflow action updates the status of the indicator in ThreatQ. This action supports all statuses, including custom, that exist on the ThreatQ instance.
	 You can view additional information and settings for this action on the application and the add-on by clicking on the <b>Settings</b> dropdown and selecting <b>Alert Actions</b> under the Knowledge heading. You can review and edit sharing permissions, action status, usage, and view log events.

## Performing Workflow Actions by Non-Admin Users

User can perform workflow actions from Splunk to ThreatQuotient without admin capability by performing following steps.

1. Navigate to **Settings > Advance search > Search macros**.
2. Apply the app filter to **ThreatQuotient Add-on for Splunk**.
3. Edit the `workflow_action_using_conf` macro and set it to **True**.

4. Go to the backend and create the **credentials\_storage.conf** in local folder.



If local folder is not available then create new folder and name it to "local"

5. Now provide the below information in the **credentials\_storage.conf** file:

```
sample of credentials_storage.conf:
[credentials]
username = <username>
password = <password>
server_url = <server_url>
threatq_splunk_url = < threatq_splunk_url >
client_id = < client_id>
[proxy_credentials]
proxy_enabled = <boolean>
proxy_password = <proxy_password>
proxy_port = <proxy_port>
proxy_type = <proxy_type>
proxy_url = <proxy_url>
proxy_username = <proxy_username>
```

6. Restart Splunk.

# CIM Support

The ThreatQuotient App for Splunk runs in the Datamodel Search mode when you are taking advantage of Splunk's CIM and mapping your logs and events to various data models provided by Splunk.

The following table summarizes how the matching algorithm will match specific data model fields to specific indicator types in ThreatQuotient.

## ThreatQ indicator type to CIM field map for the matching algorithm

CIM DATA MODELS	DATA MODEL FIELDS	THREATQ INDICATOR TYPES MATCHED
Authentication	Authentication.src_user	Username
	Authentication.user	Username
	Certificates.All_Certificates.SSL.ssl_hash	SHA-1, SHA-256, SHA-384, SHA- 512
	Certificates.All_Certificates.SSL.ssl_issuer_email	Email Address
	Certificates.All_Certificates.SSL.ssl_subject_email	Email Address
	Certificates.All_Certificates.SSL.ssl_subject_common_name	String
Certificates	Certificates.All_Certificates.SSL.ssl_issuer_common_name	String
	Certificates.All_Certificates.SSL.ssl_subject_organization	String
	Certificates.All_Certificates.SSL.ssl_issuer_organization	String
	Certificates.All_Certificates.SSL.ssl_serial	String
	Certificates.All_Certificates.SSL.ssl_subject_unit	String
	Certificates.All_Certificates.SSL.ssl_issuer_unit	String
Endpoint	Endpoint.Services.service	Service Name
	Endpoint.Processes.process_name	Service Name
	Endpoint.Filesystem.file_name	Filename
	Endpoint.Filesystem.file_hash	SHA-1, SHA-256, SHA-384, SHA-512
Email	Email.All_Email.file_name	Filename
	Email.All_Email.file_hash	SHA-1, SHA-256, SHA-384, SHA-512
	Email.All_Email.subject	Email Subject
	Email.All_Email.src_user	Email Address
Intrusion_Detection	Intrusion_Detection.IDS_Attacks.src	IP Address, IPv6 Address
	Intrusion_Detection.IDS_Attacks.signature	String
	Intrusion_Detection.IDS_Attacks.user	Username
Inventory	All_Inventory.User.user	Username
Malware	Malware.Malware_Attacks.file_name	Filename

CIM DATA MODELS	DATA MODEL FIELDS	THREATQ INDICATOR TYPES MATCHED
	Malware.Malware_Attacks.file_hash	SHA-1, SHA-256, SHA-384, SHA- 512
	Malware.Malware_Attacks.signature	String
	Malware.Malware_Attacks.sender	Email Address
	Malware.Malware_Attacks.src	IP Address, IPv6 Address
	Malware.Malware_Attacks.user	Username
Network_Traffic	Network_Traffic.All_Traffic.src	IP Address, IPv6 Address
Network Resolution (DNS)	Network_Resolution.DNS.query	FQDN, String
	Network_Resolution.DNS.answer	FQDN, String
Updates	Updates.Updates.file_name	Filename
	Updates.Updates.file_hash	SHA-1, SHA-256, SHA-384, SHA- 512
Web	Web.Web.user	Username
	Web.Web.http_referrer	URL
	Web.Web.url	URL
	Web.Web.http_user_agent	User-agent
	Web.Web.src	IP Address, IPv6 Address
	Web.Web.dest	IP Address, IPv6 Address
	Incident_Management.Notable_Events.src	IP Address, IPv6 Address
Incident_Management	Incident_Management.Suppressed_Notable_Events.src	IP Address, IPv6 Address
	Incident_Management.Notable_Event_Suppressions. Suppression_Audit.signature	String
	Incident_Management.Notable_Event_Suppressions. Suppression_Audit_Expired.signature	String
	Incident_Management.Notable_Event_Suppressions. Suppression_Audit.user	Username

# Enterprise Security Support

## ThreatQ Indicators to Splunk Enterprise Security Lookup Tables

The ThreatQuotient App for Splunk provides support to the Splunk Enterprise Security (ES) customers by making ThreatQ data more accessible using Splunk's native ES lookup tables. The following table provides how ThreatQ data is mapped to the Splunk ES lookup tables.



This data is then available in various ES dashboards.

### ThreatQ Indicator Type Mapping to Enterprise Security Lookup Tables

THREATQ TYPE	THREAT INTELLIGENCE TYPE
CIDR Block	local_ip_intel
Email Address	local_email_intel
Email Subject	local_email_intel
File Name	local_file_intel
FQDN	local_domain_intel
Fuzzy Hash	local_file_intel
GOST Hash	local_file_intel
IP Address	local_ip_intel
MD5	local_file_intel

THREATQ TYPE	THREAT INTELLIGENCE TYPE
Registry Key	local_registry_intel
Service Name	local_service_intel
SHA-1	local_file_intel
SHA-256	local_file_intel
SHA-384	local_file_intel
SHA-512	local_file_intel
x509 Serial	local_certificate_intel
x509 Subject	local_certificate_intel
URL	local_http_intel
URL Path	local_http_intel
Username	local_user_intel

To view the events and indicators, navigate to **Enterprise Security > Security Intelligence > Threat Intelligence**.

- **Threat Activity:** Shows the list of events which are compatible with CIM apps.
- **Threat Artifacts:** Shows the list of indicators fetched from the ThreatQ.



# Using Threat Intelligence Data in Splunk Enterprise Security

Splunk's Enterprise Security App provides the means of using your threat intelligence data to match against events mapped to standard Splunk models. Refer to the Splunk's documentation on **Enterprise Security Workflow for Threat Intelligence** as described here: <http://dev.splunk.com/view/enterprise-security/SP-CAAFFBC>.

ThreatQuotient provides mapping of the threat intelligence data to the standard lookup tables in Splunk Enterprise Security via the saved searches described above. Using the default Threat Generation Searches in Enterprise Security, the ES app will find matches and report those matches in the `threat_activity` index as described in the link above.

Threat Intelligence data will be added to Enterprise Security using their REST APIs with a `threat_key` of `threatq_indicator`. The score for ThreatQ Indicators will be mapped to the **Weight** attribute in ES. Any updates to the score will be automatically reflected in ES using the periodic saved searches.

The indicator will be updated in ES and put into a disabled state (will no longer be used in further correlation) if the score or status of a ThreatQ indicator changes to a value that is no longer within the parameters configured in the macro settings for ThreatQ Splunk App.



If you are using ES and are upgrading from an older version of ThreatQ Splunk App, please run the "threatq\_cleanup\_es\_lookups" saved search once to remove the old data. All the threat intelligence data is automatically added upon upgrade using the Enterprise Security's REST APIs



When using the Enterprise Security App, you will not have additional context (sources and adversaries), workflow actions, and reporting sightings back to ThreatQuotient available to you.

## Saved Searches for Enterprise Security

In addition to the core saved searches, the following saved searches apply for Enterprise Security (ES) customers. The saved searches listed run once a day and map ThreatQ indicators by type to Splunk ES lookup tables as described in the [Mapping Table](#) section of the document.

By default, the **scheduling** of all saved searches for porting Threat Intelligence data from ThreatQ to lookup tables in the ES are **disabled**. This is because not all users have Enterprise Security App installed. If you have this App installed and want to port the Threat Intelligence data over, you will need to enable the scheduling of these saved searches.

### Saved Searches for Mapping ThreatQ Indicator data to Splunk's CIM


ES SAVED SEARCH	DESCRIPTION
threatq_update_threat_intelligence_lookup_email_address	Map ThreatQ <b>type 4</b> indicators to <b>local_email_intel</b>
threatq_update_threat_intelligence_lookup_email_subject	Map ThreatQ <b>type 6</b> indicators to <b>local_email_intel</b>
threatq_update_threat_intelligence_lookup_file_name	Map ThreatQ <b>type 9</b> indicators to <b>local_file_intel</b>
threatq_update_threat_intelligence_lookup_fqdn	Map ThreatQ <b>type 10</b> indicators to <b>local_domain_intel</b>
threatq_update_threat_intelligence_lookup_hash	Map ThreatQ <b>type [11,12,15,20,21,22,23]</b> indicators to <b>local_file_intel</b>

ES SAVED SEARCH	DESCRIPTION
threatq_update_threat_intelligence_lookup_ip	Map ThreatQ <b>type 14</b> indicators to <b>local_ip_intel</b>
threatq_update_threat_intelligence_lookup_registry	Map ThreatQ <b>type 18</b> indicators to <b>local_registry_intel</b>
threatq_update_threat_intelligence_lookup_service	Map ThreatQ <b>type 19</b> indicators to <b>local_service_intel</b>
threatq_update_threat_intelligence_lookup_certificate_serial	Map ThreatQ <b>type 25</b> indicators to <b>local_certificate_intel</b>
threatq_update_threat_intelligence_lookup_certificate_subject	Map ThreatQ <b>type 26</b> indicators to <b>local_certificate_intel</b>
threatq_update_threat_intelligence_lookup_url	Map ThreatQ <b>type 27</b> indicators to <b>local_http_intel</b>
threatq_update_threat_intelligence_lookup_user	Map ThreatQ <b>type 30</b> indicators to <b>local_user_intel</b>

## Performance

The primary objective of this App is to find evidence of sightings and report those sightings back to ThreatQuotient. The sightings are discovered using the **matching algorithm** that works either in the **Raw Matching** or **Datamodel Matching** mode.

To summarize, the matching algorithm will take a set of indicators from ThreatQuotient, a set of events from Splunk, and find which indicators (and how many times) appear in the events.

 The matching algorithm, by default, runs every 30 minutes in a saved search, so it is important that it completes in under 30 minutes on average just to keep up with incoming load.

The tables below demonstrate the performance of matching algorithms for both modes. These tables are meant to be used as guidelines so you can configure your App to run for an optimal performance.

It is advised that you experiment on your system to ensure that your system does not have data loaded at higher rates than is implied by the tables below. If the machine specs are different, it is advisable to first run the match queries in the Splunk's search bar and get a sense of how long it takes a typical query to finish. Once you find the right amount of data your installation can handle, you are advised to instrument the App in a way that it will only perform matching on the said amount of data.

## Experiments

Experiments were conducted on a machine with 16 cores and 32 GB RAM. The parameters are total number of indicators from TQ, total events from Splunk, and number of indicators matched. Events were generated from various standard templates covering a wide range of firewall and web proxy logs. The bolded rows show the upper limit of performance in that the time to complete is slightly over 30 mins. We discovered that the **upper limit** was reached at around 1 million Splunk events and was largely invariant of the number of indicators from ThreatQ (due to how this algorithm is implemented). As more matches are found, it takes more time to write them in the lookup tables, thus slightly increasing the runtime.

## Raw Matching Performance Table

TOTAL INDICATORS FROM TQ	TOTAL RAW EVENTS IN SPLUNK	TOTAL INDICATORS MATCHED	TIME TO COMPLETE (S) MACHINE SPECS:(16 CORE, 32GB RAM )
100,000	500,000	0	885.36

TOTAL INDICATORS FROM TQ	TOTAL RAW EVENTS IN SPLUNK	TOTAL INDICATORS MATCHED	TIME TO COMPLETE (S) MACHINE SPECS:(16 CORE, 32GB RAM )
100,000	500,000	10,000	899.75
100,000	1,000,000	20,000	1,932.04
500,000	1,000,000	0	1,926.62
500,000	1,000,000	10000	2,020.56
1,000,000	1,000,000	0	2,174.18
1,000,000	1,000,000	25,000	2,294.39
1,000,000	5,000,000	0	11,354.64
10,000	50,000,000	0	35,233.185 (9 hr 47 min)

## Datamodel Matching Performance Table

Similar experiments were done for a **Datamodel Matching** case. From the table below, we determined that at around 15 million mark for Splunk events, the algorithm runtime started exceeding 30 minutes. **Thus, for a single saved search, this represents the upper limit of how much data this algorithm can handle every 30 minutes.**

TOTAL INDICATORS FROM TQ	TOTAL RAW EVENTS IN SPLUNK	TOTAL INDICATORS MATCHED	TIME TO COMPLETE (S) MACHINE SPECS:(16 CORE, 32GB RAM )
100,000	500,000	0	29.282
100,000	500,000	10,000	36.92
100,000	1,000,000	20,000	77.649
500,000	1,000,000	0	99.473
500,000	1,000,000	10000	130.991
1,000,000	1,000,000	0	166.517
1,000,000	1,000,000	25,000	261.362
1,000,000	5,000,000	0	420.111
100,000	5,000,000	10,000	619.047
1,000,000	10,000,000	10,000	1,316.541
1,000,000	15,000,000	10,000	1,866.059

---

TOTAL INDICATORS FROM TQ	TOTAL RAW EVENTS IN SPLUNK	TOTAL INDICATORS MATCHED	TIME TO COMPLETE (S) MACHINE SPECS:(16 CORE, 32GB RAM )
1,000,000	50,000,000	25,000	6,554.610

# Scaling the App

The tables displayed in the [Performance](#) section offer a guideline of how many Splunk events the App can handle with default configuration. As found from the internal testing, the [Raw Matching Performance table](#) demonstrates the upper limit for **raw search** is about **1 million events/30 minutes**, and the same is **15 million events/30 minutes** for the **datamodel search** (on a dedicated box with 16 cores and 32 GB RAM). However, this is valid only for one saved search running on one node.

The best way to scale the App is to run multiple saved searches for matching. This can be achieved using the **datamodel search** mode. If your data is mapped to multiple Splunk data models from the [CIM Support table](#), each data model is handled by a separate saved search. In such an instance, you would need to deploy your search head in a cluster and ensure that these saved searches are distributed in that cluster. You can run up to five of them, thus potentially scaling your App to handle five times the traffic.

For the raw matching mode, the App by default will only be able to run one saved search. In order to extend it to multiple searches, you will have to break apart this one saved search into multiple, and then, distribute these saved searches in the Splunk cluster of search heads. You can do this by running a separate saved search for:

- Splunk index for events
- ThreatQuotient indicator types.

For using a fixed Splunk index for the saved search, you can modify the default saved searches for matching as shown below.

## Splunk Search for Listing TQ Indicators

```
index=<my_index> `threatq_match_sourcetypes` source- type!="threatq:indicators" |  
threatqmatchiocs indicator_types- ='IP Address, FQDN'(threatq_match_indicators saved  
search) index=<my_index> `threatq_match_sourcetypes` source- type!="threatq:indicators" |  
threatqmatchiocs is_update=true (threatq_update_matched_indicators saved search)
```

Compare the above saved searches with the defaults as shown in the [Save Search Documentation](#) table. The macro `threatq_match_indices` is replaced by passing an actual index to the saved search. Now, you can make multiple copies of the default saved search, run them on the same schedule, and have each saved search get events from a different Splunk index.



To use the similar technique for ThreatQuotient indicator types, you can pass an additional argument to the `threatqmatchiocs` module as shown below. This allows you to make the saved search use only a specific indicator type. Again, as before, you can then make multiple copies of the saved searches and have each one handle only specific ThreatQuotient indicator types. You are free to pass a single indicator type, or a comma separated list as shown below.

## Splunk Search for Listing TQ Indicators

```
index=<my_index> `threatq_match_sourcetypes` source- type!="threatq:indicators" |
threatqmatchiocs indicator_types- ='IP Address, FQDN'(threatq_match_indicators saved
search) index=<my_index> `threatq_match_sourcetypes` source- type!="threatq:indicators" |
threatqmatchiocs is_update=true indicator_types='IP Address, FQDN'(threatq_update_matched_
indicators saved search)
```

Finally, both these techniques for scaling the App are equally applicable for the datamodel mode as well.

# Dashboards

The Threat Dashboard and Indicator Dashboard are preconfigured dashboards packaged with ThreatQuotient App to allow the analyst versatile visual representation of all indicator data from ThreatQ and the corresponding sightings. These dashboards are only a suggestion and can be modified via Splunk's standard dashboard editing capability to meet your needs.



You can also access several shortcut options and search tools via the Info tab.

## Threat Dashboards

The Threat Dashboard displays indicator sighting-related information such as:

- [Cumulative Counts](#)
- [Score Breakdown](#)
- [Type Breakdown](#)
- [Source Breakdown](#)
- [Adversaries Breakdown](#)
- [Static Table View](#)
- [Top 10 By Sightings](#)
- [Indicators Malware Family Distribution](#)
- [Indicators with Sightings Malware Family Distribution](#)

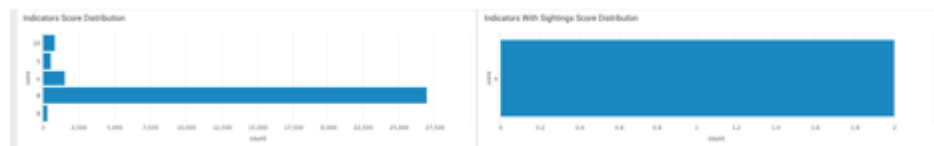
## Cumulative Counts

The top section of the dashboard shows total count for all ThreatQ indicators in the **master lookup table** (on the left) and the **match lookup table** (in the right) (all time and the last 24 hours). It is important to note that the data displayed as Sightings are not the total sightings; rather it is the total number of indicators for which evidence of sightings has been found. Example screen capture below.



## Score Breakdown

The next section shows the distribution of indicator scores for indicators in master and match lookup tables as bar charts. Example screenshot below. These charts do not have a time filter. The counts for individual score breakdown represent the cumulative indicator count. As an example, notice that there are two indicators with sightings each with score 9 (which matches up with the cumulative sightings count of 2 in the chart above).



## Type Breakdown

This section shows the distribution of indicator types for indicators in master and match lookup tables as pie charts. As the score distributions above, these are cumulative distributions. Example screenshot below. Hovering over each portion of the pie chart will display the indicator count for that specific portion.



## Source Breakdown

This section shows the breakdown of indicators and sighted indicators by sources. Example screenshot below. One thing to note here is that all indicators must have at least one source, but some indicators may have more than one. For this reason, the cumulative counts in the charts below may exceed the total number of indicators and sighted indicators in the lookup tables.





# Top 10 By Sightings

The final section displays top 10 indicators by sightings, top 10 sources by sightings and top 10 adversaries by sightings in the form of a static table, bar chart and bar chart respectively. This information gives an analyst a quick view of the indicator’s sources and adversaries with the most matches within Splunk.

Top 10 Indicators By Sightings

Indicator	Source	Type	Source	Adversary	First Seen	Last Seen	Sightings
badsource.com	IP	IP	BadSource-1	BadAdversary-1	2019-01-01 10:00:00	2019-01-01 10:00:00	2
badsource.com	IP	IP	BadSource-1	BadAdversary-1	2019-01-01 10:00:00	2019-01-01 10:00:00	2

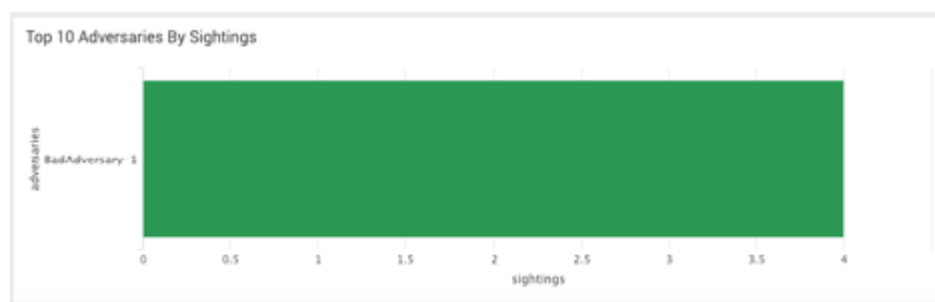
# Sources

Example screenshot below. Notice the source BadSource-1 appears as the top source with sightings corresponding to the sighted indicators as displayed in the static table above. Also notice that the sightings count is 4, which corresponds to 2 sightings each for the sighted indicators.



## Adversaries

Example screenshot below. Notice the source **BadAdversary-1** appears as the top adversary with sightings corresponding to the sighted indicators as displayed in the static table above. Also notice that the sightings count is 4, which corresponds to 2 sightings each for the sighted indicators.



## Indicators Malware Family Distribution

The Indicators Malware Family Distribution widget provides a pie with breakdown of indicator malware information.

Indicators Malware Family Distribution



## Indicators with Sightings Malware Family Distribution

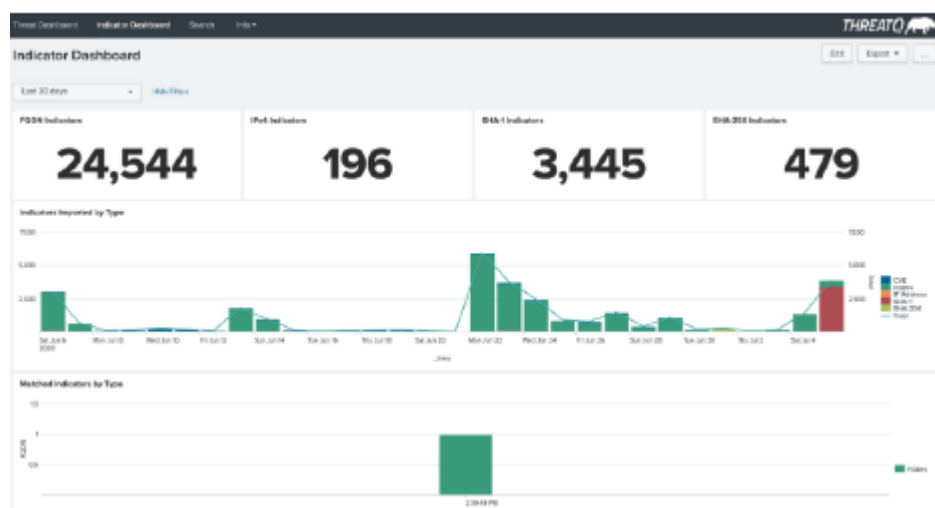
The Indicators with Sightings Malware Family Distribution widgets provides a pie chart breakdown of indicators with malware sightings.

## Indicators With Sightings Malware Family Distribution



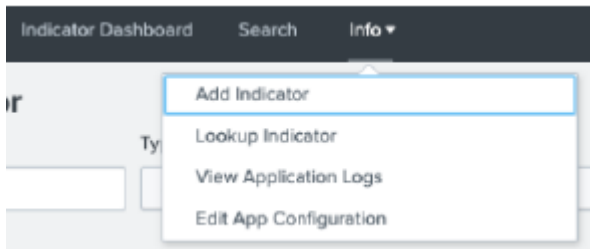
## Indicator Dashboard

The Indicator Dashboard displays indicator-related widgets, such as type counts and bar charts, for a user-specified time frame.



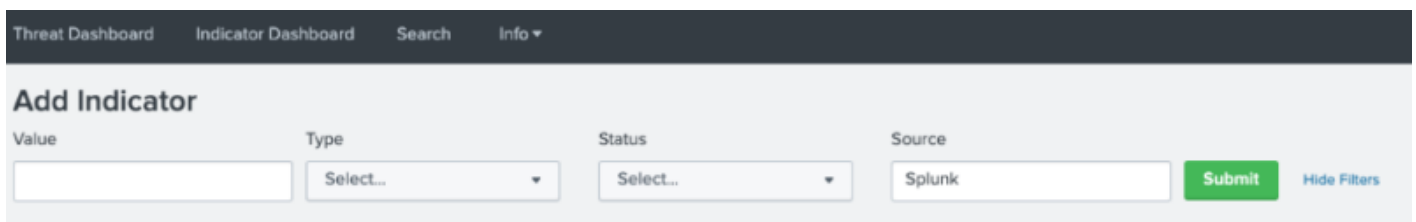
## Info Tab

The Dashboard Info tab, located next to the Search Option, provides you with the ability to perform indicator and application log searches along with shortcuts to the Add Indicator and Edit App Configuration functions.



## Add Indicator

The Add Indicator option will open the Add Indicator input form within the dashboard. You can use this form to manually add indicators to ThreatQ.



## Indicator Lookup

The Indicator Lookup option allows you to perform a search based on:

- IndicatorValue
- IndicatorType
- Status
- Source(s)



[illegible]

The screenshot displays the 'Application Logs' section of the ThreatQL interface. At the top, there's a navigation bar with 'ThreatQL' branding and a 'New ThreatQL App to Deploy' link. Below this is a sub-navigation bar with 'Threat Dashboard', 'Incident Dashboard', 'Search', and 'Info'. The main content area is titled 'Application Logs' and features a table with the following columns: 'Time Range', 'Log Level', 'Log Source Type', and 'Search'. The table lists several log entries, each with a timestamp, a source type (e.g., 'to:threatql-agent-01 on:log'), a log level (INFO, WARN, ERROR), and a message snippet. A sidebar on the right contains 'Add' and 'Export' buttons. The bottom of the page shows a pagination bar with '1' and '2' links.

# Troubleshooting

- Use the log file below to troubleshoot the ThreatQuotient Add-on:

```
$SPLUNK_HOME/var/log/Splunk/ta_threatquotient_add_on_threatq_indicators.log
```

- To find all unique indicators indexed in Splunk by the Add-On (Splunk App allows you to select a specific time range):

```
sourcetype="threatq:indicators" | dedup value
```

- To review the data collected by data collection, use a query such as:

```
"index=your_index_name sourcetype=threatq_indicators"
```

- Confirm all the saved searches are enabled.
- Confirm the macro is updated as per the settings.
- The log file can be found at the following location:

```
/opt/splunk/var/log/splunk/scheduler.log
```

- If the user changes macros for global score and status thresholds, the audit logs can be accessed using the following two saved searches:

Splunk Search for Listing TQ Indicators

```
index=_internal threatq_score_filter sourcetype="splunkd_ui_access"
```

```
index=_internal threatq_score_filter sourcetype="splunkd_access"
```

# Change Log

- App version 2.6.0
  - Added new **Configuration** tab for ThreatQ Account and App settings. The app can be configured to communicate directly with your ThreatQ instance. Previously, authentication with your ThreatQ instance was performed by the add-on.
  - Added Splunk Web URL field to the ThreatQ Account tab.
  - Added two new Threat Dashboard widgets: **Indicators Malware Family Distribution** and **Indicators with Sightings Malware Family Distribution**.
  - Resolved an issue where Add-on logs could not be viewed in the app.
  - Added Workflow Actions and Alert Actions from the add-on to the app.
  - Added new workflow action: **ThreatQ: Update Indicator Status** with options from the lookup. Options for the **ThreatQ Update Indicator Status** alert action will now populate from the lookup. This action supports all statuses, including custom, that can be pulled from the ThreatQ instance.
  - Removed the **ThreatQ: Add to Whitelist** workflow action.
  - Removed the **Verify SSL Certificate** checkbox under Configuration. See the [Upgrading](#) chapter for more details.
- TA-threatquotient-add-on Version 2.6.0
  - Migrated Workflow Actions and Alert Actions to the app.
  - The Add-on is no longer required to be installed on the search head as a dependency for the app.
  - Removed usage of Proxy while checking KVStore status.
  - Restricted initial data collection to last 90 days.
  - Removed the **Verify SSL Certificate** checkbox under the KVStore configuration. See the [Upgrading](#) chapter for more details.
- TA-threatquotient-add-on Version 2.5.1
  - Minor bug fix.
- App Version 2.5.0
  - Upgraded the JQuery bundled with the app to version 3.5.0.
  - Fixed an issue where `threatq_update_retired_indicators` failed if ingested object attributes included the \$ and . special characters. Additional data validation has been added to the custom fields/attributes on the configuration page.
  - Updated app to support Splunk versions to 8.1.x and 8.2.x.

- **TA-threatquotient-add-on Version 2.5.0**

- Updated the add-on to AOB 4.1.0.
- Fixed an issue where indicators with null values would cause kvstore data to be belated.
- Updated add-on to support Splunk versions to 8.1.x and 8.2.x.

- **App Version 2.4.1**

- Fixed the following issues:
  - Updated\_at information was not being populated in the kvstore.
  - The tstats search failed to execute in certain instances due to a typo in a search variable.
  - Updating the search to the Datamodel tstats search failed to disable older searches.
  - Custom fields with spaces were not handled correctly in the kvstore.



In some instances, existing custom attributes failed to load upon upgrading to version 2.4.1. If you encounter this issue, you should re-save your app configuration.

- The UI text in the Setup Dashboard page had a small typo.

- **TA-threatquotient-add-on: Version 2.4.1**

- The Whitelisted status has been removed as a default status when creating a new input configuration. The default status is now Active.

- **App Version 2.4.0**

- Added **Datamodel tstat Search** option for Matching Algorithm Configuration.
- Added new macro, `threatq_match_fields`, that will allow you to match on specific fields.
- Added new macro for Raw Matching, `threatq_match_base_query`, that allows you to alter the base query for matching.
- Added two new fields to the Splunk Setup Dashboard:
  - **Custom Attributes Configuration** - Allows you to include custom attributes that will be exported from ThreatQ using a comma-separated list.
  - **Custom Fields Configuration** - Allows you to include custom fields that will be exported from ThreatQ using a comma-separated list.
- Updated the datamodel search queries to support chunking. The default chunk size is 50,000.

- **TA-threatquotient-add-on: Version 2.4.0**

- Fixed an issue where attempting to fetch import-timeout resulted in a 401 error in the heavy forwarder.

- Added custom fields and custom attributes support to the KVStore.
- **App Version 2.3.0**
  - Fixed an issue which caused certain datamodel searches to not complete.
  - Fixed an issue where saved searches would fail if events had Chinese characters.
  - Upgraded the Splunklib.
- **App Version 2.2.0**
  - A Hostname configuration field has been added to the Setup page. This value will be used as a Source Attribute when calling consume endpoints.
  - Saved Searches have been staggered to prevent encountering concurrent search limitations.
  - Added a Malware family attribute field to the KVStore.
  - Added partial URL matching support for Datamodel searches.
  - Combined saved searches for Datamodel to have only a single search per Datamodel.
- **TA-threatquotient-add-on: Version 2.3.0**
  - Fixed an authentication issue with the KVStore configuration.
  - Malware family data, if available for ThreatQ indicators, will now be stored in the KVStore.
  - The localhost Username and Password dependency for the KVStore data collection has been removed.
- **App Version 2.1.0**
  - Added new Indicator Dashboard.
  - Added ability to use KVStore for saving data.
  - Added Info tab to dashboards page with the following options/shortcuts:
    - Add Indicator
    - Lookup Indicator
    - View Application Logs
    - Edit App Configurations
  - Fixed an issue where no sightings were generated for domain object types within Splunk.
  - Fixed an issue with data listed in multi-valued fields.
- **TA-threatquotient-add-on: Version 2.2.0**
  - Added new Splunk KVStore Rest configuration tab. This configuration tab is required if users save data to KVStore.

- Additional options Enable Index and Pull all Indicators available under input configuration.
  - **TA-threatquotient-add-on: Version 2.1.0**
    - Import timeout is now configurable from UI
    - Pagination support for initial import of ThreatQ data
    - Updated default frequency for ThreatQ Exports from 300 to 900
  - **App Version 2.0.0**
    - Python 3 Support - ThreatQuotient App for Splunk is now compatible with Python 3. Supported versions include:
      - Splunk 7.2.x
      - Splunk 7.3.x
      - Splunk 8.X (Python 2)
      - Splunk 8.X (Python 3)
  - **TA-threatquotient-add-on: Version 2.0.0**
    - Python 3 Support - ThreatQuotient Add-on for Splunk is now compatible with Python 3.

Supported versions include:

    - Splunk 7.2.x
    - Splunk 7.3.x
    - Splunk 8.X (Python 2)
    - Splunk 8.X (Python 3)  - Resolved an issue where creating an indicator in Splunk would occasionally result in the creation of an indicator with an incorrect type within the ThreatQ platform.
- **App Version 1.3.0**
  - Threat Intelligence support for Enterprise Security is now provided using its REST APIs
- **App Version 1.2.0**
  - Added the following contextual data to Indicators:
    - Splunk Sighting Timestamp - Last seen value
    - Match Count
    - The Source for sighted indicators is now reported as Splunk in ThreatQ.
  - Added Macro Configuration option to App Setup page. Users now have the ability to select indices, the location they want to search.



Note: If you have the macro configuration for `threatq_match_indices` set to `*`, you will need to update the app configuration upon upgrade to 1.2.0 and add the required indexes where matching should take place with ThreatQ

indicators. This step is mandatory for the app to continue to perform matching against the required indexes.

- Added Sighting Event Configuration option to the App Setup page. Users now have the ability to configure how the app create events for a sighted indicator.
- Added a new Saved Search - threatq\_consume\_indicators\_new
- **TA-threatquotient-add-on: Version 1.1.2**
  - Certificate-based errors will no longer appear in the Splunk log. They will now be added as a warning in the ThreatQ application log.
- **TA-threatquotient-add-on: Version 1.1.1**
  - We have fixed an issue where Splunk credential parsing was generating a 500 error and leaving the configuration page in an unusable state.
- **App Version 1.1.0**
  - The ThreatQuotient Splunk integration now includes support for the Common Information Model (CIM). For users who map third party data (firewall events, logs, for example) to Splunk's data models in CIM, this App provides optimized performance by leveraging those data models. As such, we now support the CIM Data Model Search. We have enhanced Enterprise Security (ES) support to provide single-click enablement within the ThreatQ App for Splunk application settings.
  - We have fixed issues where:
    - Users could not re-enable and use searches without crashing Splunk ES search head.threatq\_match\_indicators searches failed to complete. All saved search queries for matching can now accept an optional argument called indicator\_types that allows users to match only specific indicator types from ThreatQ.
- **App Version 1.0.1**
  - During authentication, users can now specify whether to verify or disable the SSL certificate.