# Getting started with

# Text Analytics & BigSheets

June, 2017

# *Contents*

# Lab 1 Overview

This Hand-on lab will introduce you to the BigInsights Text Analytics Web Tooling for BigInsights and BigSheets v4.2.

There's a convenient stopping point when you've built a single sequence, but if you continue, you will sample all the features.

In this exercise, we extract information from log files written by Cisco routers. The use case is based on a paper Cisco published explaining how these files can be used to understand potentially malicious network activity. http://www.cisco.com/web/about/security/intelligence/identify-incidents-via-syslog.html

The data for the demo is already loaded into your image in a single file containing multiple log records.

[Allow **60 minutes** to complete.]

## 1.1. What you'll learn

After completing all exercises in this lab guide, you'll know how to

- How to use the Text Analytics web tooling.
- Learn about Rich library of pre-built extractors.
- Create your one extractor.
- How to use BigSheets.

**You can find all the resources on GitHub:**

***https://github.com/fjcanobailen/biginsights***

**About the screen captures, sample code, and environment configuration**

Screen captures in this lab depict examples and results that may vary from what you see when you complete the exercises. In addition, some code examples may need to be customized to match your environment.

# Lab 2 The data

The log records to be analyzed look like this:

> Aug 24 2007 10:27:29: %ASA-6-106100: access-list OUTSIDE denied tcp outside/192.168.208.63(39675)-> inside/192.168.150.77(80) hit-cnt 1 first hit [0x22e8ac21, 0x0]

Key elements of each record are:

- Date and time - Aug 24 2007 10:27:29
- Code - %ASA-6-106100
- Access Control List - OUTSIDE
- IP address and port - 192.168.208.63(39675)

Codes are associated with events detected by the router. Access Control Lists identify groups of IP addresses, in our example they identify IP Addresses inside or outside the firewall.

Suspicious events are identified based on events caused by actions originating outside the firewall aimed at IP addresses inside the firewall. Log records for suspicious events will contain specific codes with an originating IP address outside the firewall and a target IP address inside the firewall.

In the example above we see an example where an %ASA-6-106100 code has been raised as a result of a request from outside the firewall targeted at an address inside the firewall.

Extracting this information can help the business understand what type and level of suspicious activity is taking place and where it's originating from. Attacks can include horizontal probes where a range of IP addresses are targeted and vertical probes that target a range of ports at one IP address.

## 2.1. Our task in the lab

We will perform a first level of analysis based on suspicious activity detected by the firewall. This analysis also delivers the originating IP addresses. With those in hand, the business can also determine if any probes from those addresses got through the firewall.

The demo uses a combination of: pre-built extractors; basic features using regex and dictionaries and patterns that reflect various message styles.

# Lab 3 Launching the BigInsights Home and Text Analytics Web

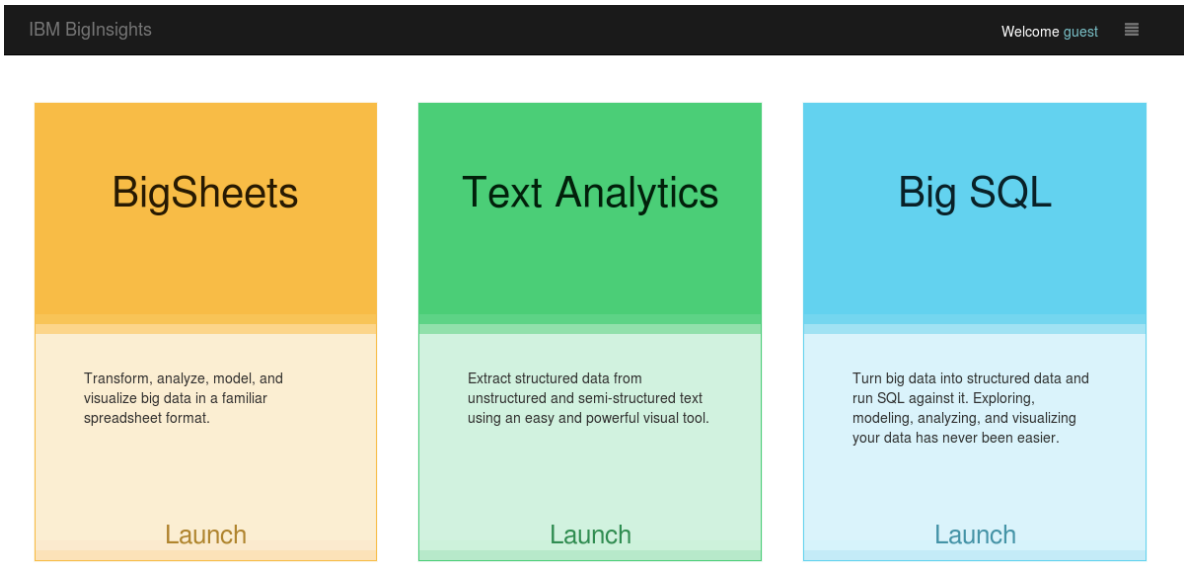
## 3.1. Launching the BigInsights Home and Big SQL web tooling

__1. Launch BigInsights Home, providing the appropriate URL based on your installation's configuration. Assuming you installed BigInsights with Knox and accepted default installation values, the BigInsights Home URL is similar to the link shown below. **Substitute the location of the Knox gateway on your cluster for the italicized text in this example. Remember start Demo LDAP**.

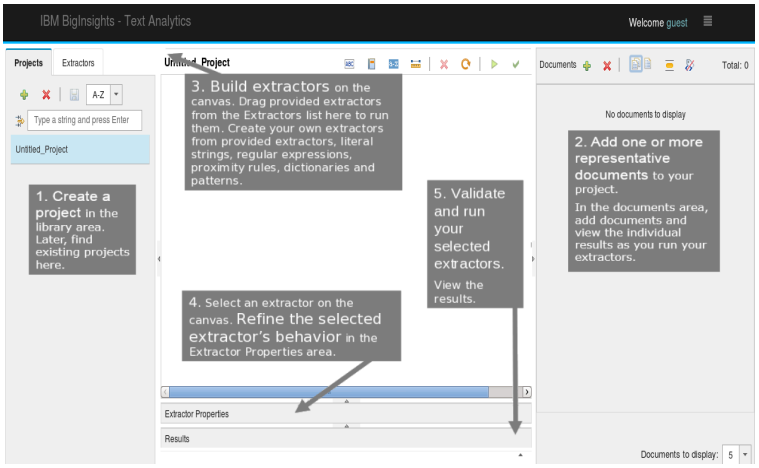
`https://bigi01.localdomain:8443/gateway/default/BigInsightsWeb/index.html`

__2. When prompted, enter a valid user ID and password for the Knox gateway. (Defaults are guest / guest-password).

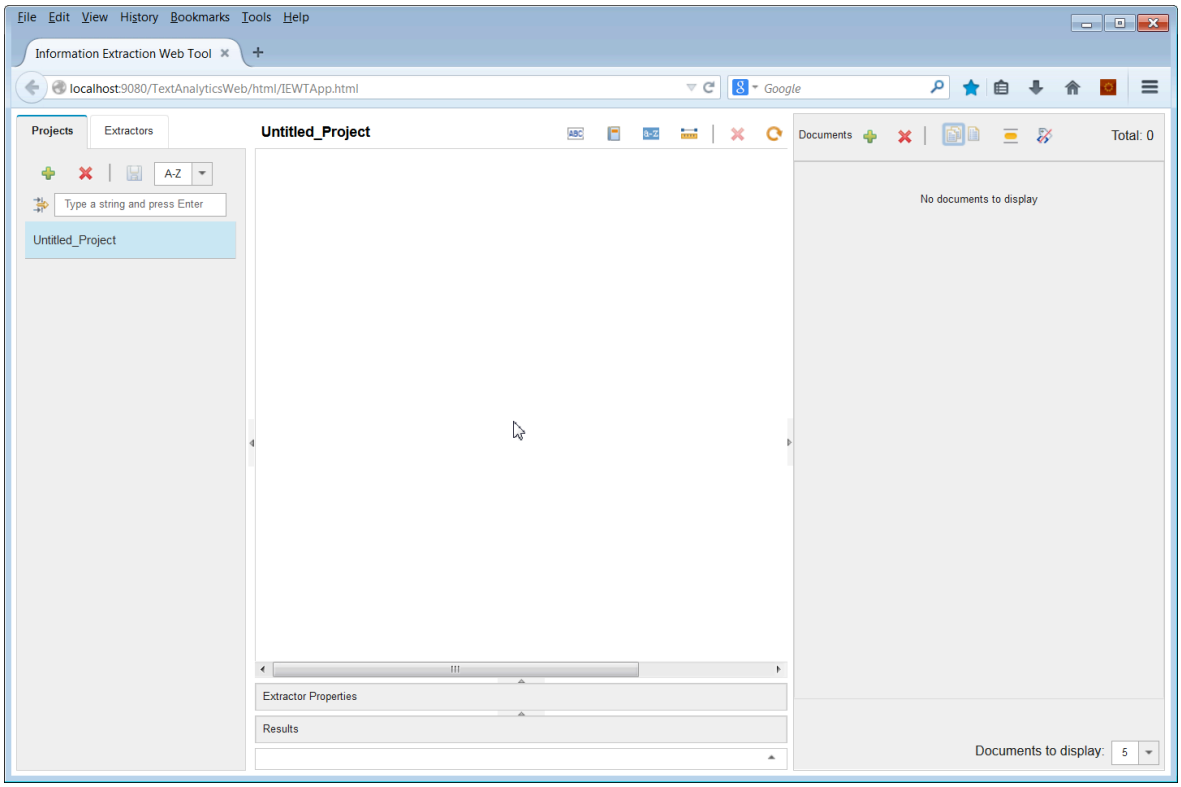
__3. Verify that BigInsights Home displays an item for Text Analytics. Depending on the size of your browser window and other BigInsights components installed on your cluster, you may need to scroll through the BigInsights Home page to locate the Text Analytics section.




__4. Click the Launch button in the Text Analytics box. (Your screen may appear somewhat different than the image below when you launch the tool for the first time.)




__5. Click in any place to remove the explanations.




There are 3 main panels on display in a new project.

- On the left is the project panel where you can create, open, delete and search for projects.
- On the right is the documents panel where you load and delete documents that you want to extract information from
- In the middle is the working canvas where you will build your text analytics application

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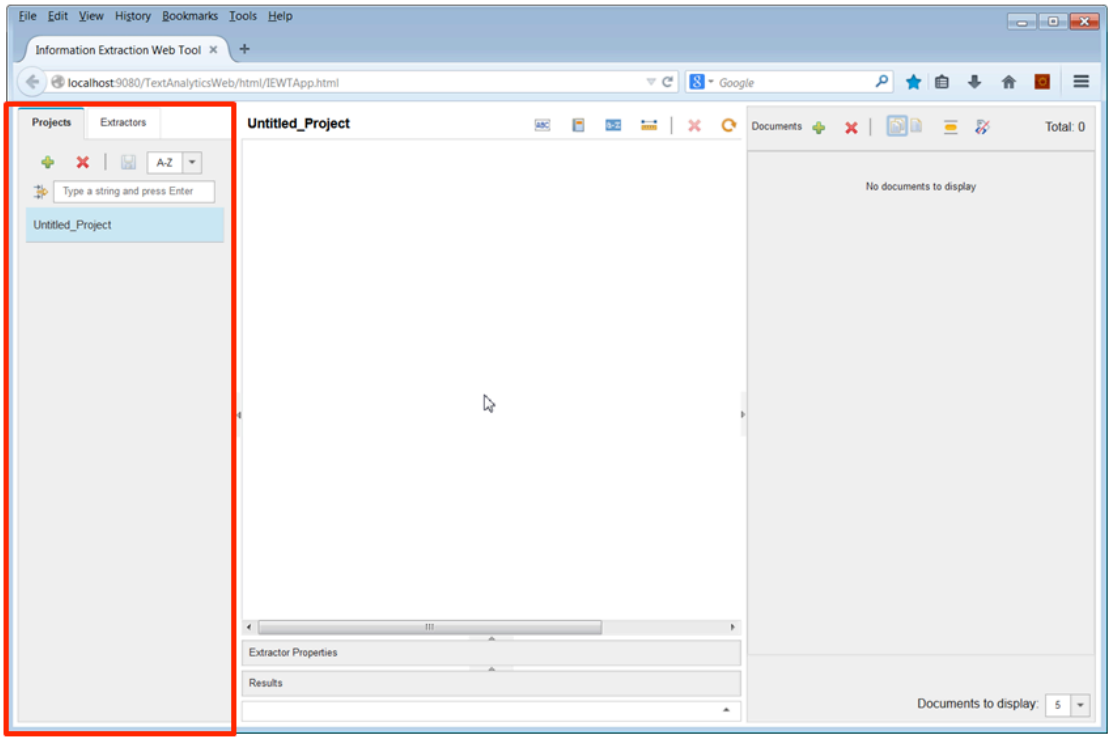
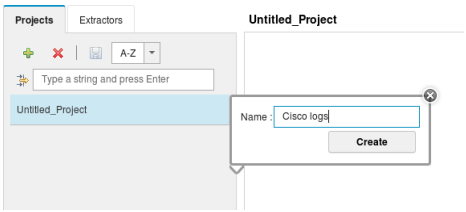
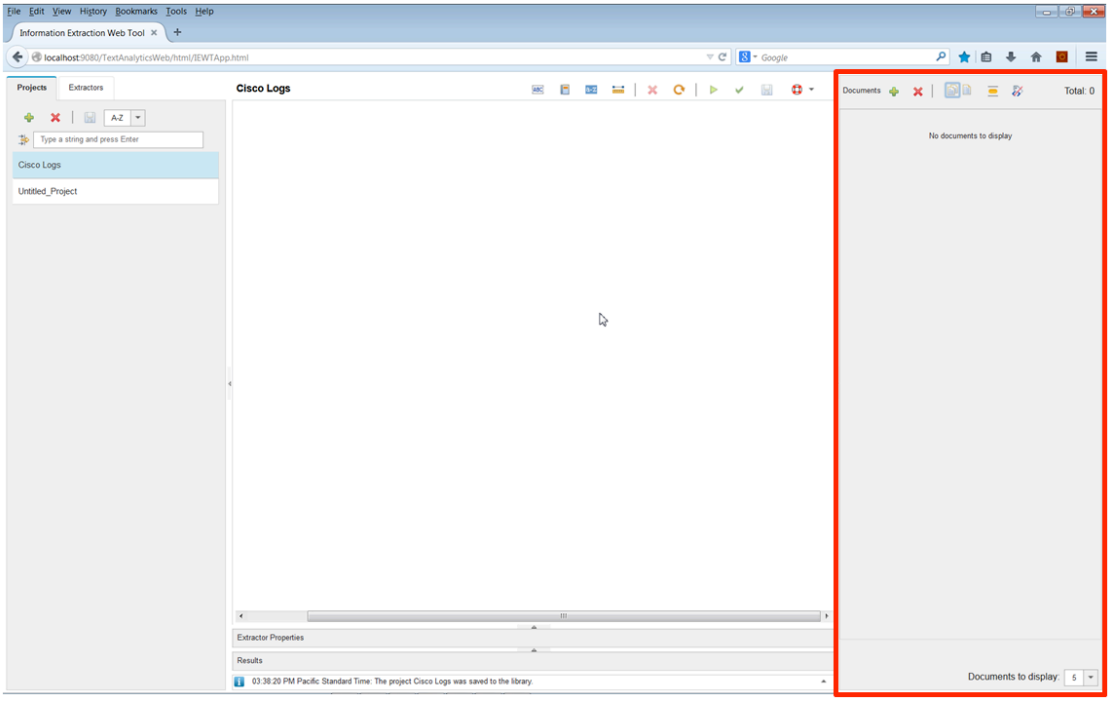



## 3.2. Create a Project

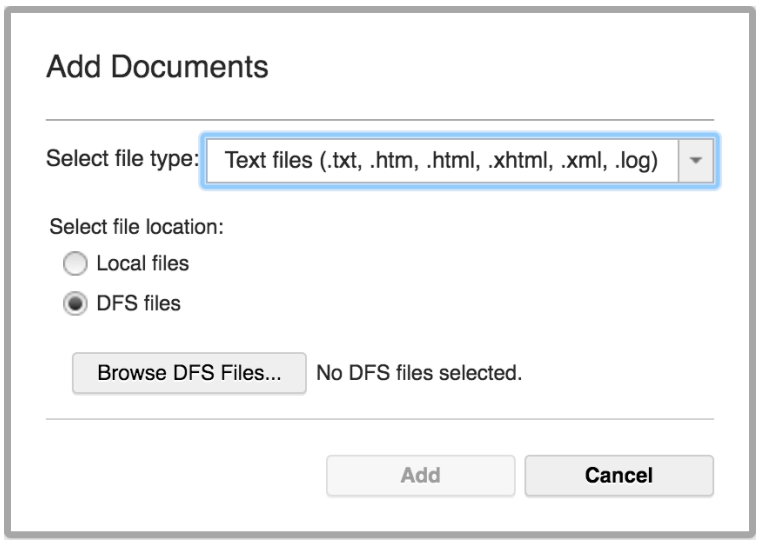
We will start with the Projects panel and create a new project by clicking on the + button and naming the project “Cisco logs” in the new project dialog



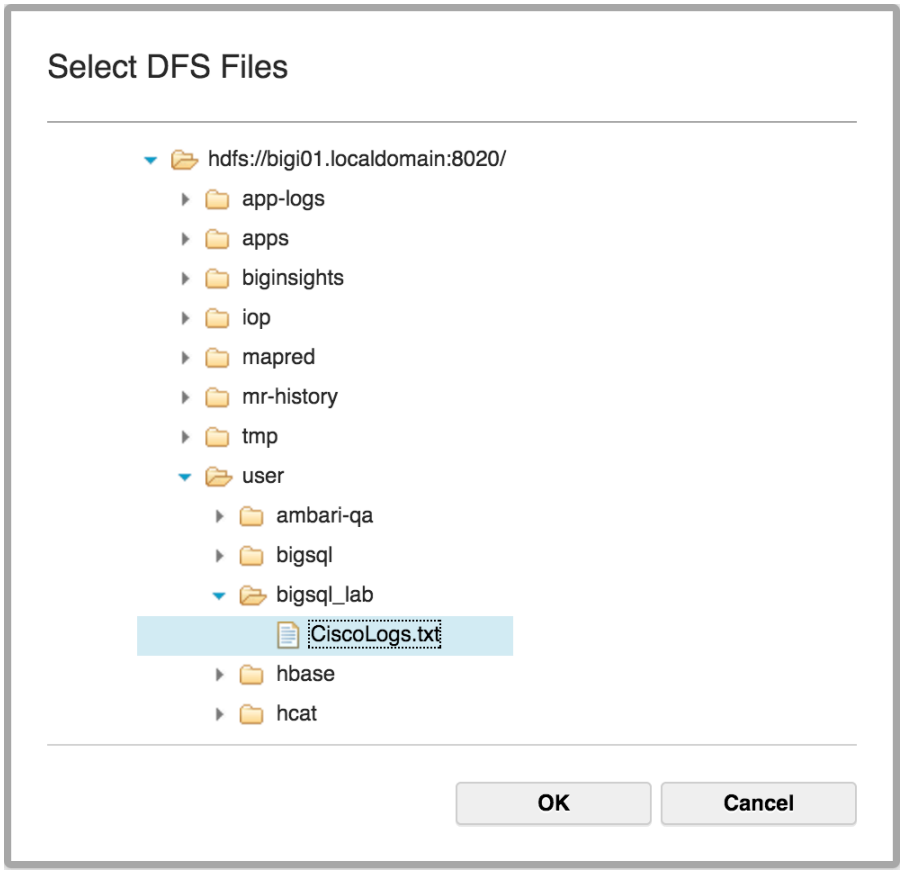

- Now we will move to the documents panel and load some data




Load a document set by clicking on the + button.

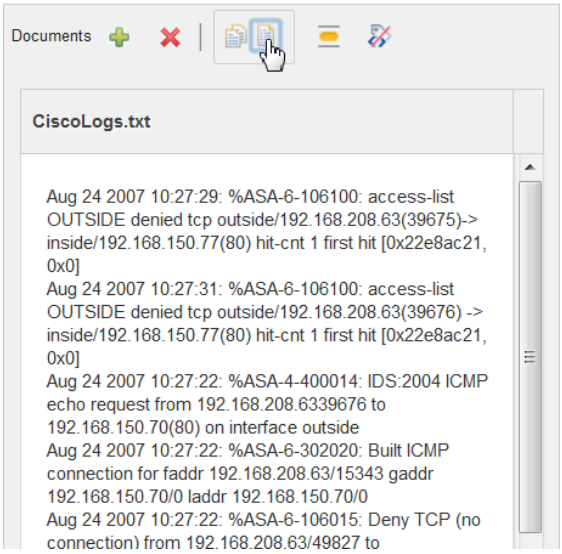



Note from the drop-down the various file types available and select text format. Leave the location as “DFS” and Browse to select the input file CiscoLogs.txt:




Click “Add” and you will see it appear in the document panel. You could use local files in your unix file system as well.

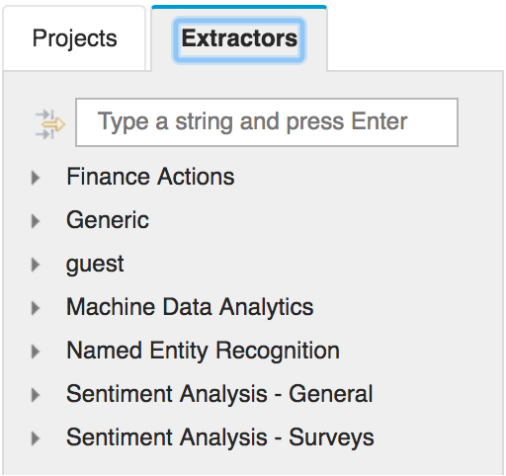
- Click on the document and select the single document button in the toolbar to switch to single document view so you can see more of the file




Now we are ready to build our extractor.

## 3.3. The Library and Pre-Build extractors

- Click on the Extractors tab in the left panel to bring the extractor library into view



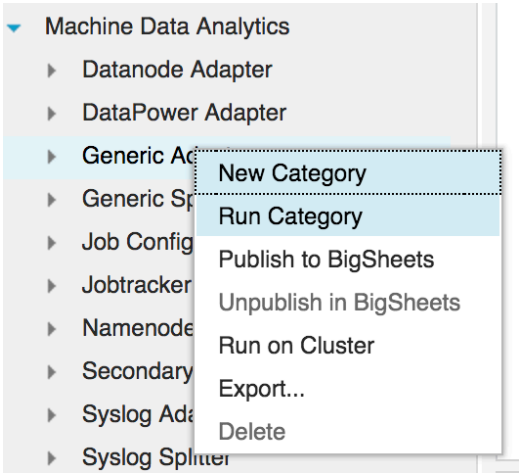

An important feature of the new Web Tooling is an easy way to reuse extractors from the extensive library of pre-built extractors.

- Expand the Named Entity Recognition category to show the rich set of extractors.

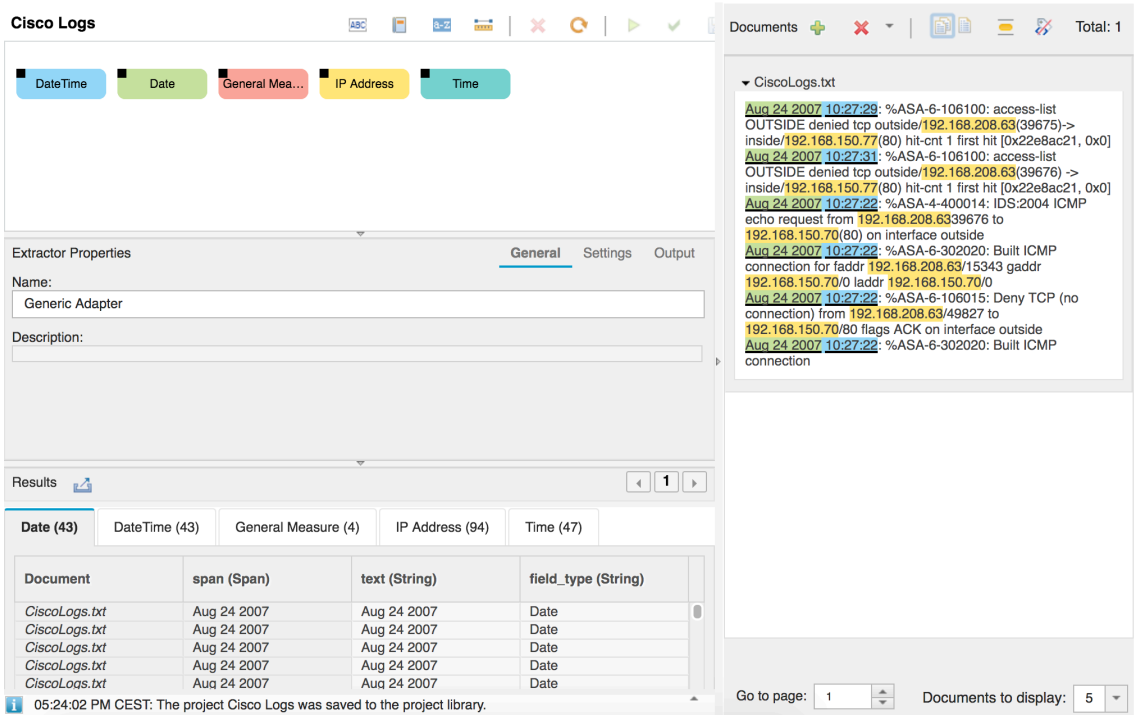
  IBM will continue to add to this library and you can add your own extractors, as you will demonstrate later.

- Close the Named Entity Recognition category and open the Machine Data Analytics category. Since we're analyzing log files, there will be useful extractors in this category. Since we don't know what will match our Cisco log records, an easy way to get started is to run the category.

  Right click on the Generic Adapter category and select 'Run Category'




The Category will run and the extractors that match against the sample document will be automatically added to the canvas.



Note how the default extractors have already matched parts of the document, with colour-coding to the dates and IP addresses.

- Minimize the properties panel (underneath the canvas) and click in the grid in the results panel to highlight one of the extracted spans. Note that clicking in the grid highlights that result in the document. Click on the tabs in the results panel to show the results from each of the extractors.

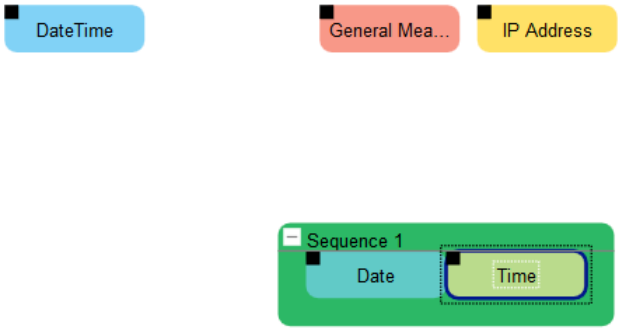
# Lab 4 Building a Sequence

## 4.1. Create the first Sequence

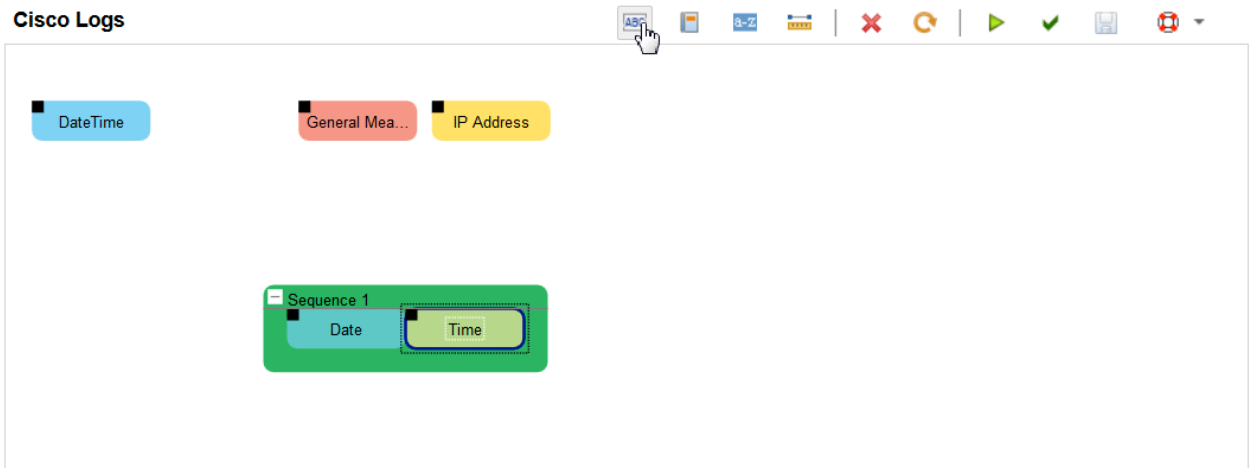
To match elements of log records and extract the IP addresses associated with suspicious activity we will build a sequence to match records like the first one in the document that include: an ASA-6 code and the OUTSIDE ACL:

> Aug 24 2007 10:27:29: %ASA-6-106100: access-list OUTSIDE denied tcp outside/192.168.208.63(39675)-> inside/192.168.150.77(80) hit-cnt 1 first hit [0x22e8ac21, 0x0]

- Start the sequence by dragging the Date extractor further down toward the middle left of the canvas, then drag the Time extractor and dock it on the right of Date

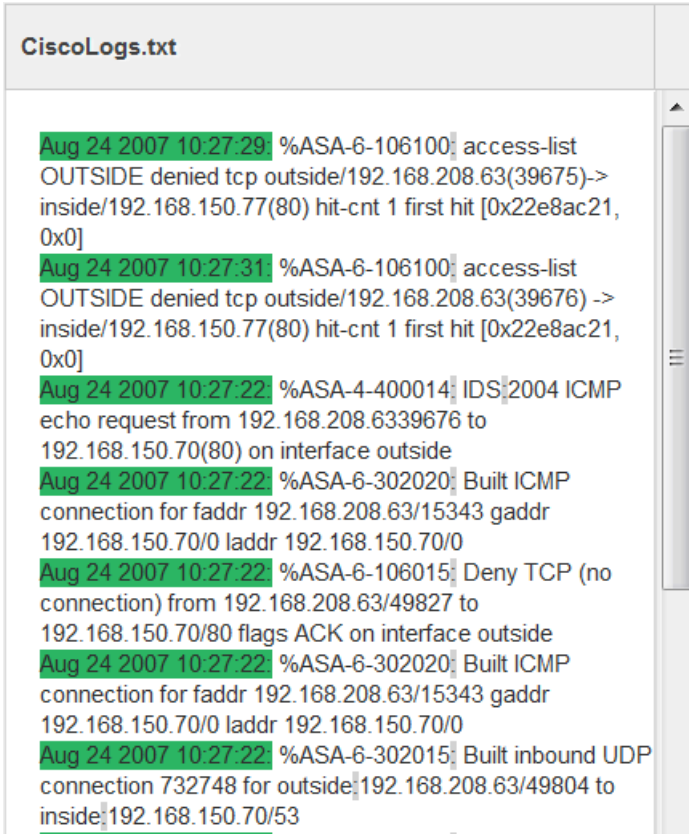



- We can create new extractors for literals, dictionaries, regular expressions and token gaps. Looking at the first record in the document panel, notice that the next element in the log record is a colon. Match this by clicking on the literal button in the toolbar



On the new literal that was added to the canvas, type a colon, hit enter and then drag it and dock it to the right of Time


- Right click on sequence 1 and choose run selected from the context menu. You could also select the sequence and then hit the run button in the toolbar.

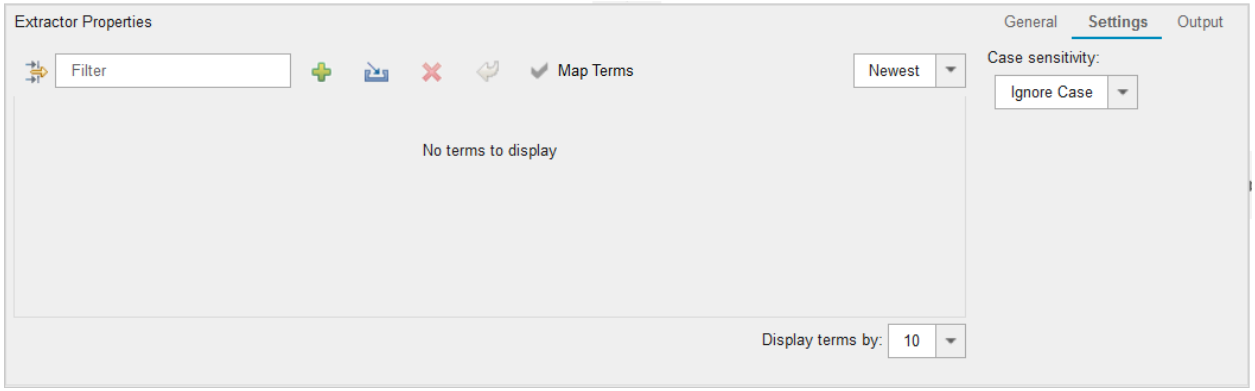



The highlighting now shows the matches, you can see the rapid iterative way of working that is a feature of this interface.

- The next element in the log record is the code %ASA-6-106100. We will use a dictionary to match this and any other codes that are caused by suspicious events.

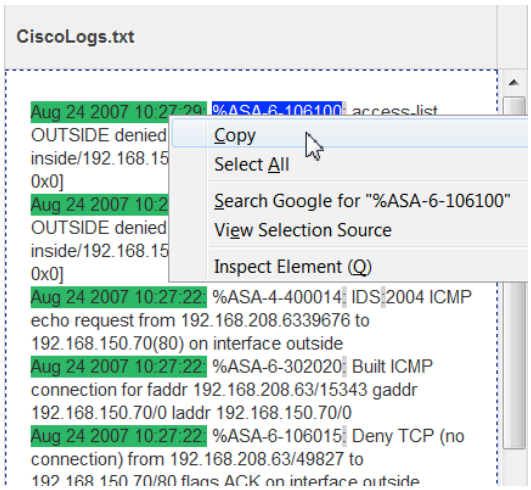
Click on the dictionary button in the toolbar, type Codes to name the new extractor and hit enter.

- Expand the extractor properties panel below the canvas.

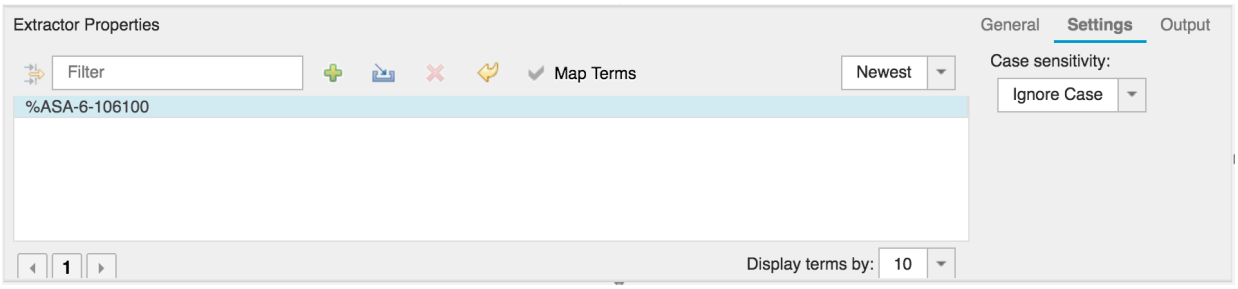



Look at the General tab where we could add more detail about this extractor (note that each of the pre-built extractors has extensive descriptive metadata). We will use the Output tab later when we need to define the output of our extractor.

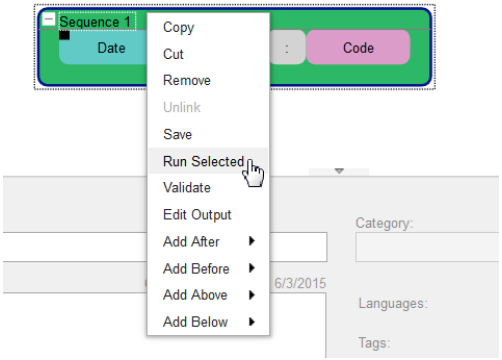
Click back to the Settings tab. We can enter dictionary terms directly or load them from a file. Select %ASA-6-106100 in the document panel and copy the text to the clipboard.



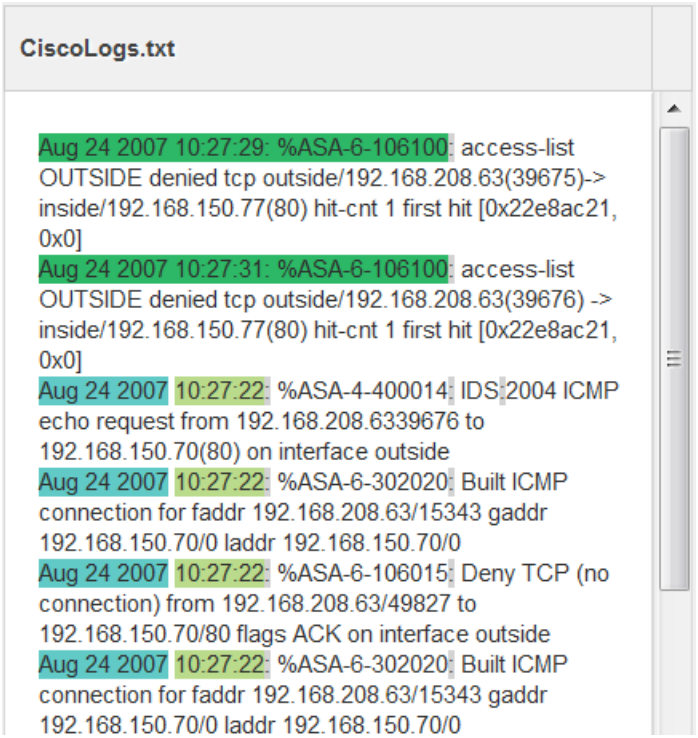

In the Properties panel select the + button, paste the text from the clipboard into the entry field and then hit enter.




- Drag the Code extractor and dock it to the right of the colon in the sequence, then highlight the sequence and either hit the run button on the toolbar or right click and choose run selected from the context menu.



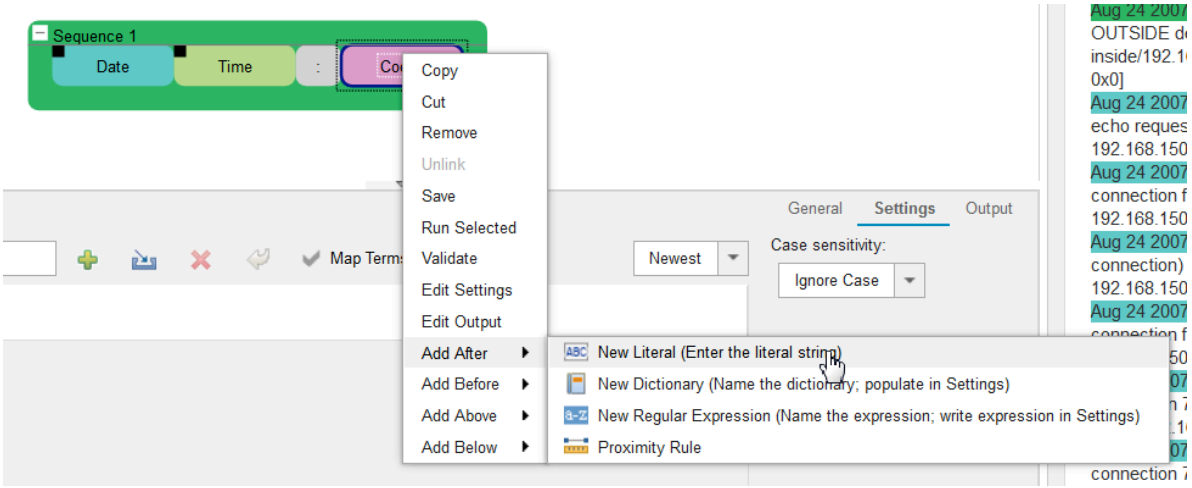

- Now we are only matching the records that contain the ASA-6-106100 code we just added to the dictionary:



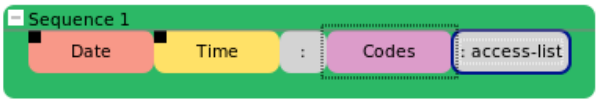
- Scroll down in the document view to show additional matches and click on the page 2 button at the bottom of the panel to show paging. Switch back to page 1.

- The next part of the sequence includes some text ': access-list' and a reference to the ACL - OUTSIDE. We will use a literal and a dictionary to match these elements.

  Select and copy the text ': access-list' from the first record in the document panel. Right click on the Code extractor that's already in the sequence and select Add After->New Literal from the context menu.

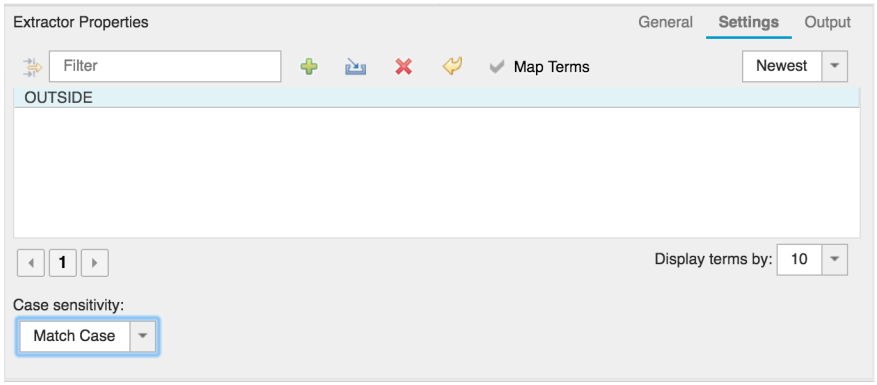



  Paste the text you just copied and hit enter.




- Right click on the new literal you just added and from the context menu select Add After->New Dictionary. Type ACL as the name and hit enter. In the Properties panel type OUTSIDE in the entry field and hit enter.

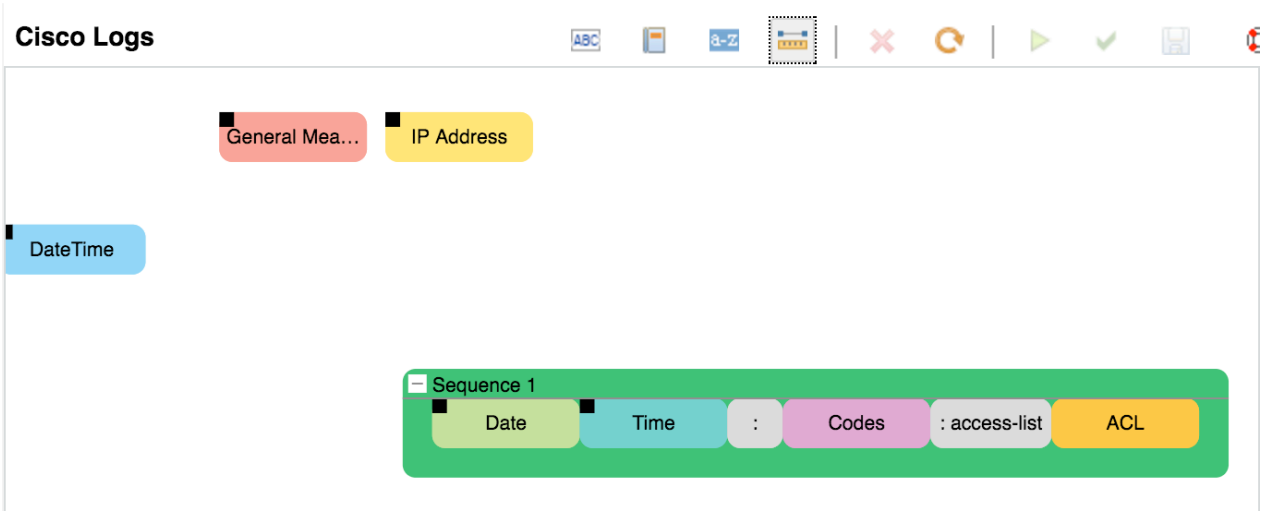
  Change the Case sensitivity setting on the right to Match Case.



Select the full sequence on the canvas, run again and check the document panel to validate that you are matching the message through to the ACL OUTSIDE.

- The next element was interested in is the TCPIP address. Between the ACL and the TCPIP address there's some text that we don't need to match exactly - 'denied tcp outside' and then a slash '/'. We can use a token gap (proximity rule) to match the text, a literal to match the slash and the pre-built to extract TCPIP address.

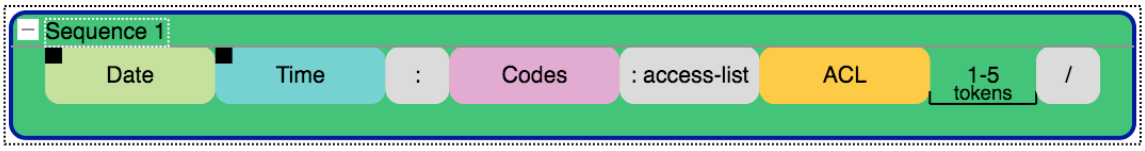
Click on the proximity rule button in the toolbar.




Type 1-5 (no spaces) on the extractor input box and hit enter. Dock the proximity rule to the right of ACL in the sequence. The proximity rule will match between 1 and 5 tokens. A token is either a consecutive sequence of 1 or more characters or a punctuation mark. The text in our log message 'denied tcp outside' contains 3 tokens. We could have specified 3-3, matching precisely this text, but allowing 1 - 5 tokens gives us some flexibility.

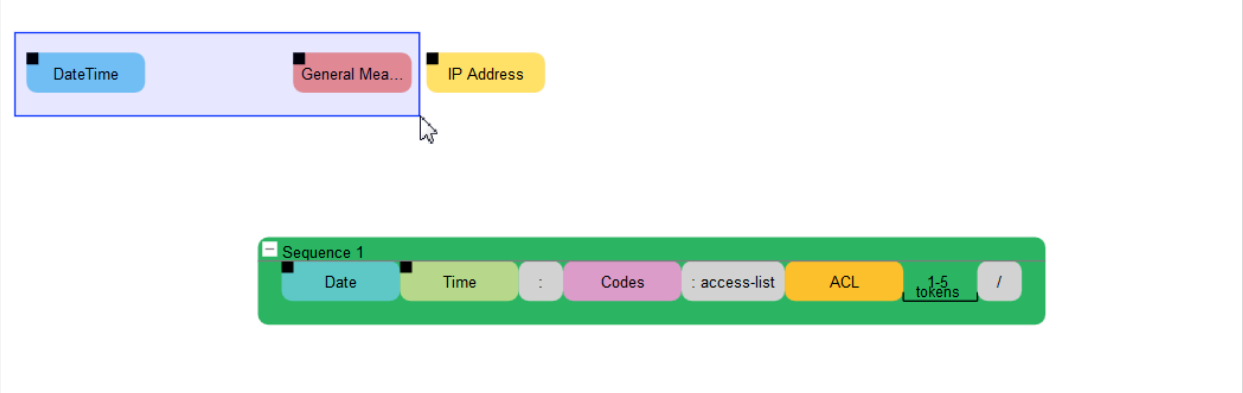
- Add a new literal, type a slash, hit enter and if you didn't use the 'Add After' method dock it to the right of the proximity rule.

Select the sequence, run it and check the results.

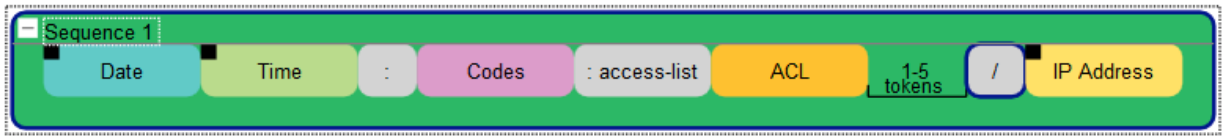


## 4.2. Completing the Sequence

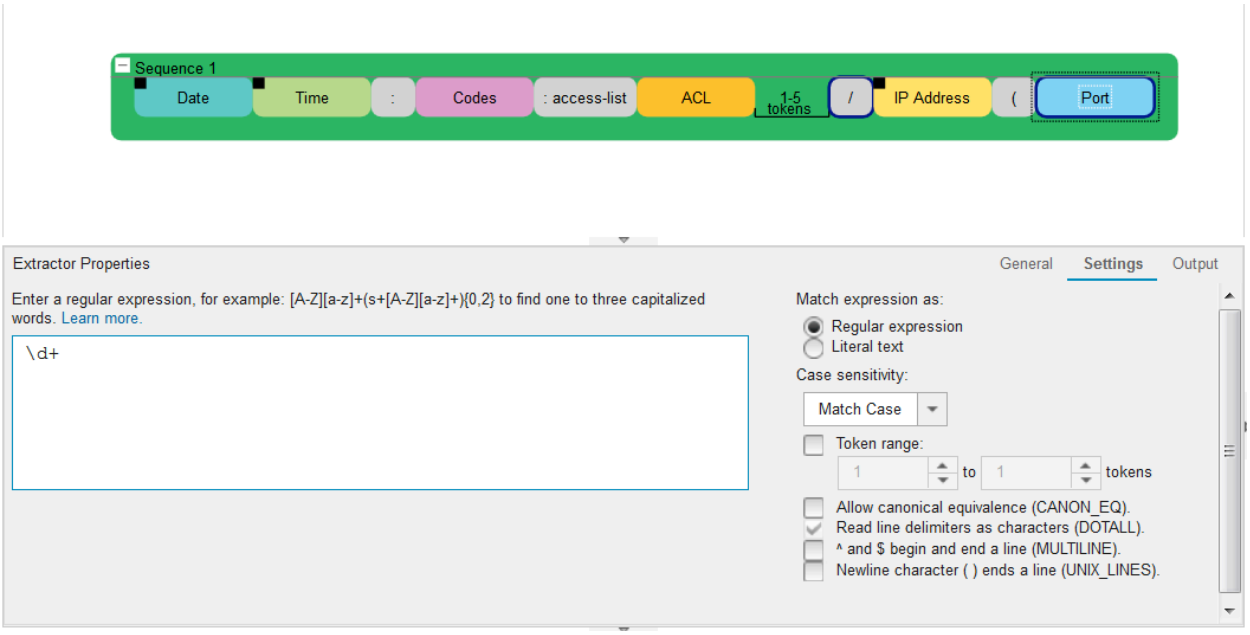
- Before we complete the sequence, tidy up a little by selecting and deleting the two unused pre-builts that we don't need.




- Drag the IP address extractor and dock it to the right of the slash.

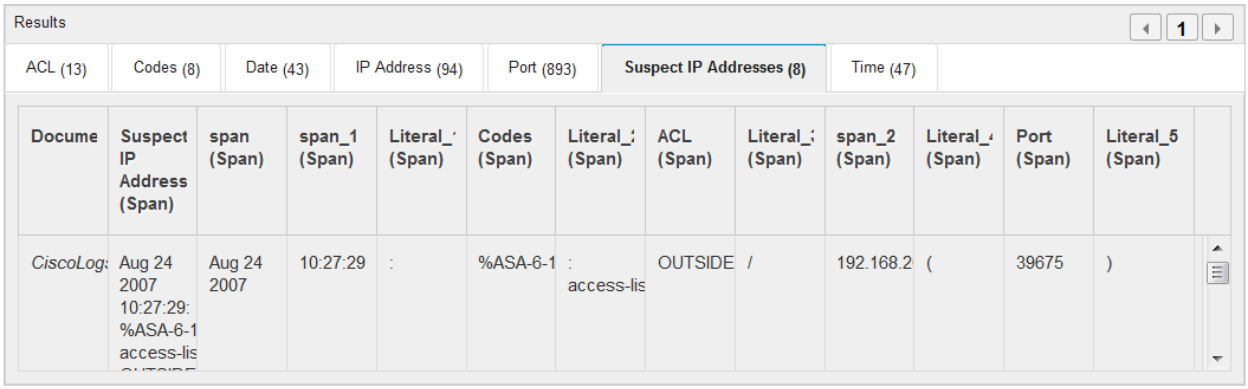



- Right click on the IP Address extractor, select Add After->New Literal, enter '(' character and hit enter.
- We will use a regular expression to match the port number. Right click on the literal you just created, select Add After-> New Regular Expression. Enter Port as the name, hit enter and in the Properties panel enter the regular expression \d+

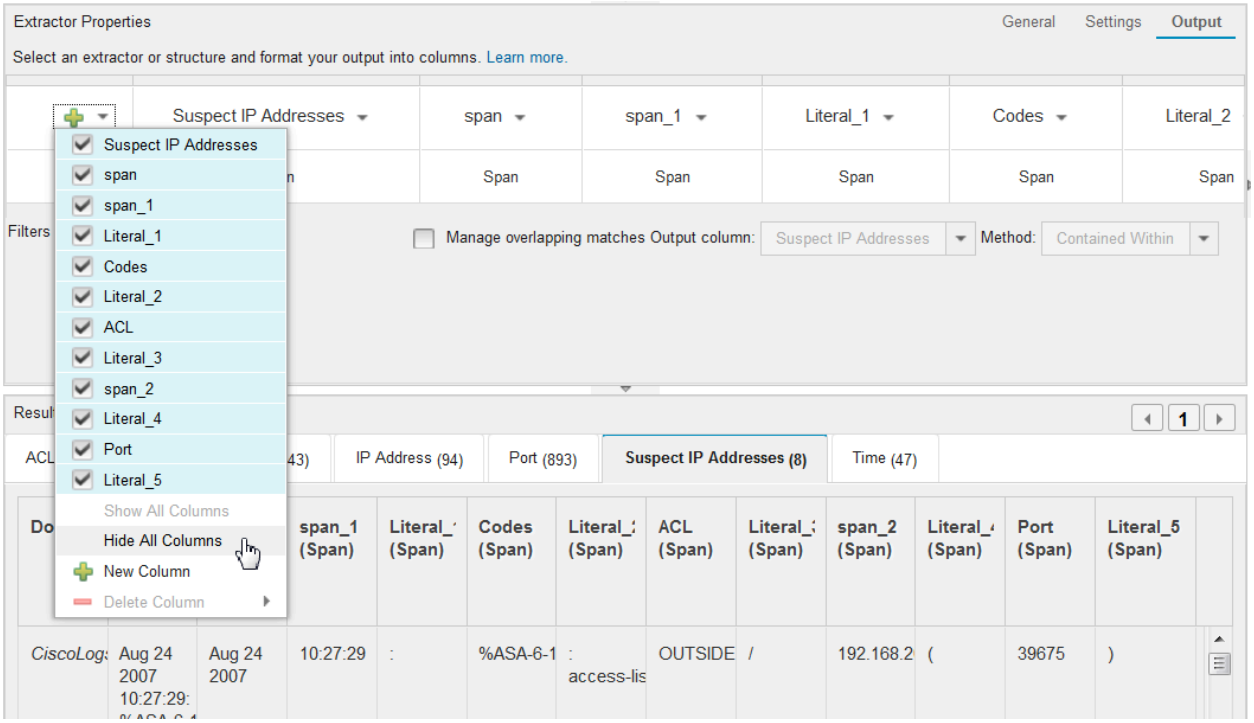


- Complete the sequence by adding a literal for the ‘)’ character.

- In the general properties for the sequence, change the name to 'Suspect IP Addresses'. Run the extractor and check the results. You will see full matches against the first two log records and in the grid you can see various elements being returned by the extractor

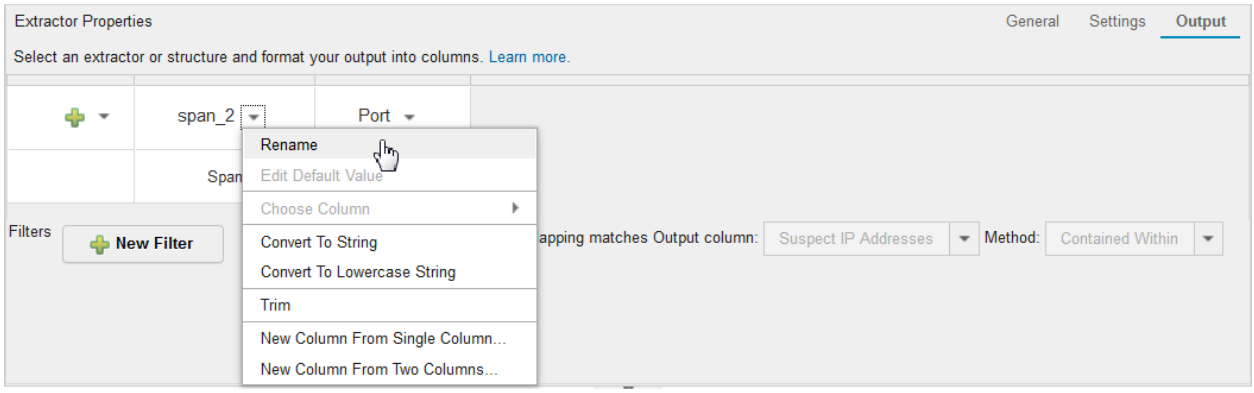



- We want the extractor to return just the IP address and port. We control this from the Output tab of the Properties. Select the Output tab and then click on the + to the left of the output column names and select Hide All Columns.

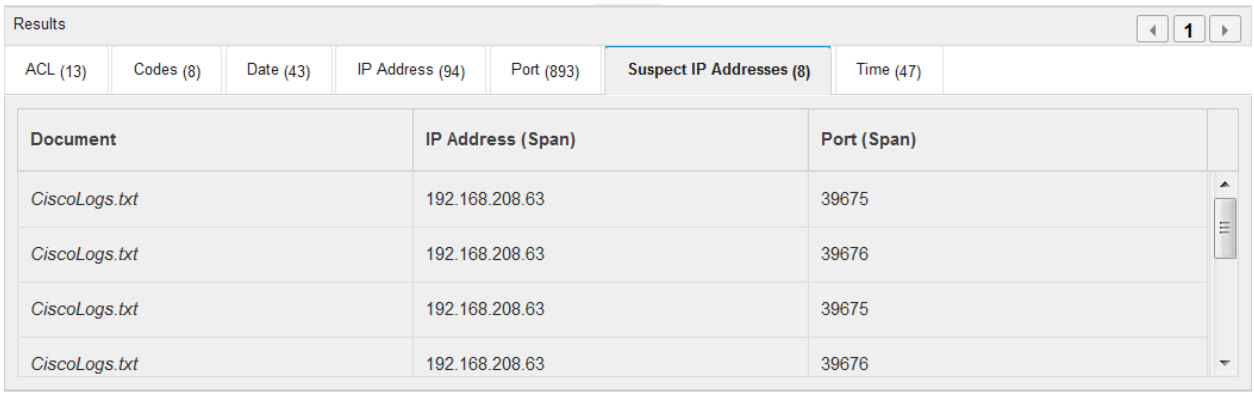


- Select span_2 and Port - note that you should uncheck the first entry - Suspect IP Addresses since it was left as the default output by the hide all columns operation.

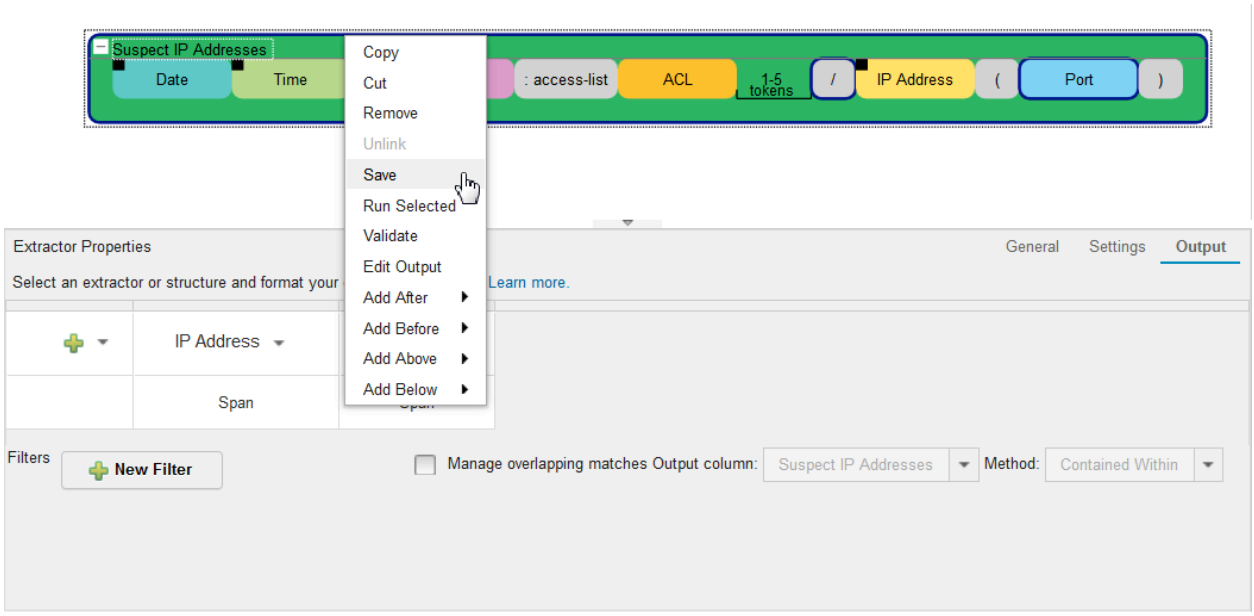
- In the output column names grid, select the menu on the span_2 column and choose Rename.



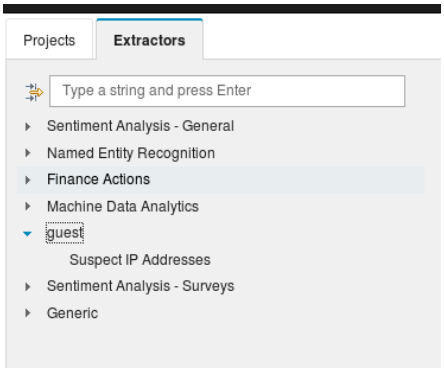

Type 'IP Address' and hit enter. Run the extractor and show the new results.




- Finally, since this is a useful extractor we are likely to use again, we will save it to the library. Right click on the extractor and select Save from the context menu.




Select your userid (guest) and click OK in the dialog. You will now see your extractor in the library:




This is a good place to stop if you are running short of time. The only features you haven't shown are copy/paste with linked extractors and unions.

# Lab 5 Adding a second pattern

The data contains another log record for denied connections that we will add a second pattern to detect. Look down to the fifth record:

> Aug 24 2007 10:27:22: %ASA-6-106015: Deny TCP (no connection) from 192.168.208.63/49827 to 192.168.150.70/80 flags ACK on interface outside

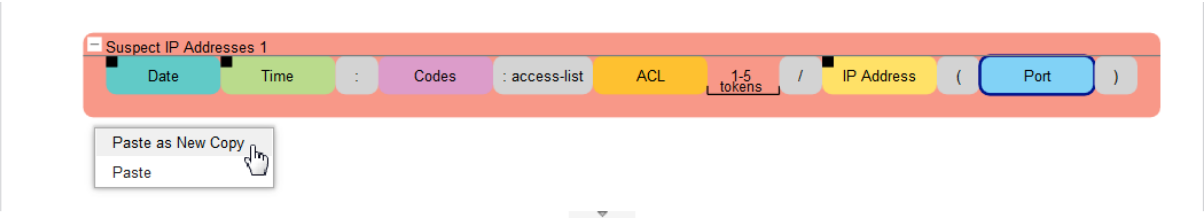
We can use another sequence pattern to detect these records and then union together both patterns to deliver a complete result set.

- Start by renaming the current extractor Suspect IP Addresses 1 in the General page of the Properties panel. Dismiss the warning message which tells you that you are making changes that will not be reflected in the copy of the extractor in the library.

- Copy the extractor and right click on the canvas. There are two paste options:

    - Paste will paste a linked copy of the extractor. Changes made to one will be automatically reflected in all linked copies, keeping them all consistent.
    - Paste as New Copy will paste a new, independent copy. New copy is just for the sequence (the internal extractor continue been a linked extractor).

We need an independent copy, so select Paste as New Copy and then rename it to Suspect IP Addresses 2.




- Looking at the fifth log record, notice that the first change we need to make is to add the code %ASA-6-106015 to the Codes dictionary. Select the dictionary in the new sequence and notice

that it's also selected in the first sequence. The extractors within the sequence are linked. Select **unlinked** in the second one (right click over extractor) and renamed with Codes 2

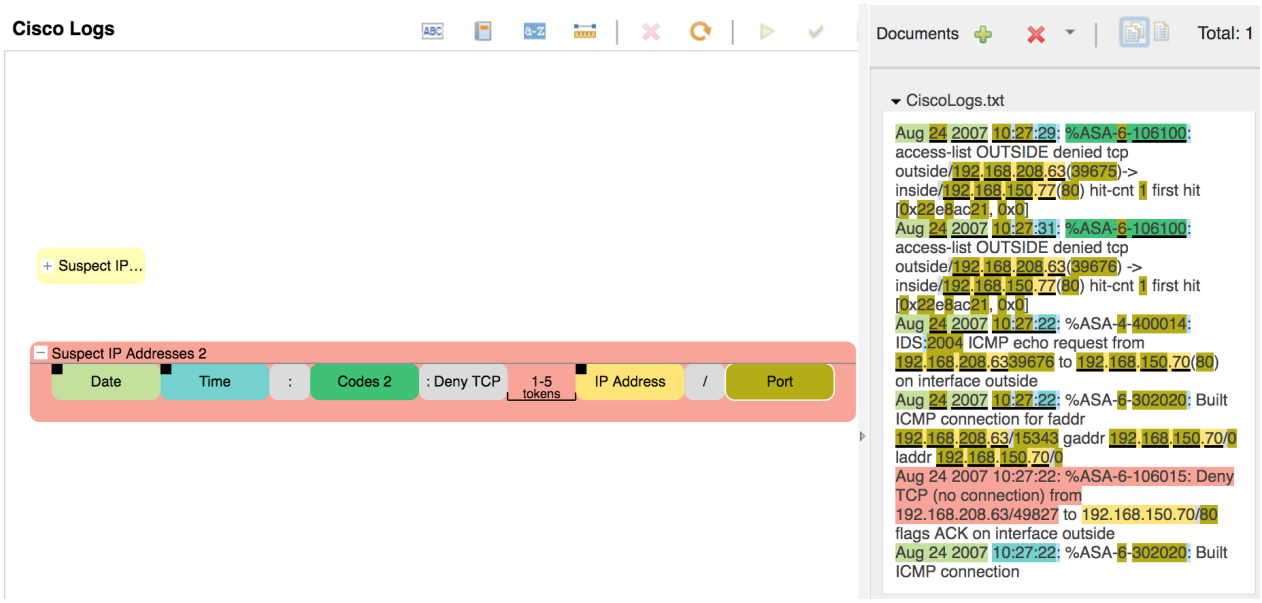
Copy the code %ASA-6-106015 from the fifth log record and on the Settings page of the Properties panel, click on the '+' button, paste the new code into the entry field and hit enter. Dismiss the warning message (in case that you get it) - note development are planning to give the user an option to suppress these messages after the first one.

- To modify the literal, change the literal text to ': Deny TCP '.

- Unlink and remove the ACL extractor from the sequence - right click and select remove from the context menu.

- Leave the proximity gap, drag the literal slash to the other side of IP Address and remove the literals for left and right parenthesis.


- Select and run the sequence. It may be difficult to see the results clearly in the documents view. To make it clearer, collapse the extractor by selecting the '-' to the left of the name and run it again. Now you will only see matches for the full sequence, not the contained elements.



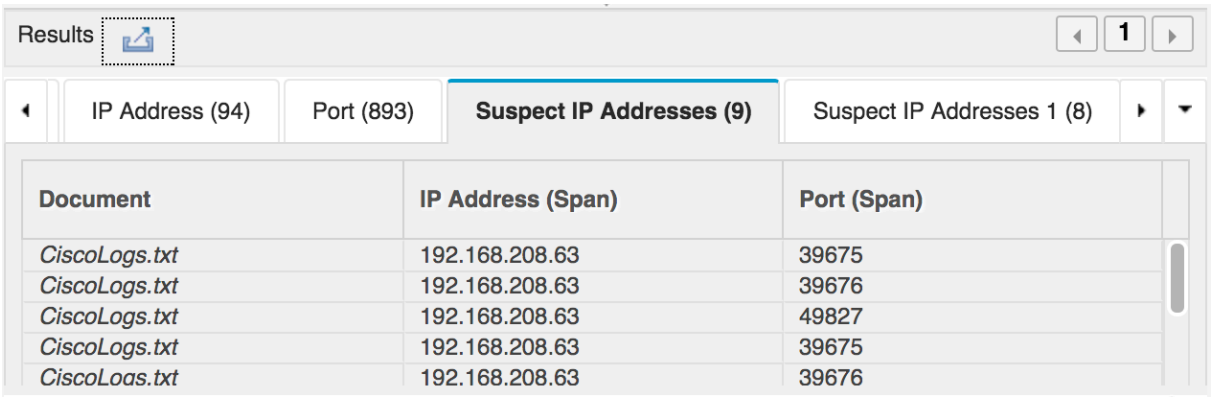
- Notice that the output of the new extractor includes a more fields. Go to the Output page of the Properties, select the + to the left of the output columns grad and uncheck the all except IP and Port

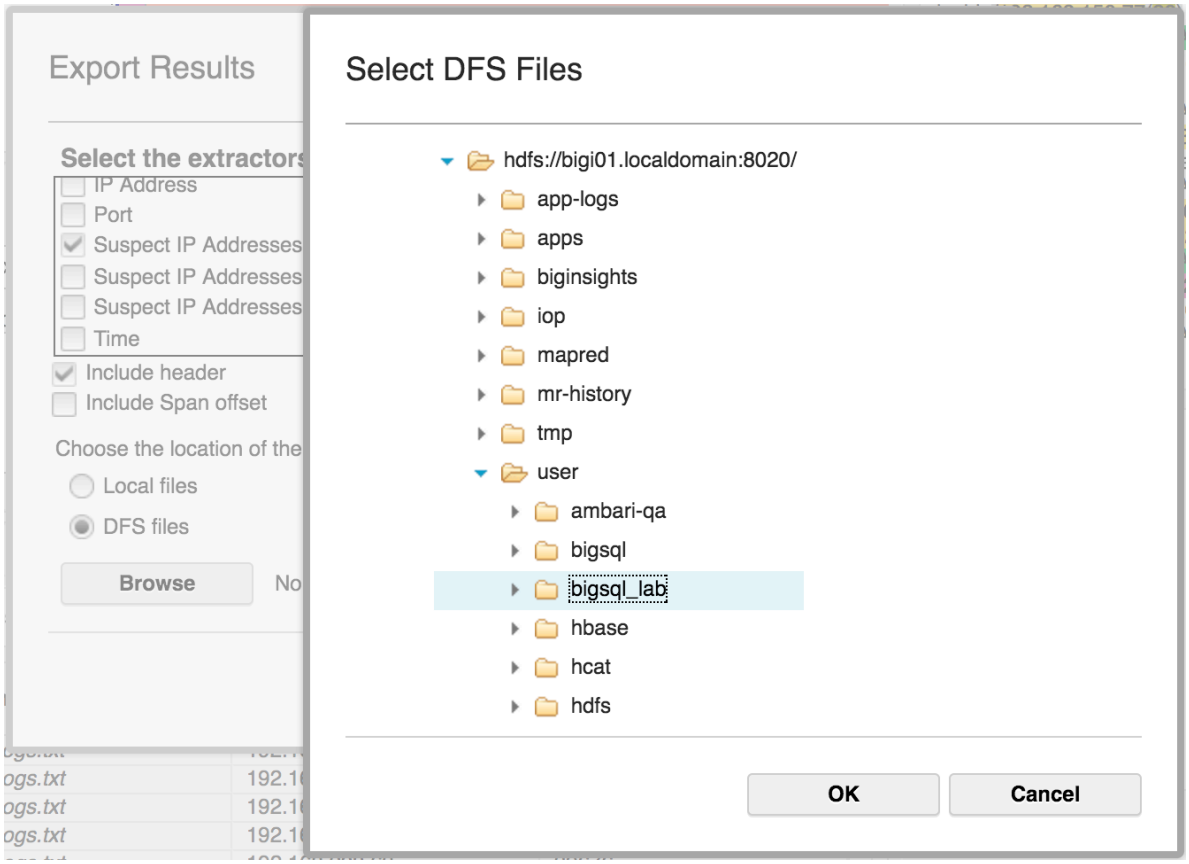
- To union together the two extractors, drag the new one and dock it under the first one:


- Run the union and check the results. You should see that all the suspicious activity in this log file is coming from one IP Address.

- Rename Union1 to Suspect IP Addresses and save it.

- Press  in Suspect IP Addresses tab, deselect all, select Suspect IP Addresses, uncheck Include Span offset and save result in DFS path /user/bigsql_lab:




Export Results
Select the extractors
IP Address
Port
Suspect IP Addresses
Suspect IP Addresses
Suspect IP Addresses
Time
Include header
Include Span offset
Choose the location of the
Local files
DFS files
Browse
Select DFS Files
hdfs://bigi01.localdomain:8020/
app-logs
apps
biginsights
iop
mapred
mr-history
tmp
user
ambari-qa
bigsql
bigsql_lab
hbase
hcat
hdfs
OK
Cancel


Information
01:06:56 PM CEST: Successfully exported 1 file(s) to /user/bigsql_lab.
Close

# Lab 6 BigSheets

To help business analysts and those without a programming background analyze big data, IBM provides a spreadsheet-style tool called BigSheets. In this lab, you'll learn how you can explore big data through this tool without writing scripts or MapReduce applications.

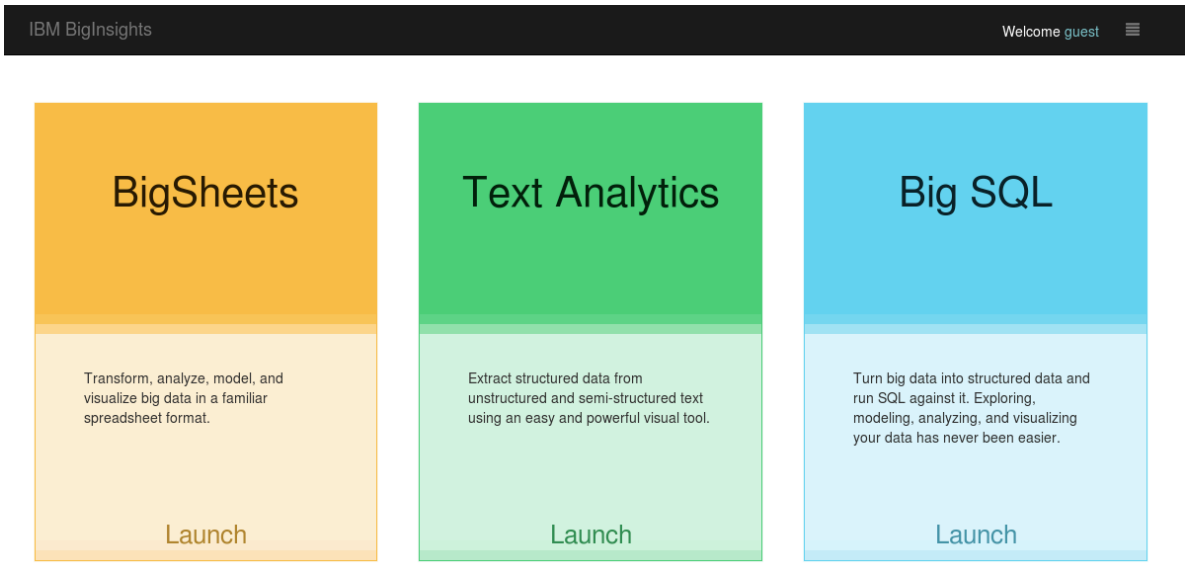
BigSheets is a browser-based analytic tool that you use to break large amounts of unstructured data into consumable, situation-specific business contexts.

Use BigSheets to create master workbooks from data files in your distributed file system.

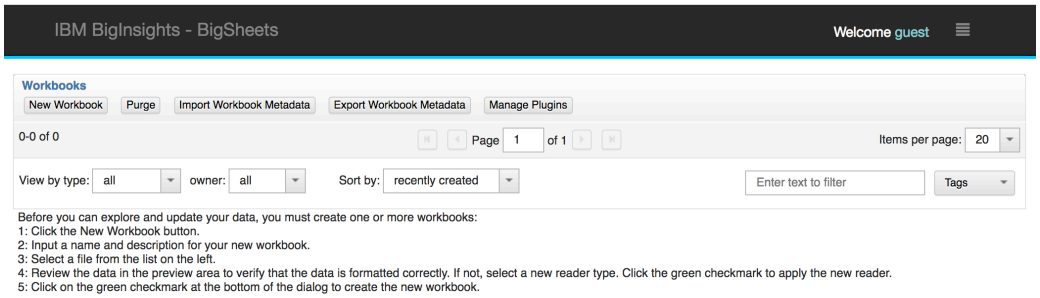
After you collect data, you load data into a master workbook. Then, you format and explore the data by building sheets, which resemble spreadsheets, in workbooks that are based on the master workbook. You can combine columns from different workbooks, run formulas, and filter data. These manipulations form the basis of your analysis. You can also combine data with functions that are designed for BigInsights® text analytics to drill further into information and derive content out of raw data. These deep insights help you to filter and manipulate data from sheets even further.

Following the previous stored results, we are going to load the data on BigSheets and we are going to create a column bar chart.

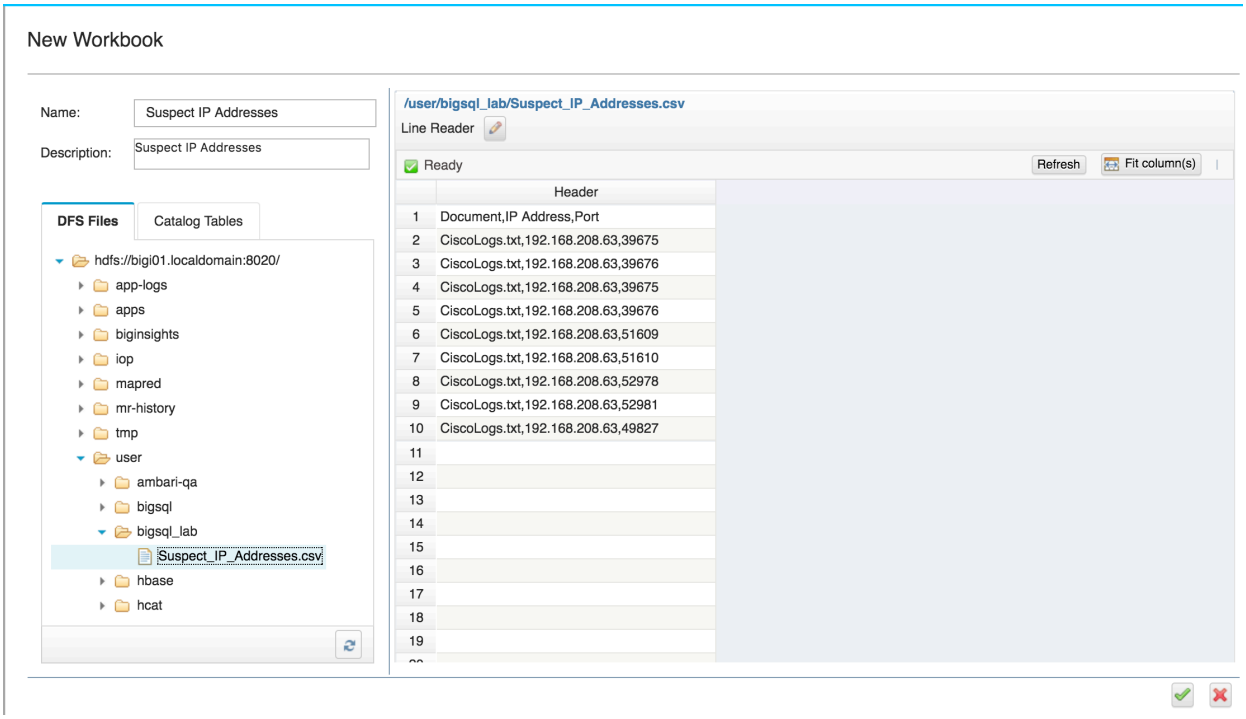
- Login on BigSheets from BigInsights Home:



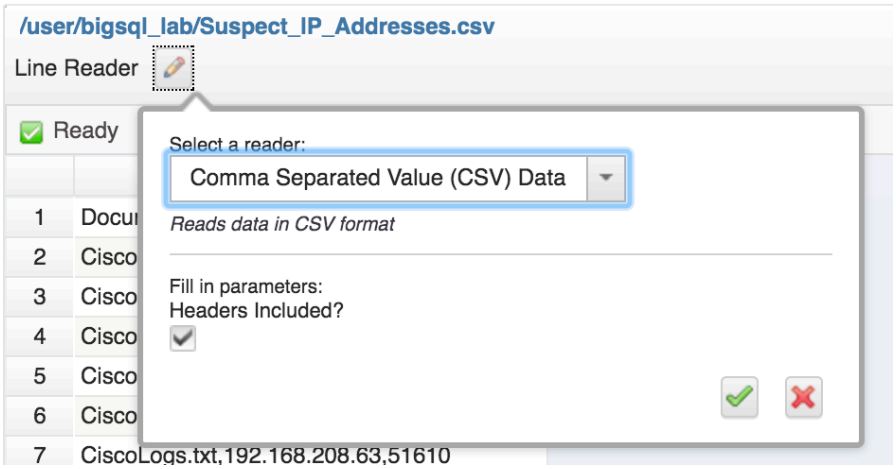

- BigSheets Home:

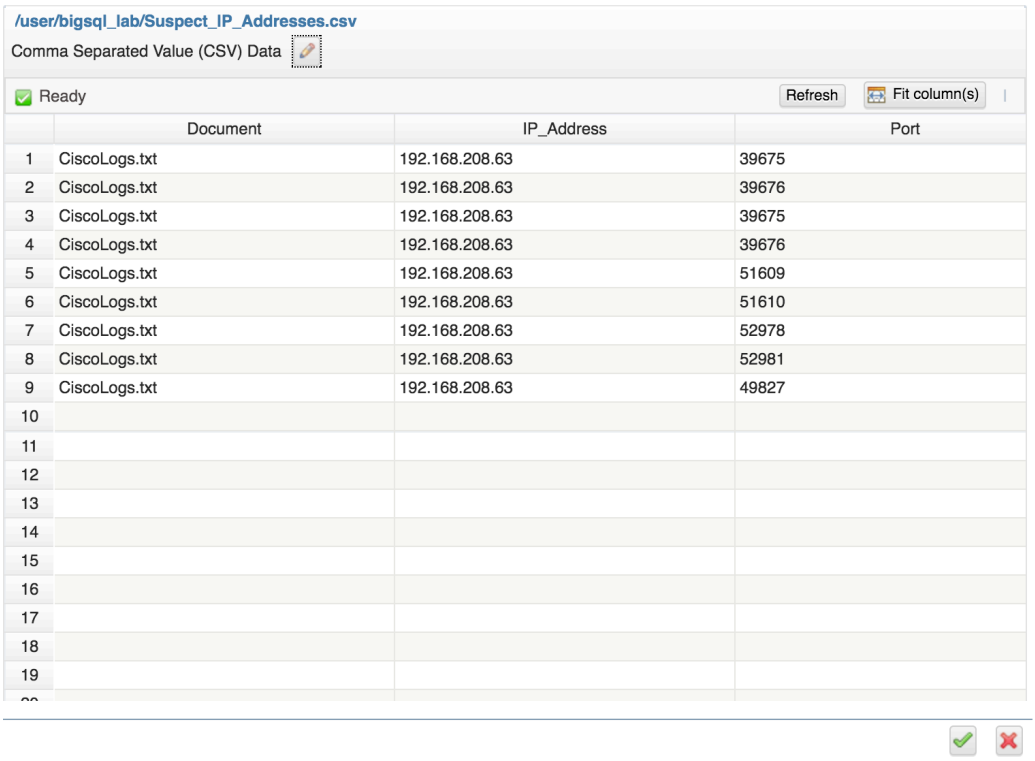



- Click on New Workbook and fill up name and description and choose DFS File on /user/bigsql_lab/Suspect_IP_Addresses.csv



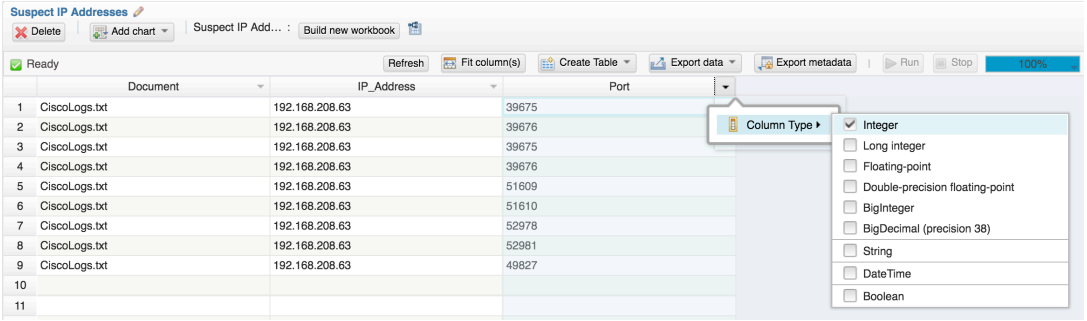

- As you can see the reader is not the correct one, select CSV reader:



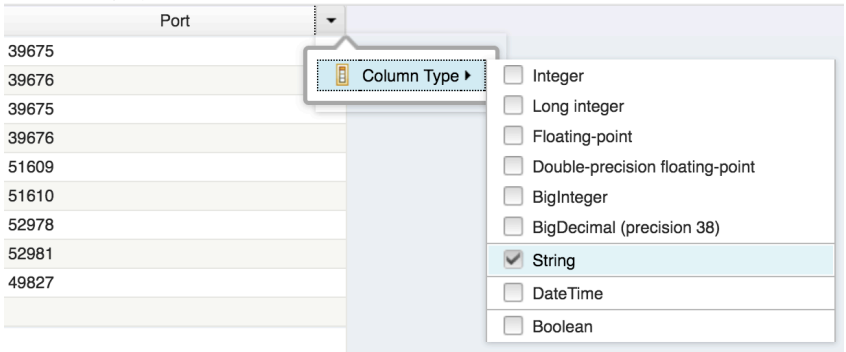



- Save the workbook 

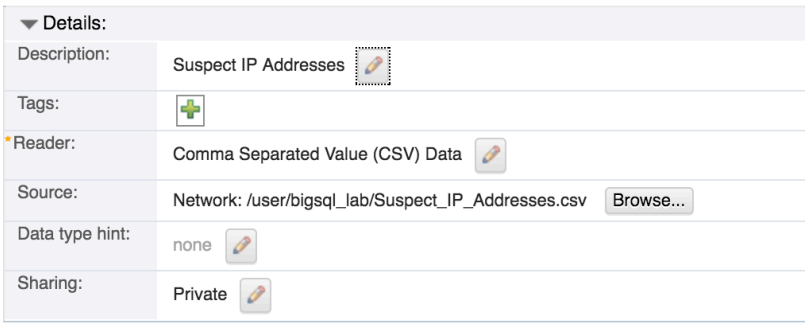
- Review how BigSheets can extract ColumnType



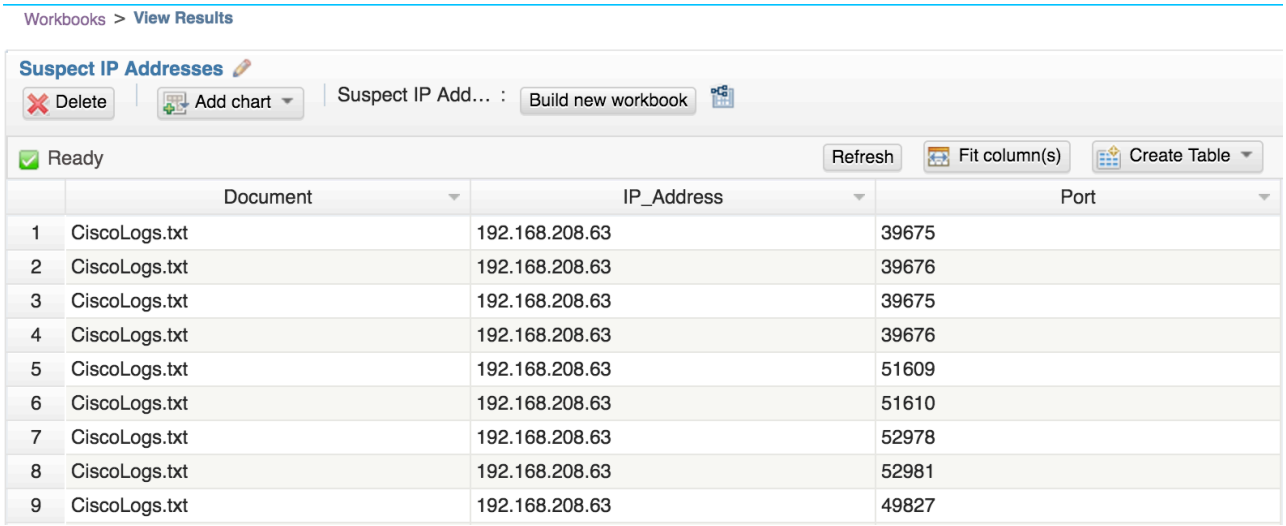

- Set Port column as String type



- Review Workbook details at bottom of the page

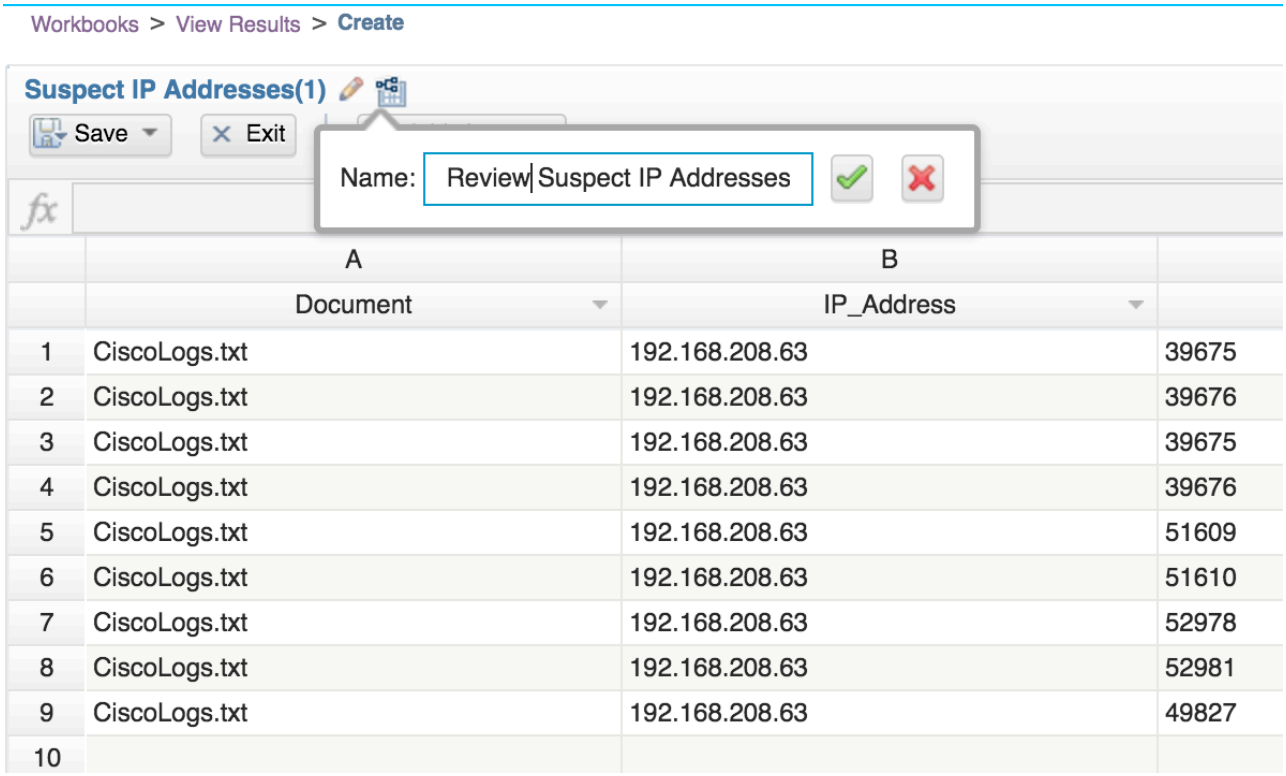



- Click on Build new workbook

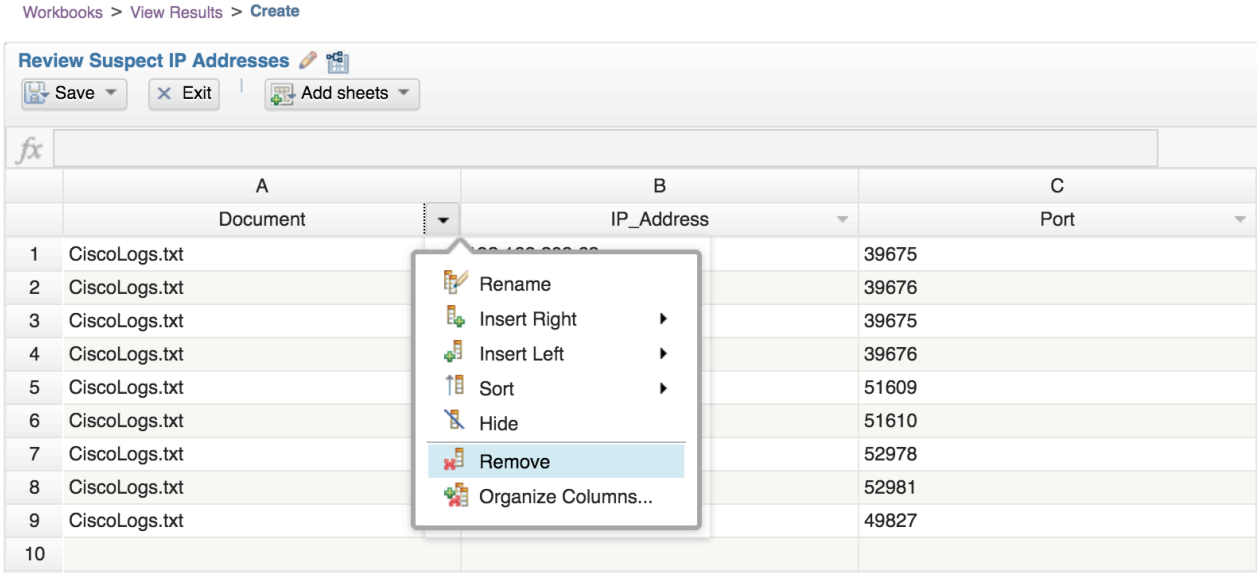



| | Document | IP_Address | Port |
|---|---|---|---|
| 1 | CiscoLogs.txt | 192.168.208.63 | 39675 |
| 2 | CiscoLogs.txt | 192.168.208.63 | 39676 |
| 3 | CiscoLogs.txt | 192.168.208.63 | 39675 |
| 4 | CiscoLogs.txt | 192.168.208.63 | 39676 |
| 5 | CiscoLogs.txt | 192.168.208.63 | 51609 |
| 6 | CiscoLogs.txt | 192.168.208.63 | 51610 |
| 7 | CiscoLogs.txt | 192.168.208.63 | 52978 |
| 8 | CiscoLogs.txt | 192.168.208.63 | 52981 |
| 9 | CiscoLogs.txt | 192.168.208.63 | 49827 |

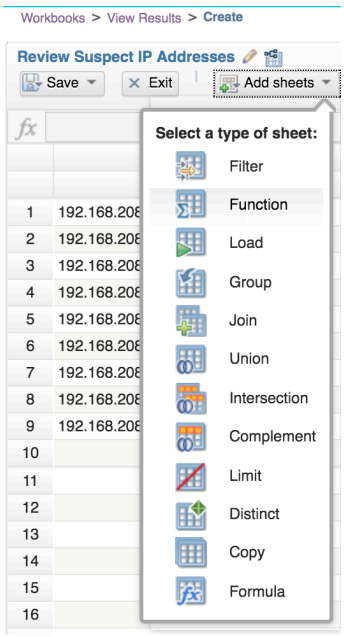
- Edit name



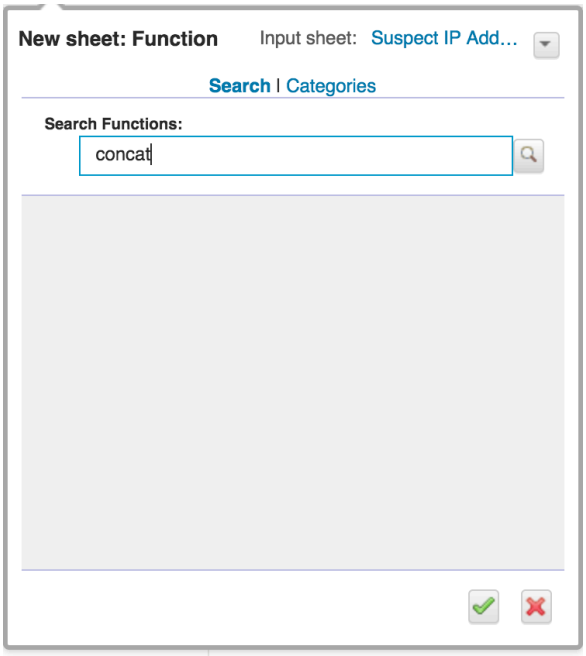

- Click on Document column menu and Remove it



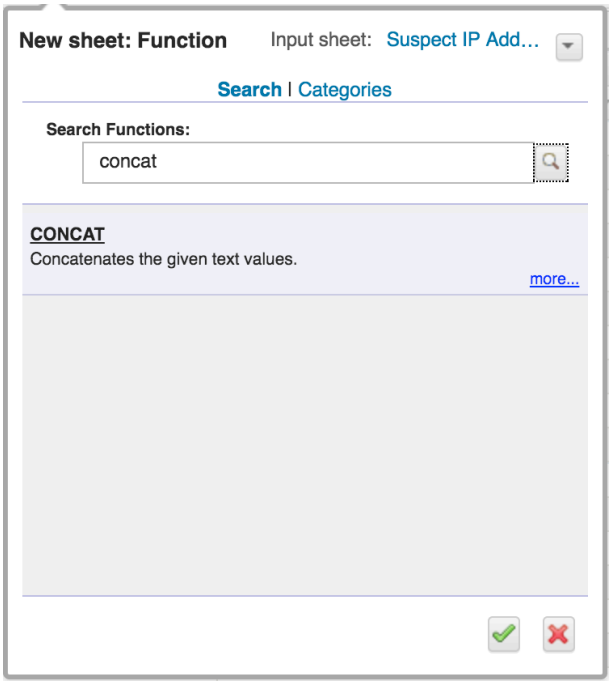

- Click on Add sheet > Function



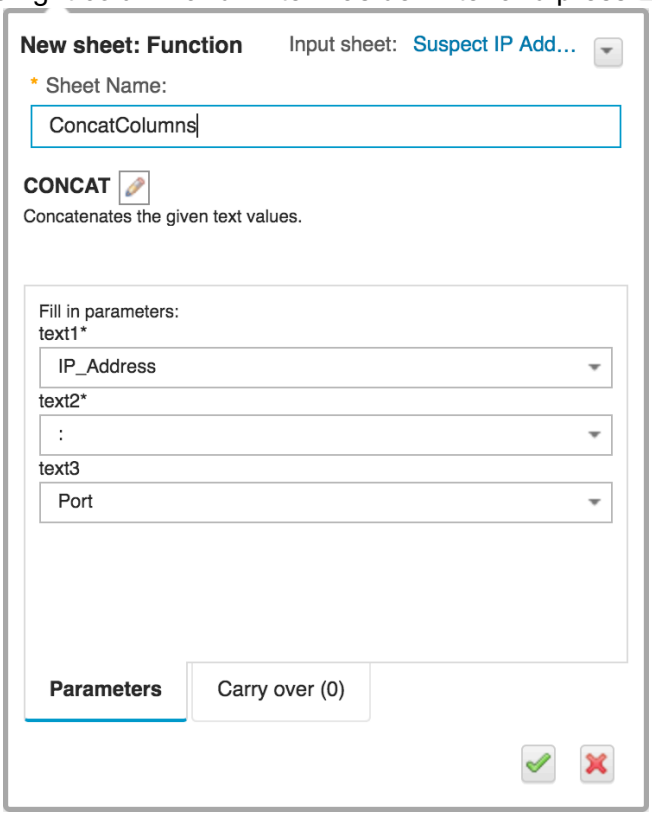

- Search concat function



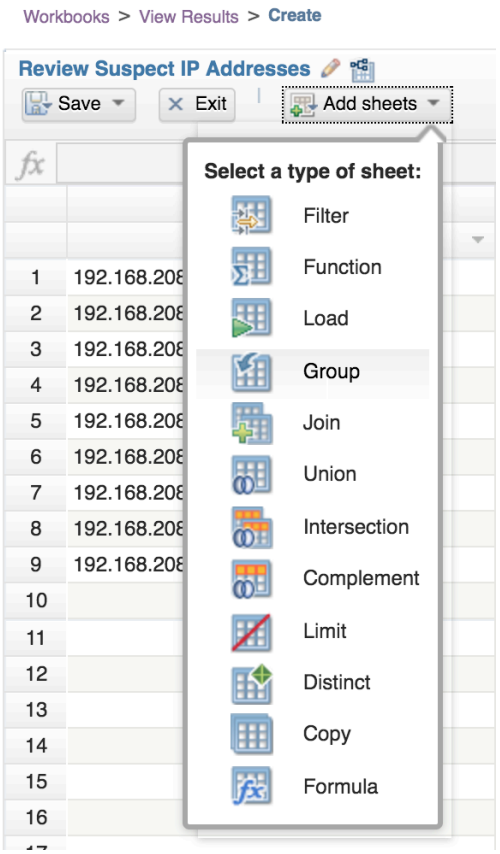

- Click on Concat function



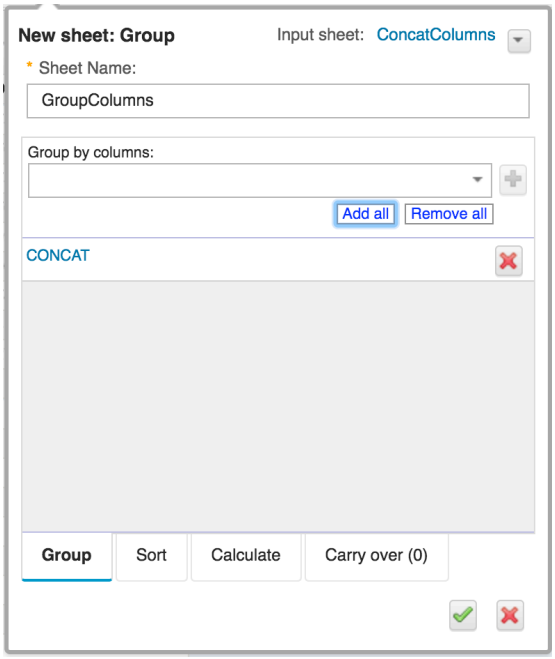

- Set name and select the right column and write ':' as delimiter and press 



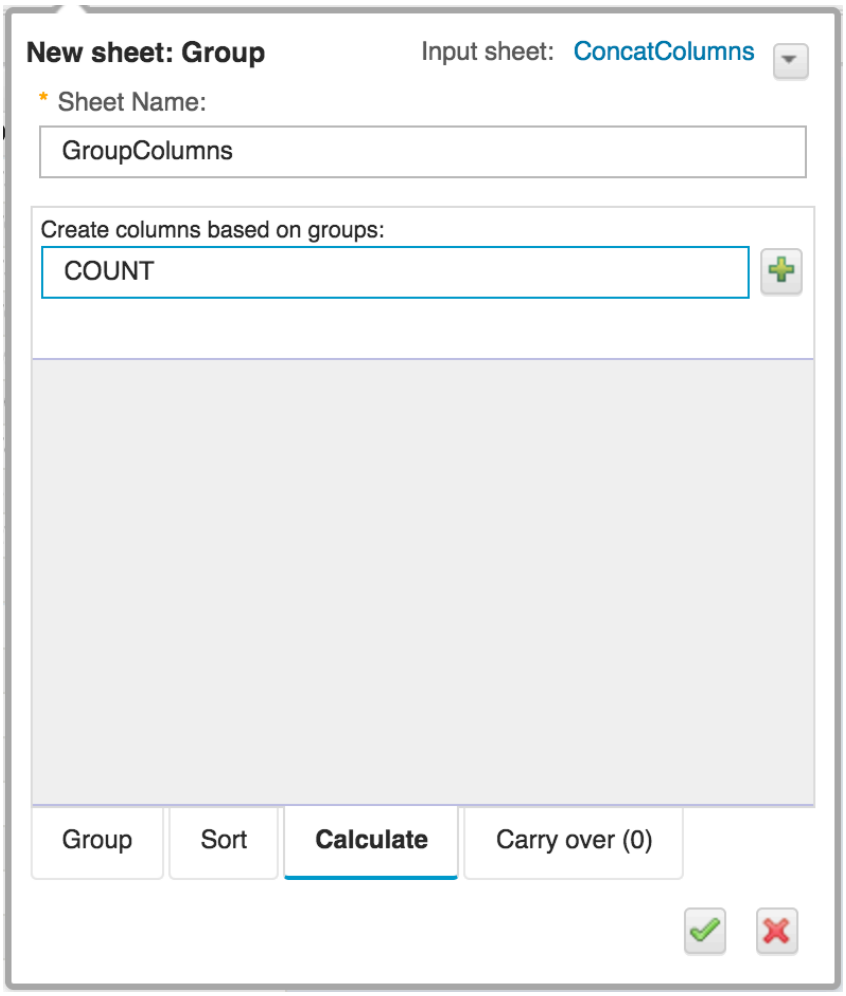

- Click on Add sheet > Group



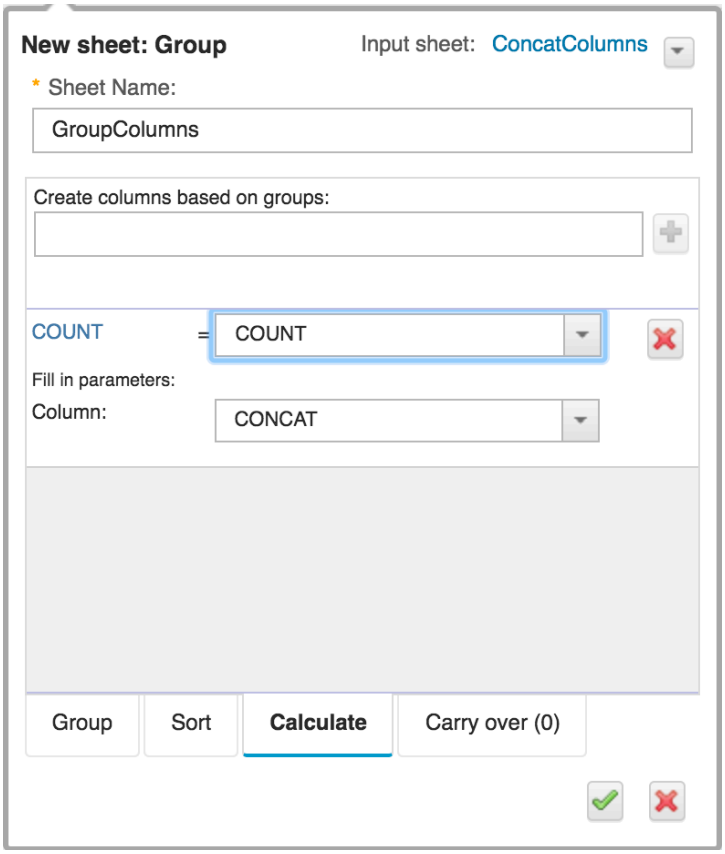

- Set name and click on Add all



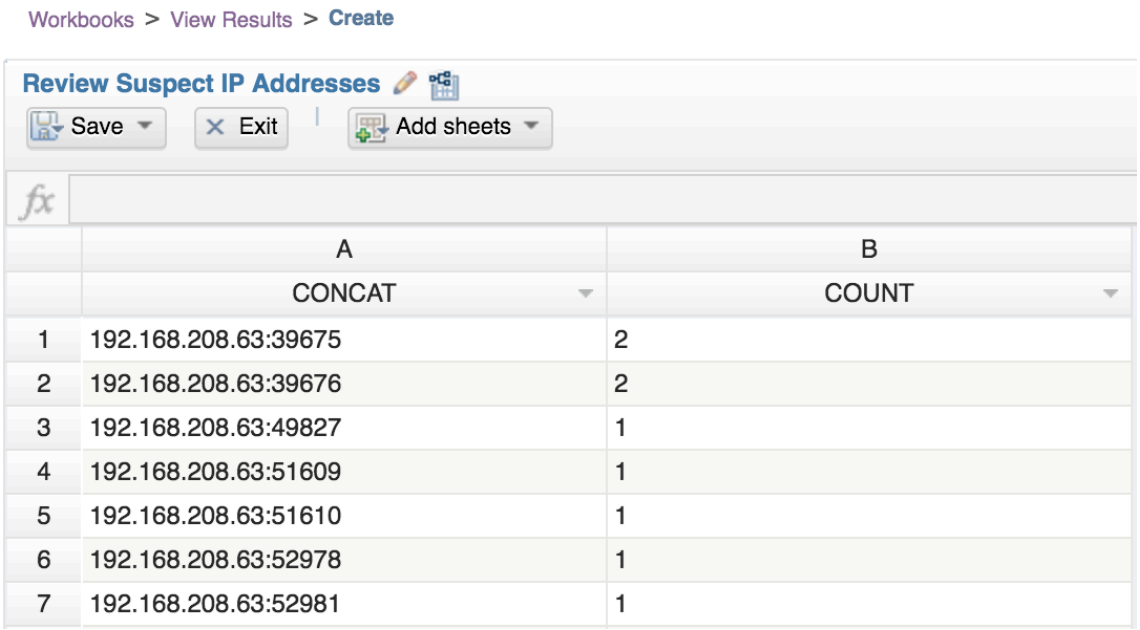

- Click on Calculate tab and set COUNT column name a press '+'




- Select COUNT operation and select CONCAT column

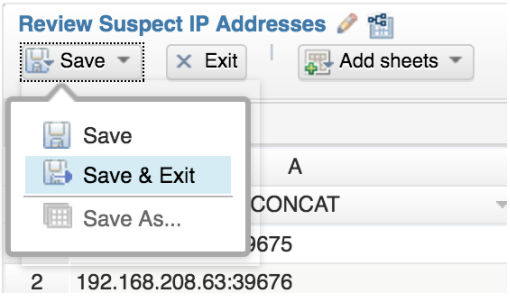



- Press 
- Review the results

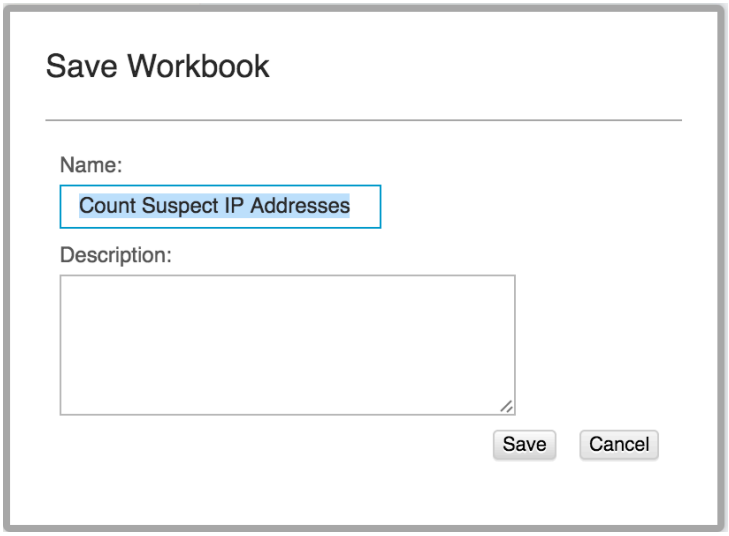



| | A | B |
|---|---|---|
| | CONCAT | COUNT |
| 1 | 192.168.208.63:39675 | 2 |
| 2 | 192.168.208.63:39676 | 2 |
| 3 | 192.168.208.63:49827 | 1 |
| 4 | 192.168.208.63:51609 | 1 |
| 5 | 192.168.208.63:51610 | 1 |
| 6 | 192.168.208.63:52978 | 1 |
| 7 | 192.168.208.63:52981 | 1 |

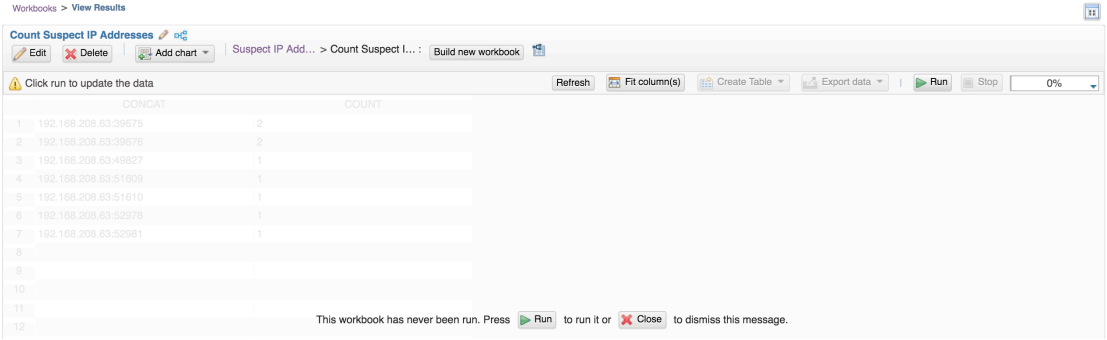
- Save & Exit



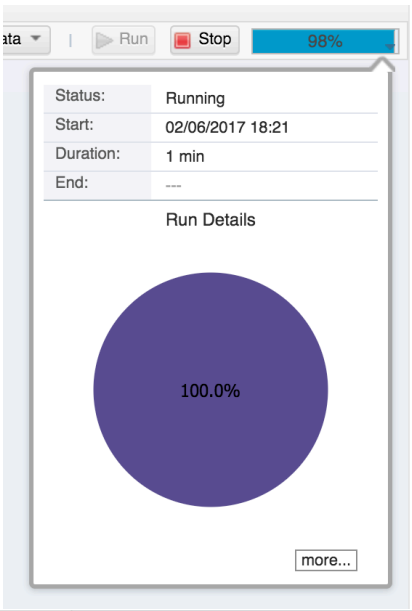

- Set name

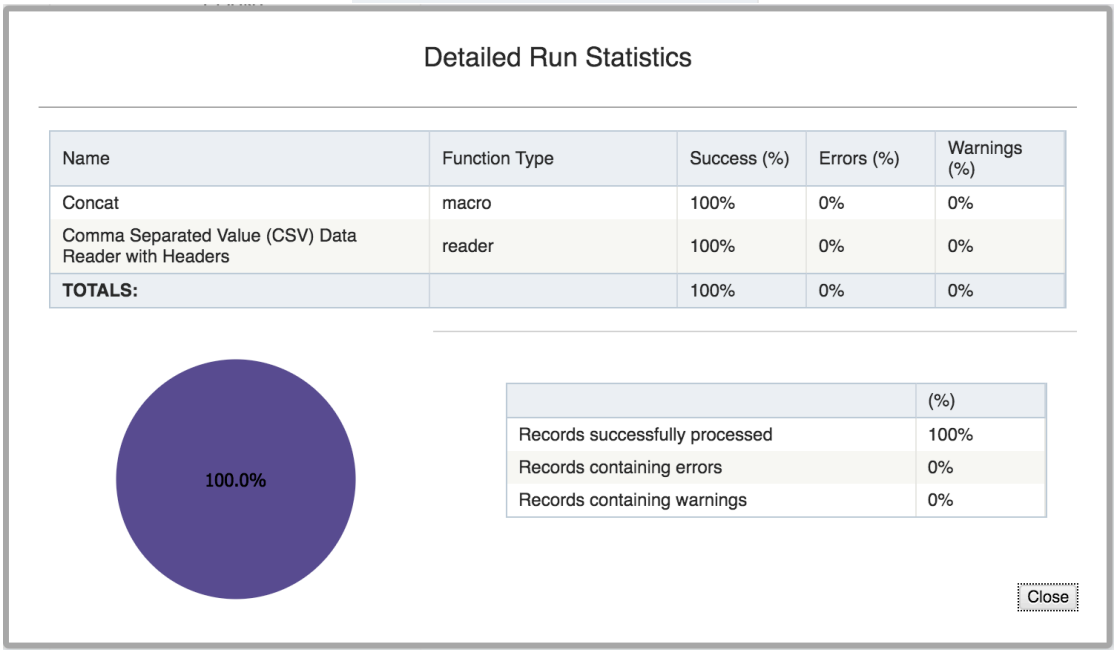



- Press Run (this will run your flow over the data)

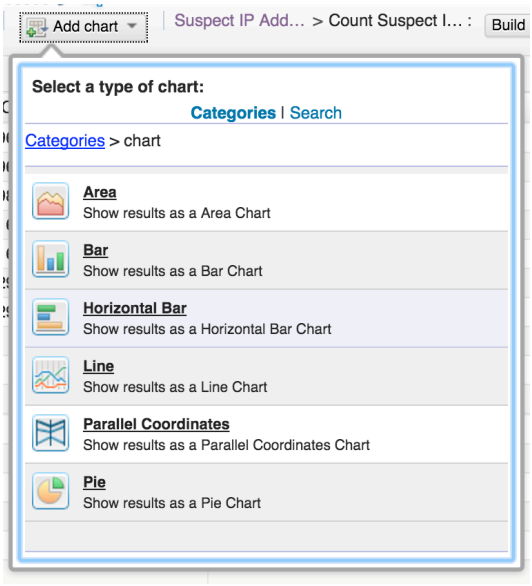



- If you press over the progress bar, you will see the statistics. You can press on More link to review the process

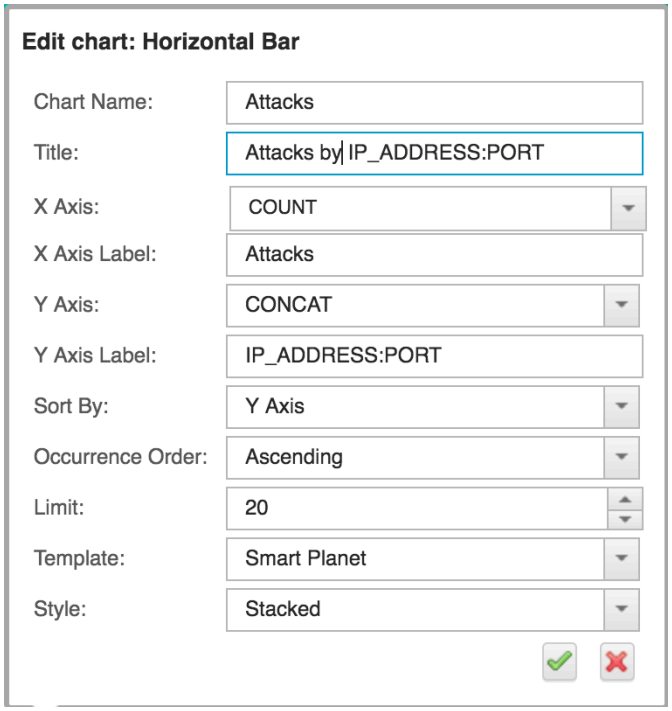



- Press Add chart and select Horizontal Bar

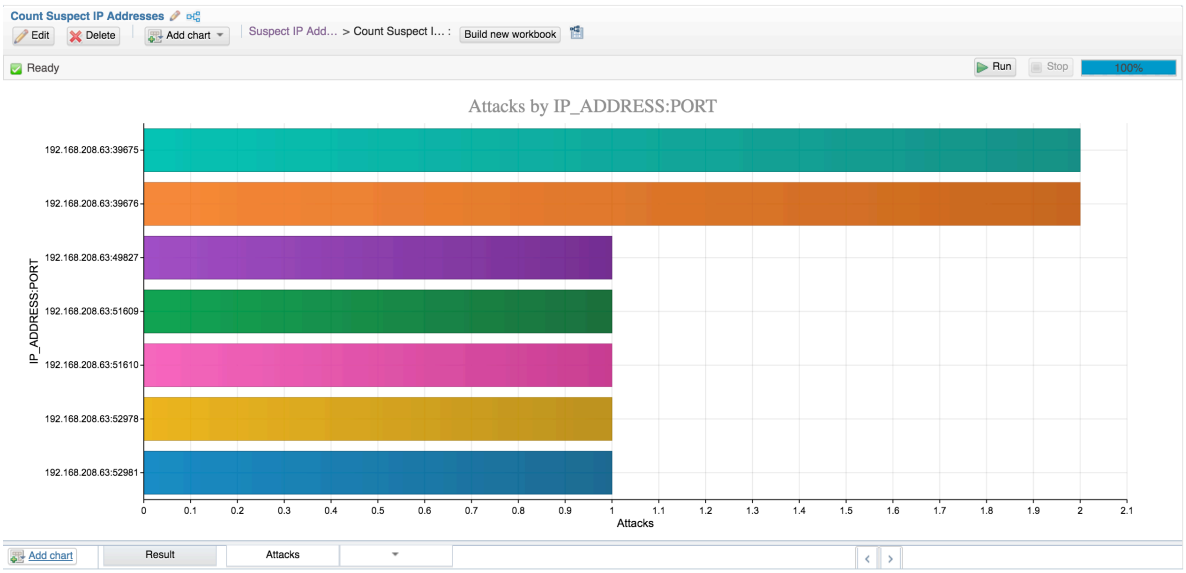



- Set the values and press 

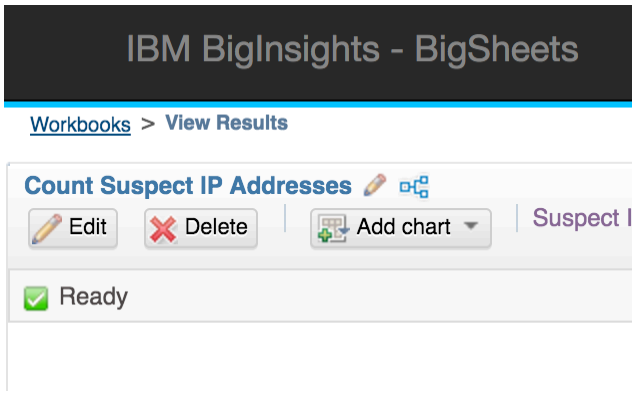



- Press Run

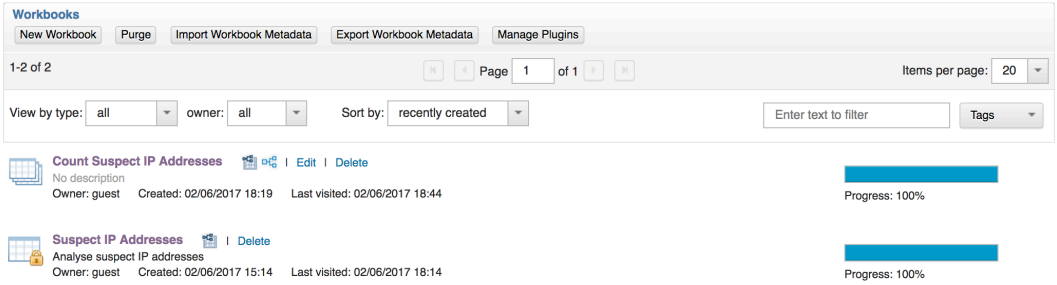

- Review results




- Click on Workbooks link




- Check that you have store your workbooks




- If you press on  you can review the hierarchy of the workbooks and review you developed work