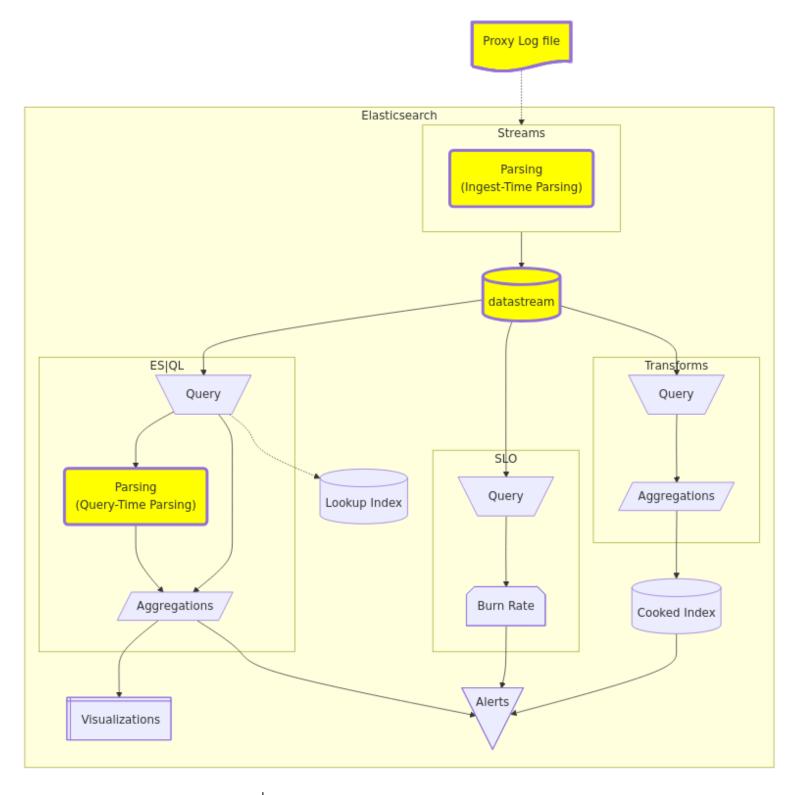


Observability 100: A Modern Logging Workflow

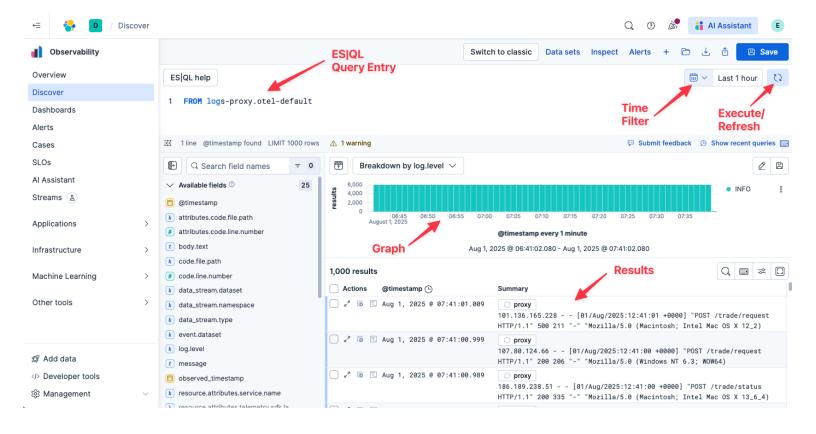
We've gotten word from our customer service department that some users are receiving an error when trying to use our web-based application. We will use this workshop to showcase Elastic's state-of-the-art logging workflow to get to the root cause of these errors.

Ingest vs. query-time parsing

Throughout this workshop, we will be pivoting back and forth between query-time parsing using ES|QL and ingest-time parsing using Streams. ES|QL lets us quickly test theories and look for possible tells in our log data. Once we've determined value in parsing our logs using ES|QL at query-time, we can shift that parsing to ingest-time using Streams. As we will see in this lab, ingest-time parsing allows for more advanced and complex workflows. Moving parsing to ingest-time also facilitates faster search results. Regardless of where the parsing is done, we will leverage ES|QL to perform aggregations, analysis, and visualization.

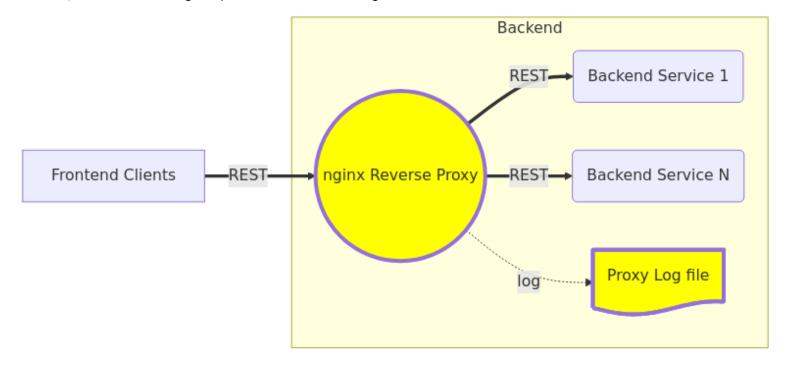


This workshop will heavily leverage ES|QL, Elastic's query-time language, to analyze our nginx reverse proxy logs. You can enter your queries in the pane at the top of the Elasticsearch tab. You can change the time window of your search using the Time Filter. To execute a search, click the Play/Refresh icon.



Getting started

We know that all of the REST API calls from our frontend web app flow through a nginx reverse proxy en route to our backend services; that seems like a good place to start our investigation.



Finding errors

Execute the following query:

FROM logs-proxy.otel-default

We can see that there are still transactions occurring, but we don't know if they are successful or failing. Before we spend time parsing our logs, let's just quickly search for common HTTP "500" errors in our nginx logs.

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE body.text LIKE "* 500 *" // look for messages containing " 500 " in the body
```

If we didn't find any 500 errors, we could of course add additional LIKE criteria to our WHERE clause, like WHERE body.text LIKE "* 500 *" OR body.text LIKE "* 404 *". We will do a better job of implicitly handling more types of errors once we start parsing our logs. For now, though, we got lucky: indeed, we are clearly returning 500 errors for some users.

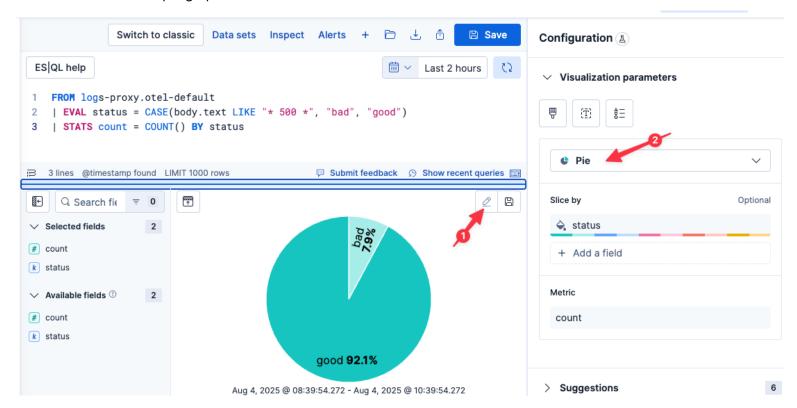
Are the errors affecting all requests?

The next thing we quickly want to understand is what percentage of requests to our backend services are resulting in 500 errors?

Execute the following query:

```
FROM logs-proxy.otel-default
| EVAL status = CASE(body.text LIKE "* 500 *", "bad", "good") // label messages containing " 500 " as "bad", else "good"
| STATS count = COUNT() BY status // count good and bad
```

Let's visualize this as a pie graph to make it a little easier to understand.



- 1. Click on the pencil icon to the right of the existing graph
- 2. Select Pie from the visualizations drop-down menu
- 3. Click Apply and close

This error appears to only be affecting a percentage of our overall requests. We don't yet have the tools to break this down by customer or client, but we will in a future exercise.

Are the errors still occurring?

Let's confirm that we are still seeing a mix of 500 and 200 errors (e.g., the problem wasn't transitory and somehow fixed itself).

Execute the following query:

```
FROM logs-proxy.otel-default
| EVAL status = CASE(body.text LIKE "* 500 *", "bad", "good") // label messages containing " 500 " as "bad", else "good"
| STATS COUNT() BY minute = BUCKET(@timestamp, "1 min"), status
```

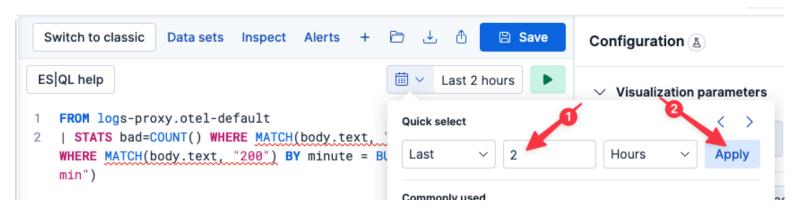
Then change the resulting graph to a bar graph over time:

- 1. Click on the pencil icon to the right of the existing graph
- 2. Select Bar from the visualizations drop-down menu
- 3. Click Apply and close

Indeed, we are still seeing a mix of 500 and 200 errors.

When did the errors start?

Let's see if we can find when the errors started occurring. Use the Time Filter to show the last 3 hours of data; this should automatically rerun the last query.



Ok, it looks like this issue first started happening roughly in the last 2 hours. We can use ES QL's CHANGE_POINT to narrow it down to a specific minute:

Execute the following query:

```
FROM logs-proxy.otel-default
| EVAL status = CASE(body.text LIKE "* 500 *", "bad", "good") // label messages containing " 500 " as "bad", else "good"
| STATS count = COUNT() BY minute = BUCKET(@timestamp, "1 min"), status
| CHANGE_POINT count ON minute AS type, pval // look for distribution change
| WHERE type IS NOT NULL
| KEEP type, minute
```

A-ha! Using CHANGE_POINT, we can say that these errors clearly started occurring 80 minutes ago.

Parsing logs with ES|QL

As you can see, simply searching for known error codes in our log lines will only get us so far. Maybe the error code isn't just 500, or maybe we want to analyze status code vs. request URL, for example.

Fortunately, nginx logs are semi-structured which makes them (relatively) easy to parse.

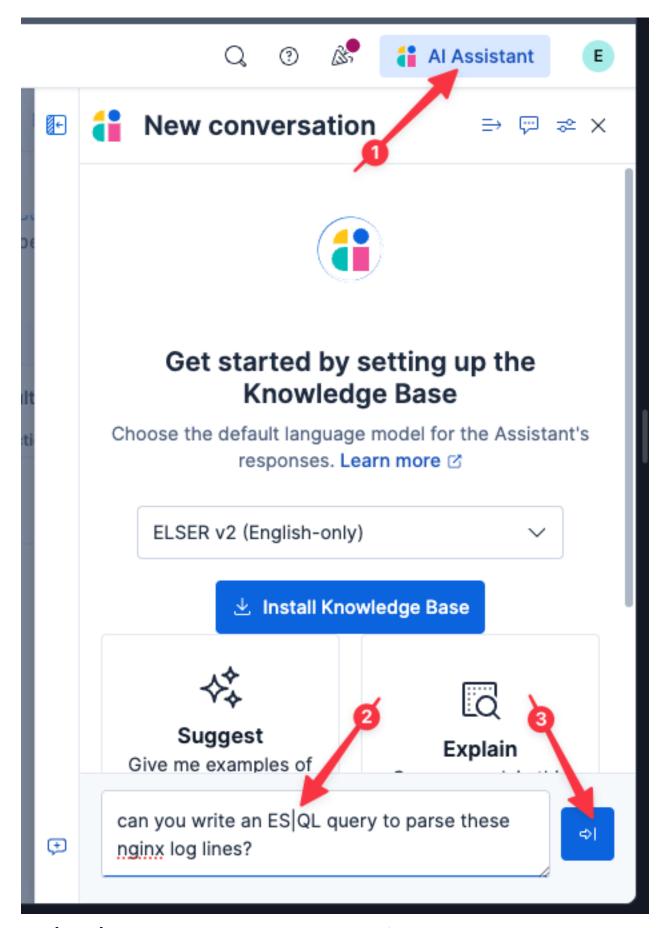
Some of you may already be familiar with grok expressions which provides a higher-level interface on top of regex; namely, grok allows you define patterns. If you are well versed in grok, you may be able to write a parsing pattern yourself for nginx logs, possibly using tools like Grok Debugger to help.

If you aren't well versed in grok expressions, or you don't want to spend the time to debug an expression yourself, you can leverage our Al Assistant to help!

- 1. Click on the Al Assistant button in the upper-right.
- 2. Enter the following prompt in the Send a message to the Assistant field at the bottom of the fly-out.

can you write an ES|QL query to parse these nginx log lines?

3. Click the execute button



[!NOTE] The output should look something like the following. Notably, the Al Assistant may generate slightly different field names on each generating. Because we rely on those field names in subsequent analysis, please close the flyout and copy and paste the following ES|QL expression into the ES|QL query entry box.

Is this affecting all backend APIs?

Let's make use of these parsed fields to break down status_code by request_path to see if this is affecting only a specific API, or several APIs?

Execute the following query:

```
FROM logs-proxy.otel-default
| GROK body.text "%{IPORHOST:client_ip} %{USER:ident} %{USER:auth} \\[%{HTTPDATE:timestamp}\\] \"%{WORD:http_method} %{NOTSPACE:request_partial black of the status_code IS NOT NULL | STATS COUNT() BY status_code, request_path
```

Ok, it seems these errors are affecting all of the APIs (2) exposed by our simple backend.

[!NOTE] You may notice that our search has gotten a little slower when we added query-time grok parsing. This is because Elasticsearch is now applying our grok pattern to *every* log line in the selected time window. In our next challenge, we will show you how we can retain fast-search over long time windows WITH parsing using ingest-time parsing!

Is this affecting all User Agents?

Our nginx access logs also include a User Agent field, which is a semi-structured field containing some information about the requesting browser. Ideally, we could also cross-reference the errors against this field to understand if it is affecting all browsers, or only some types of browsers.

Execute the following query:

```
FROM logs-proxy.otel-default
| GROK body.text "%{IPORHOST:client_ip} %{USER:ident} %{USER:auth} \\[%{HTTPDATE:timestamp}\\] \"%{WORD:http_method} %{NOTSPACE:request_partitions} | WHERE status_code IS NOT NULL
| WHERE TO_INT(status_code) == 500
| STATS bad = COUNT() BY user_agent
```

Unfortunately, the unparsed user_agent field is too unstructured to really be useful for this kind of analysis. We could try to write a grok expression to further parse user_agent, but in practice, it is too complicated (it requires translations and lookups in addition to parsing). Let's put a pin in this topic and revisit it in a bit when we have more tools at our disposal.

Making use of our parsed fields

Let's redraw the time graph we drew before, but this time using status_code instead of looking for specific error codes.

Execute the following query:

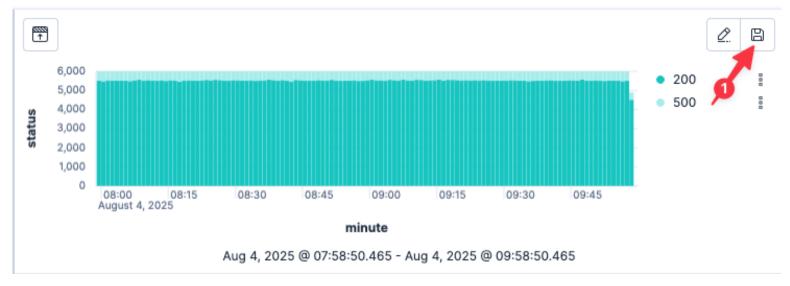
```
FROM logs-proxy.otel-default
| GROK body.text "%{IPORHOST:client_ip} %{USER:ident} %{USER:auth} \\[%{HTTPDATE:timestamp}\\] \"%{WORD:http_method} %{NOTSPACE:request_pathere status_code IS NOT NULL
| EVAL @timestamp = DATE_PARSE("dd/MMM/yyyy:HH:mm:ss Z", timestamp)
| STATS status_count = COUNT() BY status_code, minute = BUCKET(@timestamp, "1 min")
```

[!NOTE] If the resulting graph does not default to a bar graph plotted over time, click on the Pencil icon in the upper-right of the graph and change the graph type to Bar

Now that we are graphing by status_code, we know definitively that we returning only 200 and 500 status codes.

Saving our visualization to a dashboard

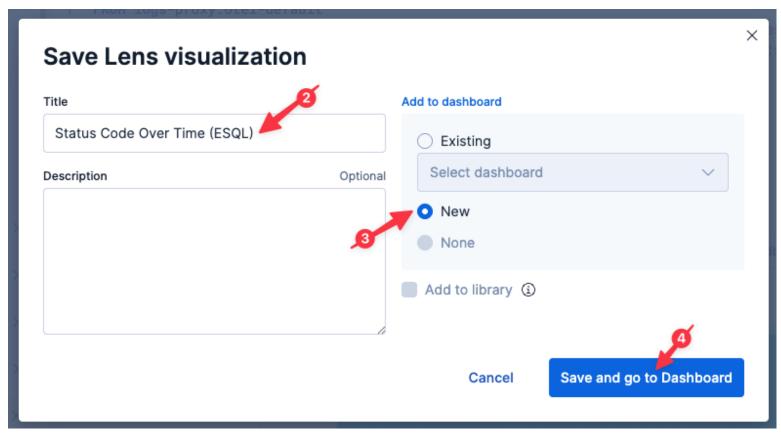
Let's save this graph to a dashboard for future use.



- 1. Click on the Disk icon in the upper-left of the resulting graph
- 2. Name the visualization

Status Code Over Time (ESQL)

- 3. Select New under Add to dashboard
- 4. Click Save and go to Dashboard



You will be taken to a new dashboard. Let's save it for future reference.

- 1. Click the Save button in the upper-right
- 2. Enter the title of the new dashboard as

Ingress Proxy

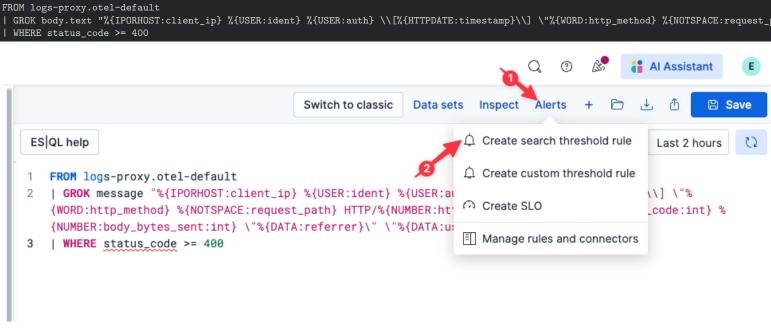
3. Click Save

Setting up a simple alert

Go back to Discover using the left-hand navigation pane.

Let's create a simple alert to notify us whenever a status_code >= 400 is received:

Execute the following query:



- 1. Click Alerts in the taskbar
- 2. Select Create search threshold rule
- 3. Click Test query
- 4. Leave the defaults and click Next
- 5. Click Next on Actions tab
- 6. Set Rule name to

status_code >= 400

7. Set Tags to

ingress

- 8. Click Create rule on Details tab
- 9. Click Save rule on the pop-up dialog

In practice, this alert is too simple. We probably are okay with a small percentage of non-200 errors for any large scale infrastructure. What we really want is to alert when we violate a SLO. We will revisit this topic in a bit.

Summary

Let's take stock of what we know:

- a percentage of requests are experiencing 500 errors
- the errors started occurring around 80 minutes ago
- the only error type seen is 500
- the errors occur over all APIs

And what we've done:

- Created a dashboard to monitor our ingress proxy
- Created graphs to monitor status codes over time
- Created a simple alert to let us know if we ever return non-200 error codes

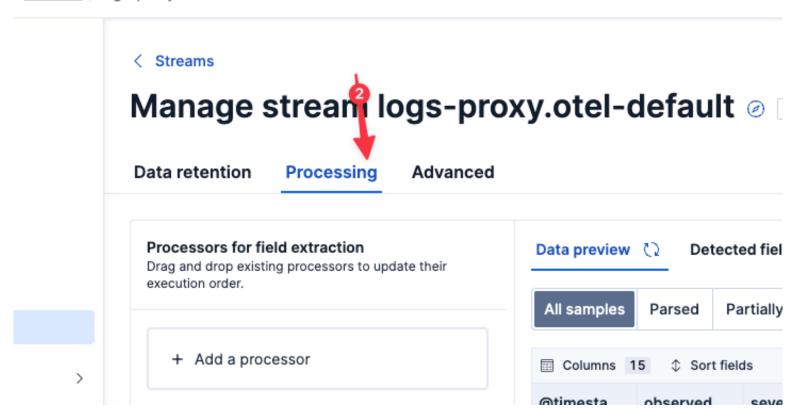
So far, we've been using ES|QL to parse our proxy logs at query-time. While incredibly powerful for quick analysis, we can do even more with our logs if we parse them at ingest-time.

Parsing with Streams

We will be working with Elastic Streams which makes it easy to setup log parsing pipelines.

- 1. Select logs-proxy.otel-default from the list of data streams (if you start typing, Elasticsearch will help you find it)
- 2. Select the Processing tab

Streams / logs-proxy.otel-default



Parsing the log message

We can parse our nginx log messages at ingest-time using the Elastic Grok processor.

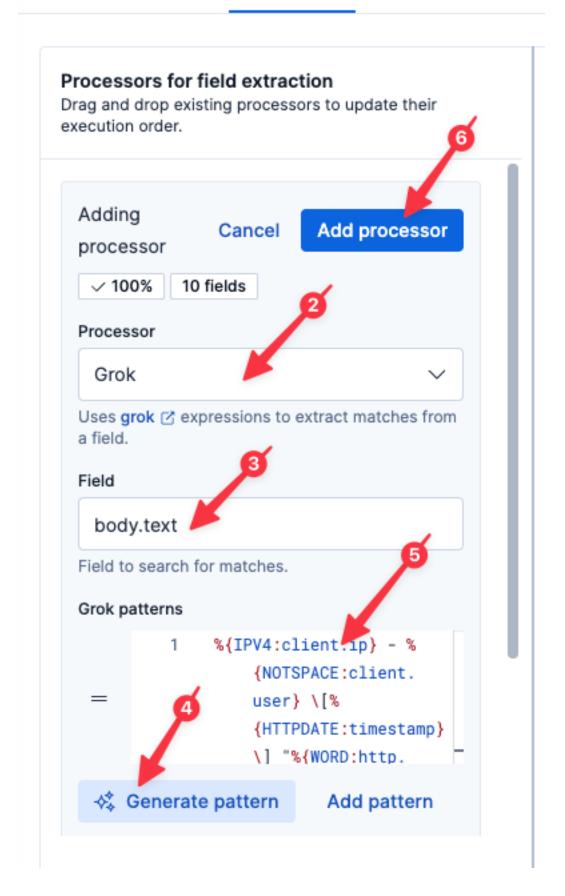
- 1. Click Add a processor
- 2. Select the Grok Processor (if not already selected)
- 3. Set the Field to

 ${\tt body.text}$

- 4. Click Generate pattern. Elasticsearch will analyze your log lines and try to determine a suitable grok pattern.
- 5. To ensure a consistent lab experience, copy the following grok expression and paste it into the Grok patterns field (rather than clicking on the Accept button)

 $\label{lem:limit} $$ \[\[\] - \[$

6. Click Add processor

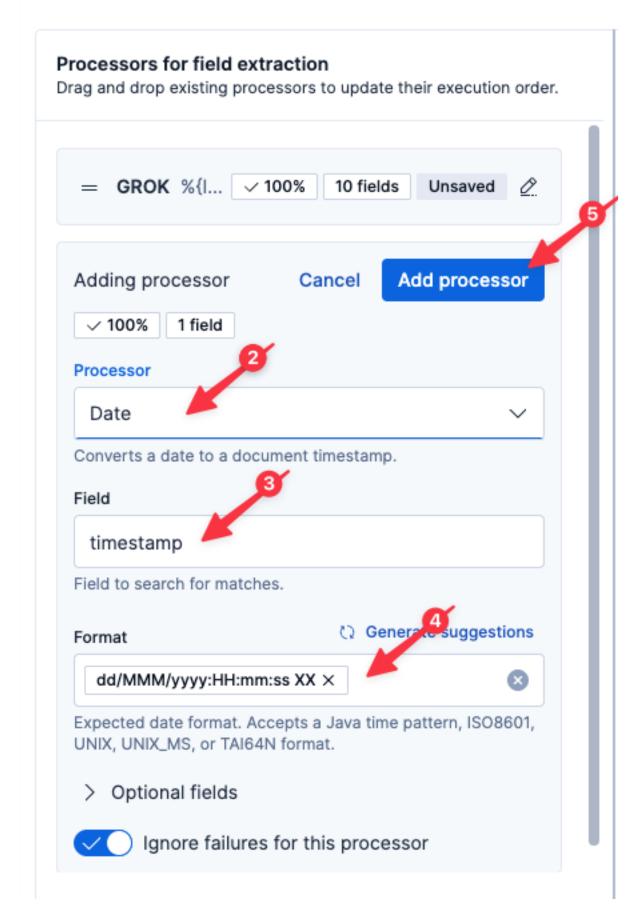


Parsing the timestamp

The nginx log line includes a timestamp; let's use that as our record timestamp.

1. Click Add a processor

- 2. Select Date
- Set Field to timestamp
 Elastic should auto-recognize the format: dd/MMM/yyyy:HH:mm:ss XX
 Click Add processor



A faster way to query

Now let's jump back to Discover by clicking Discover in the left-hand navigation pane.

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE http.response.status_code IS NOT NULL
| KEEP @timestamp, client.ip, http.request.method, http.request.url.path, http.response.status_code, user_agent.original
```

[!NOTE] If you get back 1,000 results but the resulting columns are empty, remove the Selected fields (by clicking the X next to each), and then add each Available field (by clicking the + next to each).

Let's redraw our status code graph using our newly parsed field:

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE http.response.status_code IS NOT NULL
| STATS COUNT() BY TO_STRING(http.response.status_code), minute = BUCKET(@timestamp, "1 min")
```

Note that this graph, unlike the one we drew before, currently shows only a few minutes of data. That is because it relies upon the fields we parsed in the Processing we just setup. Prior to that time, those fields didn't exist. Change the time field to Last 5 Minutes to zoom in on the newly parsed data.

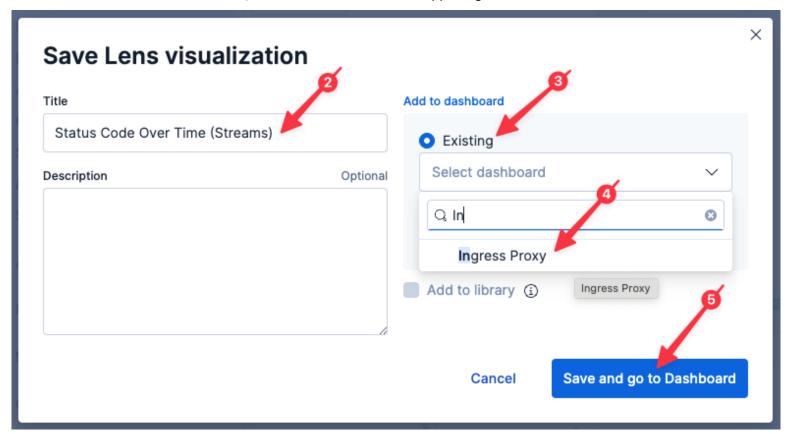
Saving our visualization to a dashboard

This is a useful graph! Let's save it to our dashboard for future use.

- 1. Click on the Disk icon in the upper-left of the resulting graph
- 2. Name the visualization

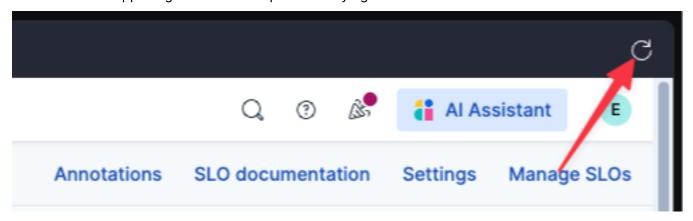
Status Code Over Time (Streams)

- 3. Select Existing under Add to dashboard
- 4. Select the existing dashboard Ingress Proxy (you will need to start typing Ingress in the Search dashboards... field)
- 5. Click Save and go to Dashboard
- 6. Once the dashboard has loaded, click the Save button in the upper-right



Creating a SLO

[!NOTE] Because we are moving quickly, Elasticsearch may take some time to update field lists in the UI. If you encounter a situation where Elasticsearch doesn't recognize one of the fields we just parsed, click the Refresh icon in the upper-right of the Instrugt tab and try again to create the SLO.



Remember that simple alert we created? Now that we are parsing these fields at ingest-time, we can create a proper SLO instead of a simple binary alert. With a SLO, we can allow for some percentage of errors over time (common in a complex system) before we get our support staff out of bed.

- 1. Click SLOs in the left-hand navigation pane
- 2. Click Create SLO
- 3. Select Custom Query (if not already selected)
- 4. Set Data view to logs-proxy.otel-default
- 5. Set Timestamp field to @timestamp (if not already selected)
- 6. Set Good query to

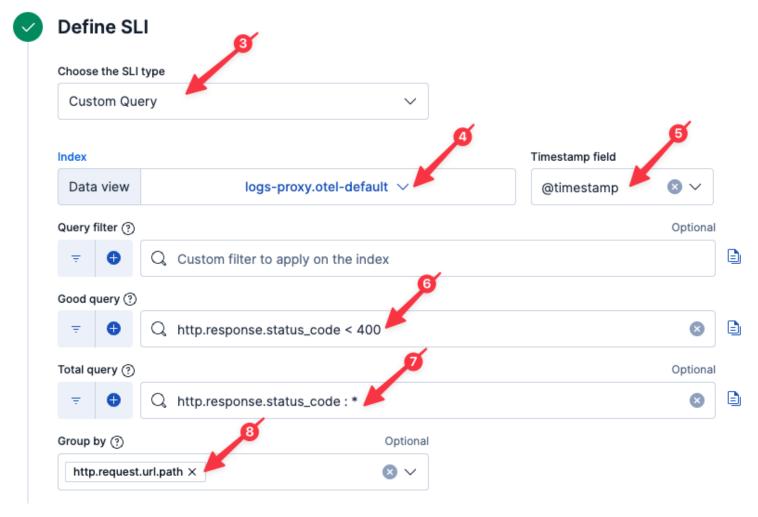
http.response.status_code < 400

7. Set Total query to

http.response.status_code : *

8. Set Group by to

http.request.url.path



9. Set SLO Name to

Ingress Status

10. Set Tags to

ingress

11. Click Create SLO



Alerting on a SLO

Now let's setup an alert that triggers when this SLO is breached.

- 1. Click on your newly created SLO Ingress Status
- 2. Under the Actions menu in the upper-right, select Manage burn rate rule

With burn rates, we can have Elastic dynamically adjust the escalation of a potential issue depending on how quickly it appears we will breach our SLO.

3. On the Details tab of the fly-out, set the Rule name to:

Ingress Status SLO

4. Set Tags to

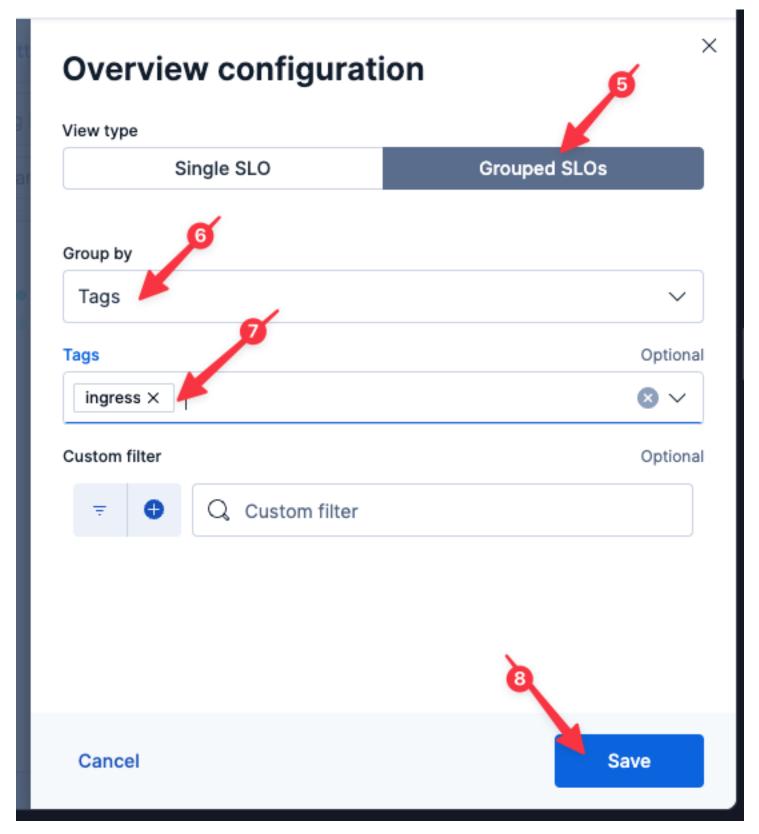
ingress

- 5. Click Save changes
- 6. Click Save rule on the pop-up dialog

Adding SLO monitors to our dashboard

Now let's add the SLO monitor to our dashboard to help us find it in the future.

- 1. Click Dashboards in the left-hand navigation pane
- 2. Open the Ingress Status dashboard (if not already open)
- 3. Click Add panel
- 4. Select SLO Overview
- 5. Select Grouped SLOs
- 6. Set Group by to Tags
- 7. Set Tags to ingress
- 8. Click Save



Note that we are dynamically adding SLOs by tag. Any additional SLOs tagged with ingress will also appear here.

Adding alerts to our dashboard

Let's also add our growing list of alerts to our dashboard.

- 1. Click Add panel
- 2. Select Alerts
- 3. Set Filter by to Rule tags
- 4. Set Rule tags to ingress
- 5. Click Save

Note that we are dynamically adding alerts by tag. Any additional alerts tagged with ingress will also appear here.

Now save the changes to our dashboard by clicking the Save button in the upper-right.

Summary

Let's take stock of what we know:

- a small percentage of requests are experiencing 500 errors
- the errors started occurring around 80 minutes ago
- the only error type seen is 500
- · the errors occur over all APIs

And what we've done:

- Created a dashboard to monitor our ingress proxy
- Created graphs to monitor status codes over time
- Created a simple alert to let us know if we ever return non-200 error codes
- Parsed the logs at ingest-time for quicker and more powerful analysis
- Create a SLO (with alert) to let us know if we ever return a significant number of non-200 error codes over time

We still don't know why some requests are failing. Now that we are parsing the logs, however, we have access to a lot more information.

Is this affecting every region?

Let's analyze our clients by client.ip to look for possibly geographic patterns.

Adding the GeoIP processor

We can add the Elastic GeoIP processor to geo-locate our clients based on their client IP address.

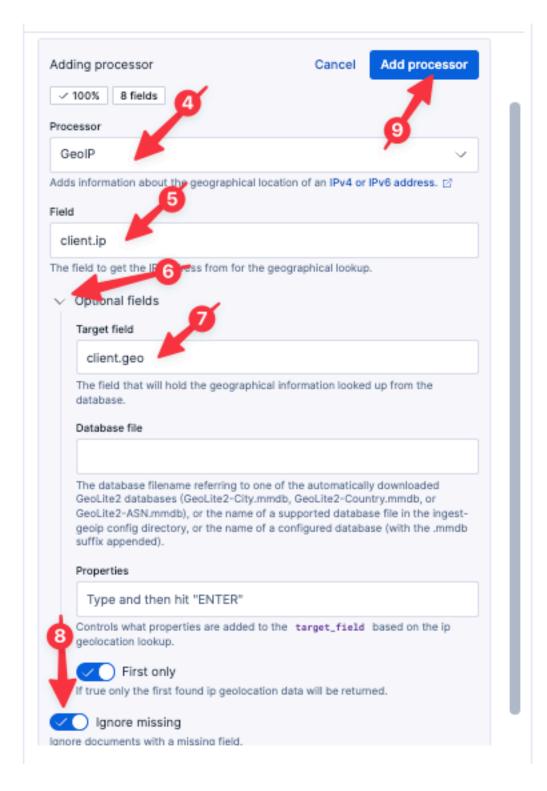
- 1. Select logs-proxy.otel-default from the list of Streams.
- 2. Select the Processing tab
- 3. Click Add a processor
- 4. Select the GeoIP Processor
- 5. Set the Field to

client.ip

- 6. Open Optional fields
- 7. Set Target field to

client.geo

- 8. Set Ignore missing to true
- 9. Click Add processor
- 10. Click Save changes in the bottom-right



Analyzing with Discover

Jump back to Discover by clicking Discover in the left-hand navigation pane.

Adjust the time field to show the last 3 hours of data.

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE client.geo.country_iso_code IS NOT NULL AND http.response.status_code IS NOT NULL
| STATS COUNT() BY http.response.status_code, client.geo.country_iso_code
| SORT http.response.status_code DESC
```

Let's make this a pie chart to allow for more intuitive visualization.

- 1. Click the pencil icon to the right of the graph
- 2. Select Pie from the dropdown menu
- 3. Click Apply and close

Wow! It looks like all of our 500 errors are occurring in the TH (Thailand) region. That is really interesting; without more information, we might be tempted to stop our RCA analysis here. However, there is often more to the story, as we will see.

Saving our visualization to a dashboard

In the meantime, this is a useful graph! Let's save it to our dashboard for future use.

- 1. Click on the Disk icon in the upper-left of the resulting graph
- 2. Name the visualization

Status by Region

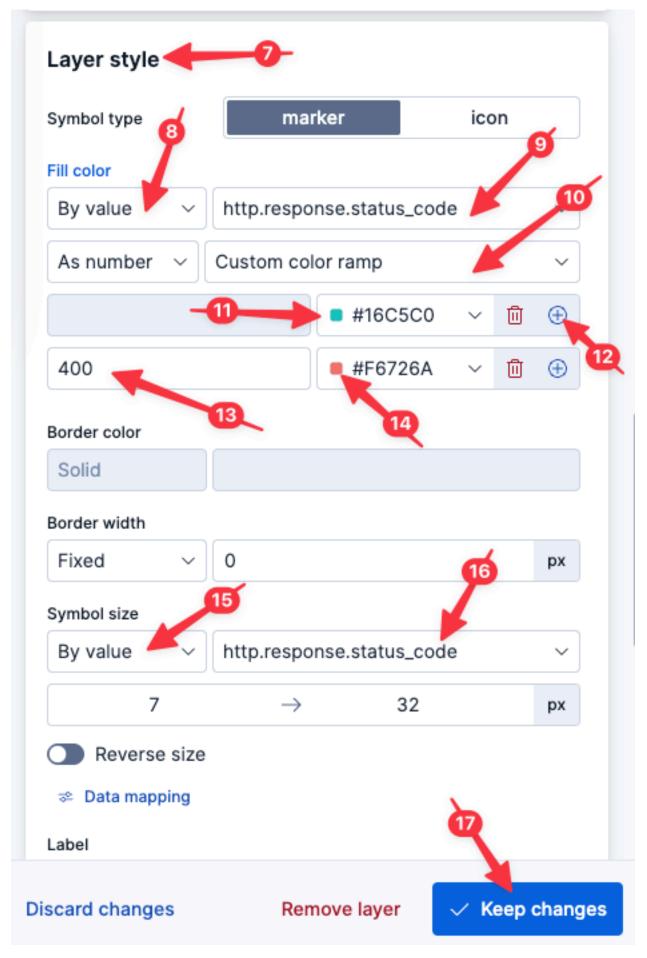
- 3. Select Existing under Add to dashboard
- 4. Select the existing dashboard Ingress Proxy (you will need to start typing Ingress in the Search dashboards... field)
- 5. Click Save and go to Dashboard
- 6. Once the dashboard has loaded, click the Save button in the upper-right

Visualizing with Maps

[!NOTE] Because we are moving quickly, Elasticsearch may take some time to update field lists in the UI. If you encounter a situation where Elasticsearch doesn't recognize one of the fields we just parsed, click the Refresh icon in the upper-right of the Instrugt tab and try again to create the Map.

Sometimes it is helpful to visualize client geography on a map. Fortunately, Elastic has a built-in Map visualization we can readily use!

- 1. Go to Other tools > Maps using the left-hand navigation pane
- 2. Click Add layer
- 3. Select Documents
- 4. Select Data view to logs-proxy.otel-default
- 5. Set Geospatial field to client.geo.location (if this field isn't available, refresh the Instruct virtual browser tab)
- 6. Click Add and continue
- 7. Scroll down to Layer style
- 8. Set Fill color to By value
- 9. Set Select a field to http.response.status_code
- 10. Select Custom color ramp in the field next to As number
- 11. Select a greenish color for the first number row (if not already selected)
- 12. Click the + button to the right of the first number row
- 13. Enter 400 in the second number row
- 14. Select a reddish color for the 400 number row
- 15. Set Symbol Size to By value
- 16. Set Select a field to http.response.status_code
- 17. Click Keep changes



Feel free to scroll around the globe and note the intuitive visualization of client locations and status codes.

Saving our map to a dashboard

Let's add our map to our dashboard for future reference.

- 1. Click the Save button in the upper-right
- 2. Set Title to

Status Code by Location

- 3. Select existing dashboard Ingress Status (you will need to start typing Ingress in the Search dashboards... field)
- 4. Click Save and go to dashboard

Now save the dashboard by clicking on the Save button in the upper-right.

Summary

Let's take stock of what we know:

- a small percentage of requests are experiencing 500 errors
- the errors started occurring around 80 minutes ago
- the only error type seen is 500
- · the errors occur over all APIs
- the errors occur only in the TH (Thailand) region

And what we've done:

- · Created a dashboard to monitor our ingress proxy
- · Created graphs to monitor status codes over time
- Created a simple alert to let us know if we ever return non-200 error codes
- Parsed the logs at ingest-time for quicker and more powerful analysis
- Create a SLO (with alert) to let us know if we ever return a significant number of non-200 error codes over time
- Created visualizations to help us visually locate clients and errors

We know that errors appear to be localized to a specific region. But maybe there is more to the story?

Is this affecting every type of browser?

Remember the User Agent string we tried to group by and failed using ES|QL? While nearly impossible to parse with a simple grok expression, we can easily parse the User Agent string using the Elastic User agent processor.

Adding the User Agent processor

- 1. Select logs-proxy.otel-default from the list of Streams.
- 2. Select the Processing tab
- 3. Select Add a processor
- 4. Select the User agent Processor
- 5. Set the Field to

user_agent.original

- 6. Set Ignore missing to true
- 7. Click Add processor



Drag and drop existing processors to update their execution order.

= DATE timestamp • dd/MMM/yyyy:HH:m...

= GEOIP

0

Adding processor

Cancel

Add processor

√ 100%

6 fields

Processor

User agent



The user_agent processor 2 extracts details from the user agent string a browser sends with its web requests. This processor adds this information by default under the user_agent field.

Field

user_agent.original

The field containing the user agent string.

> Optional fields



Ignore missing

Igare documents with a missing field.

Adding the Set processor

In addition to the fields produced by the User Agent processor, we also want a simplified combination of browser name and version. We can easily craft one using the Set processor.

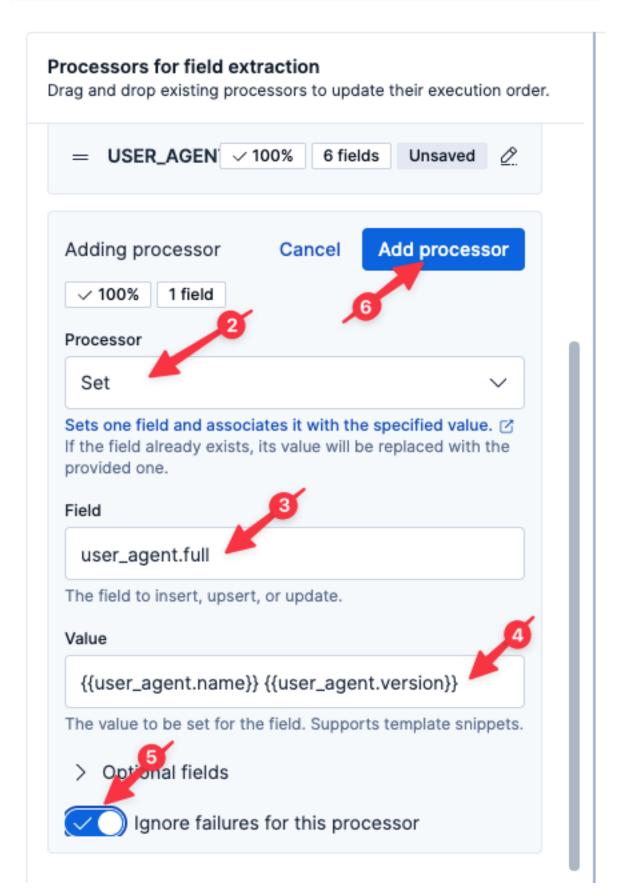
- 1. Click Add a processor
- 2. Select the Set Processor
- 3. Set Field to

user_agent.full

4. Set Value to

{{user_agent.name}} {{user_agent.version}}

- 5. Click Ignore failures for this processor
- 6. Click Add processor
- 7. Click Save changes in the bottom-right



This processor will add a new field user_agent.full to each document composed the user_agent.name and user_agent.version fields concatenated together.

Analyzing with Discover

Now let's jump back to Discover by clicking Discover in the left-hand navigation pane.

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE user_agent.full IS NOT NULL
| STATS good = COUNT(http.response.status_code < 400 OR NULL), bad = COUNT(http.response.status_code >= 400 OR NULL) BY user_agent.full
| SORT bad DESC
```

Ah-ha, there is more to the story! It appears our errors may be isolated to a specific browser version. Let's break this down by user_agent.version.

```
FROM logs-proxy.otel-default
| WHERE user_agent.full IS NOT NULL
| STATS good = COUNT(http.response.status_code < 400 OR NULL), bad = COUNT(http.response.status_code >= 400 OR NULL) BY user_agent.versic
| SORT bad DESC
```

Indeed, it appears we might have a problem with version 136 of the Chrome browser!

Correlating with region

So what's the correlation with the geographic area we previously identified as being associated with the errors we saw? Execute the following guery:

```
FROM logs-proxy.otel-default
| WHERE client.geo.country_iso_code IS NOT NULL AND user_agent.version IS NOT NULL AND http.response.status_code IS NOT NULL
| EVAL version_major = SUBSTRING(user_agent.version,0,LOCATE(user_agent.version, ".")-1)
| WHERE user_agent.name == "Chrome" AND TO_INT(version_major) == 136
| STATS COUNT() BY client.geo.country_iso_code
```

A-ha! It appears that this specific version of the Chrome browser (v136) has only been seen in the TH region! Quite possibly, Google has rolled out a specialized or canary version of their browser first in the TH region. That would explain why we saw errors only in the TH region.

Congratulations! We found our problem! In the next challenge, we will setup a way to catch new User Agents in the future.

Summary

Let's take stock of what we know:

- a small percentage of requests are experiencing 500 errors
- the errors started occurring around 80 minutes ago
- the only error type seen is 500
- · the errors occur over all APIs
- the errors occur only in the TH region
- the errors occur only with browsers based on Chrome v136

And what we've done:

- Created a dashboard to monitor our ingress proxy
- Created graphs to monitor status codes over time
- Created a simple alert to let us know if we ever return non-200 error codes
- Parsed the logs at ingest-time for quicker and more powerful analysis
- Create a SLO (with alert) to let us know if we ever return a significant number of non-200 error codes over time
- Created visualizations to help us visually locate clients and errors ____

Now that we know what happened, let's try to be sure this never happens again by building out more reporting and alerting.

Generating a breakdown of user agents

As long as we are parsing our User Agent string, let's build some visualizations of the makeup of our browser clients. We can accomplish this using our parsed User Agent string and ES|QL.

Breakdown by OS

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE user_agent.os.name IS NOT NULL
| STATS COUNT() by user_agent.os.name, user_agent.os.version
```

- 1. Click on the pencil icon to the right of the existing graph
- 2. Select Treemap from the visualizations drop-down menu
- 3. Click Apply and close

Saving our visualization to a dashboard

Let's save it to our dashboard for future use.

- 1. Click on the Disk icon in the upper-left of the resulting graph
- 2. Name the visualization

Client OSs

- 3. Select Existing under Add to dashboard
- 4. Select the existing dashboard Ingress Proxy (you will need to start typing Ingress in the Search dashboards... field)
- 5. Click Save and go to Dashboard
- 6. Once the dashboard has loaded, click the Save button in the upper-right

Breakdown by Browser

Let's also create a chart depicting the overall breakdown of browsers.

Jump back to Discover by clicking Discover in the left-hand navigation pane.

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE user_agent.name IS NOT NULL
| STATS COUNT() by user_agent.name
```

- 1. Click on the pencil icon to the right of the existing graph
- 2. Select Pie from the visualizations drop-down menu
- 3. Click Apply and close

Adding our visualization to a dashboard

Let's save it to our dashboard for future use.

- 1. Click on the Disk icon in the upper-left of the resulting graph
- 2. Name the visualization

Client Browsers

- 3. Select Existing under Add to dashboard
- 4. Select the existing dashboard Ingress Proxy (you will need to start typing Ingress in the Search dashboards... field)
- 5. Click Save and go to Dashboard
- 6. Once the dashboard has loaded, click the Save button in the upper-right

Generating a table of user agents

It would also be helpful is to keep track of new User Agents as they appear in the wild.

Jump back to Discover by clicking Discover in the left-hand navigation pane.

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE user_agent.full IS NOT NULL
| STATS @timestamp.min = MIN(@timestamp), @timestamp.max = MAX(@timestamp) BY user_agent.full
```

This is good, but it would also be helpful, based on our experience here, to know the first country that a given User Agent appeared in.

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE user_agent.full IS NOT NULL
| STATS @timestamp.min = MIN(@timestamp), @timestamp.max = MAX(@timestamp) BY user_agent.full, client.geo.country_iso_code
| SORT @timestamp.min ASC // sort first seen to last seen
| STATS first_country_iso_code = TOP(client.geo.country_iso_code , 1, "asc"), first_seen = MIN(@timestamp.min), last_seen = MAX(@timestamp.min) | SORT user_agent.full, first_seen, last_seen, first_country_iso_code
```

Fabulous! Now we can see every User Agent we encounter, when we first encountered it, and in what region it was first seen.

Using LOOKUP JOIN to determine release date

Say you also wanted to know when a given User Agent was released to the wild by the developer?

We could try to maintain our own User Agent lookup table and use ES|QL LOOKUP JOIN to match browser versions to release dates:

Execute the following query:

```
FROM ua_lookup
```

We built this table by hand; it is far from comprehensive. Now let's use LOOKUP JOIN to do a real-time lookup for each row:

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE user_agent.full IS NOT NULL
| EVAL user_agent name_and_vmajor = SUBSTRING(user_agent.full, 0, LOCATE(user_agent.full, ".")-1) // simplify user_agent
| STATS @timestamp.min = MIN(@timestamp), @timestamp.max = MAX(@timestamp) BY user_agent.name_and_vmajor, client.geo.country_iso_code
| SORT @timestamp.min ASC // sort first seen to last seen
| STATS first_country_iso_code = TOP(client.geo.country_iso_code , 1, "asc"), first_seen = MIN(@timestamp.min), last_seen = MAX(@timestamp)
| SORT user_agent.name_and_vmajor, first_seen, last_seen, first_country_iso_code
| LOOKUP JOIN ua_lookup ON user_agent.name_and_vmajor // lookup release_date from ua_lookup using user_agent.name_and_vmajor key
| KEEP release_date, user_agent.name_and_vmajor, first_country_iso_code, first_seen, last_seen
```

We can quickly see the problem with maintaining our own ua_lookup index. It would take a lot of work to truly track the release date of every Browser version in the wild.

Using COMPLETION to determine release date

Fortunately, Elastic makes it possible to leverage an external Large Language Model (LLM) as part of an ES|QL query using the COMPLETION command. In this case, we can pipe each browser to the LLM and ask it to return the release date.

Execute the following query:

```
FROM logs-proxy.otel-default
| WHERE user_agent.full IS NOT NULL
| STATS @timestamp.min = MIN(@timestamp), @timestamp.max = MAX(@timestamp) BY user_agent.full, client.geo.country_iso_code
| SORT @timestamp.min ASC // sort first seen to last seen
| STATS first_country_iso_code = TOP(client.geo.country_iso_code , 1, "asc"), first_seen = MIN(@timestamp.min), last_seen = MAX(@timestam | SORT first_seen DESC
| LIMIT 10 // intentionally limit to top 10 first_seen to limit LLM completions
| EVAL prompt = CONCAT(
    "when did this version of this browser come out? output only a version of the format mm/dd/yyyy",
    "browser: ", user_agent.full
) | COMPLETION release_date = prompt WITH openai_completion // call out to LLM for each record
| EVAL release_date = DATE_PARSE("MM/dd/YYYY", release_date)
| KEEP release_date, first_country_iso_code, user_agent.full, first_seen, last_seen
```

[!NOTE] If this encounters a timeout, try executing the query again.

You'll note that we are limiting our results to only the top 10 last seen User Agents. This is intentional to limit the number of COMPLETION commands executed, as each one will result in a call to our configured external Large Language Model (LLM). Notably, the use of the COMPLETION command is in Tech Preview; future revisions of ES|QL may include a means to more practically scale the use of the COMPLETION command.

Let's save this search for future reference:

- 1. Click the Save button in the upper-right
- 2. Set Title to

ua_release_dates

3. Click Save

Saving an ES|QL query allows others on our team to easily re-run it on demand. By saving the query, we can also add it to our dashboard!

Adding our table to a dashboard

- 1. Click Dashboards in the left-hand navigation pane
- 2. Open the Ingress Status dashboard (if it isn't already open)
- 3. Click Add from library
- 4. Find and select ua_release_dates
- 5. Close the fly-out
- 6. Click Save to save the dashboard

Organizing our dashboard

As we are adding panels to our dashboard, we can group them into collapsible sections.

- 1. Click on Add panel
- 2. Select Collapsible Section
- 3. Click on the Pencil icon to the right of the name of the new collapsible section
- 4. Name the collapsible section

User Agent

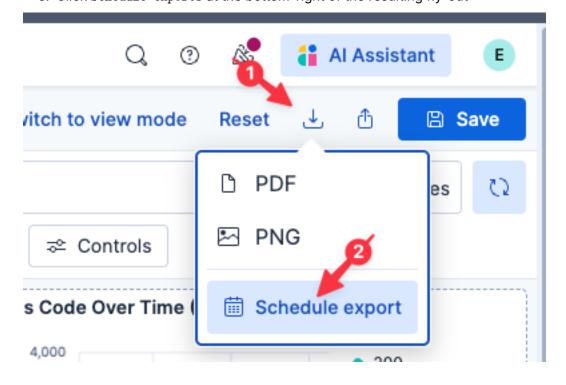
- 5. Click the green check box next to the name of the collapsible section
- 6. Open the collapsible section (if it isn't already) by clicking on the open/close arrow to the left of the collapsible section name
- 7. Drag the ua_release_dates table, the Client Browsers pie chart, and the Client OSs treemap into the body below the User Agent collapsible section
- 8. Click Save to save the dashboard

Feel free to create additional collapsible sections to group and organize other visualizations on our dashboard.

Scheduling a report

The CIO is concerned about us not testing new browsers sufficiently, and for some time wants a nightly report of our dashboard. No problem!

- 1. Click on Export icon
- 2. Select Schedule exports
- 3. Click Schedule exports at the bottom-right of the resulting fly-out



Alert when a new UA is seen

Ideally, we can send an alert whenever a new User Agent is seen. To do that, we need to keep state of what User Agents we've already seen. Fortunately, Elastic Transforms makes this easy!

Transforms run asynchronously in the background, querying data, aggregating it, and writing the results to a new index. In this case, we can use a Pivot transform to read from our parsed proxy logs and pivot based on user_agent.full. This will create a new index with one record per user_agent.full. We can then alert whenever a new record is added to this index, indicating a new User Agent!

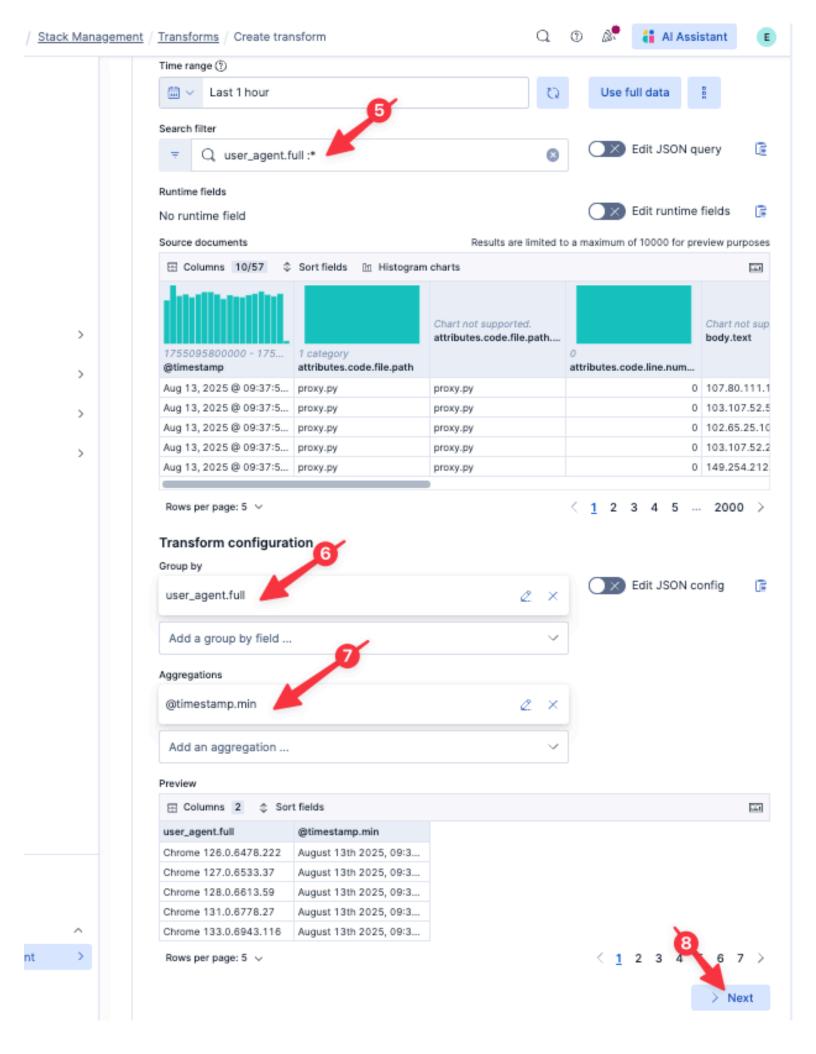
Creating a transform

[!NOTE] Because we are moving quickly, Elasticsearch may take some time to update field lists in the UI. If you encounter a situation where Elasticsearch doesn't recognize one of the fields we just parsed, click the Refresh icon in the upper-right of the Instruct tab and try again to create the Transform.

- 1. Go to Management > Stack Management > Transforms using the left-hand navigation pane
- 2. Click Create your first transform
- 3. Select logs-proxy.otel-default
- 4. Select Pivot (if not already selected)
- 5. Set Search filter to

user_agent.full :*

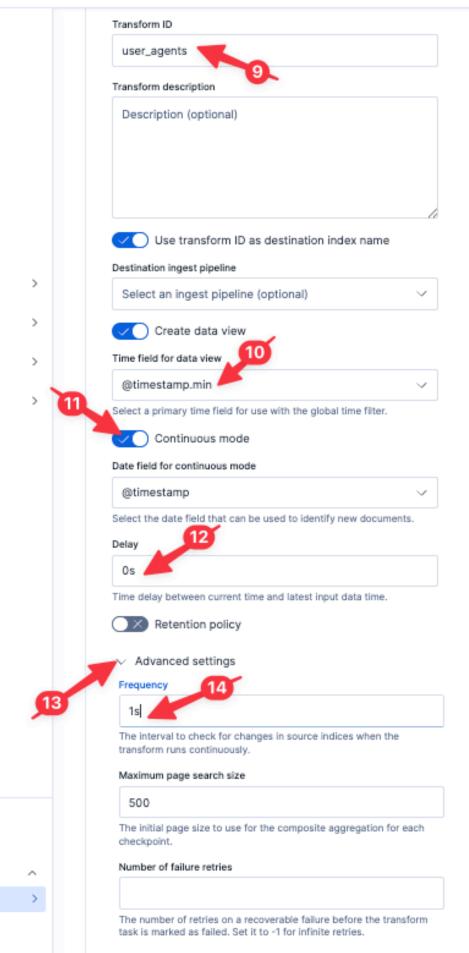
- Set Group by to terms(user_agent.full)
- 7. Add an aggregation for @timestamp.min
- 8. Click > Next



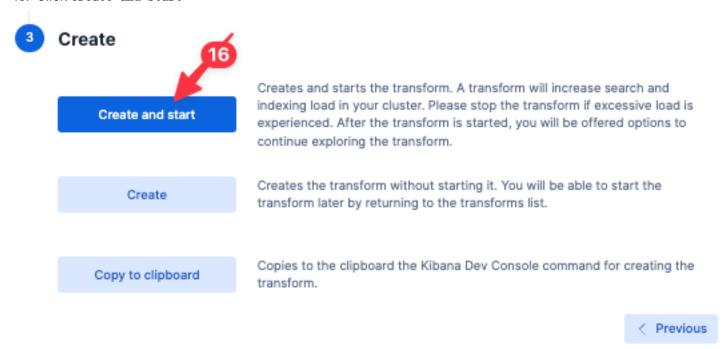
9. Set the $Transform\ ID\ to$

user_agents

- 10. Set Time field to @timestamp.min (if not already selected)
- 11. Set Continuous mode on
- 12. Set Delay under Continuous mode to Os
- 13. Open Advanced settings14. Set the Frequency to 1s under Advanced Settings15. Click Next







[!NOTE] We are intentionally choosing very aggressive settings here strictly for demonstration purposes (e.g., to quickly trigger an alert). In practice, you would use more a more practical frequency, for example.

Our transform is now running every second looking for new User Agents in the <code>logs-proxy.otel-default</code> datastream. It is smart enough to only look for new User Agents across log records which have arrived since the last run of the transform. When a new User Agent is seen, a corresponding record is written to the <code>user_agents</code> index.

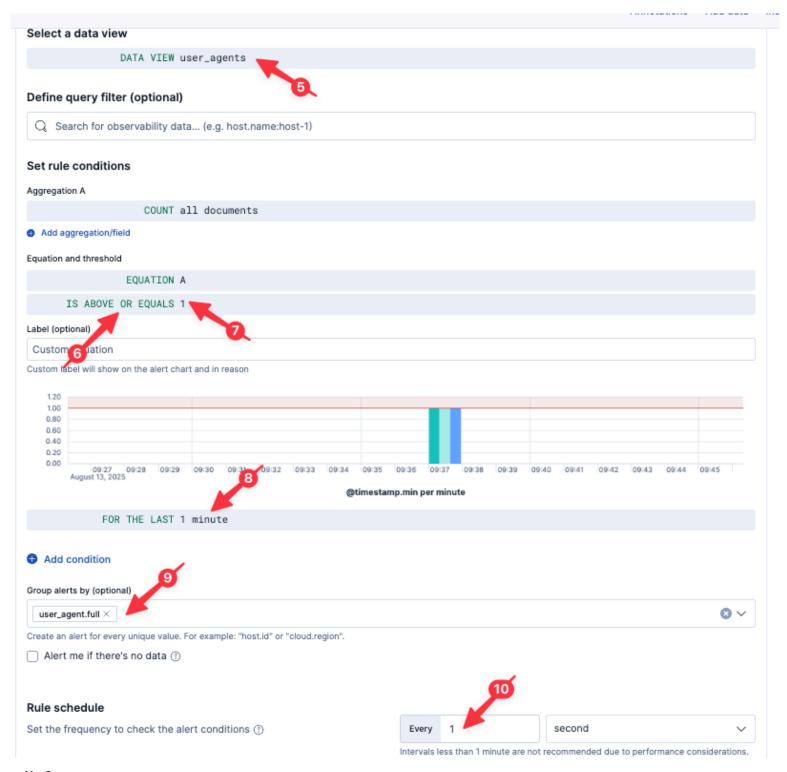
Creating an alert

Let's create a new alert which will fire whenever a new User Agent is seen. We specifically want to alert whenever a new record is written to the user_agents index, which in turn is maintained by the transform we just created.

- 1. Go to Alerts using the left-hand navigation pane
- 2. Click Manage Rules
- 3. Click Create Rule
- 4. Select Custom threshold
- 5. Set DATA VIEW to user_agents
- 6. Change IS ABOVE to IS ABOVE OR EQUALS
- 7. Set IS ABOVE OR EQUALS to 1
- 8. Set FOR THE LAST to 1 minute
- 9. Set Group alerts by (optional) to

user_agent.full

10. Set Rule schedule to 1 seconds



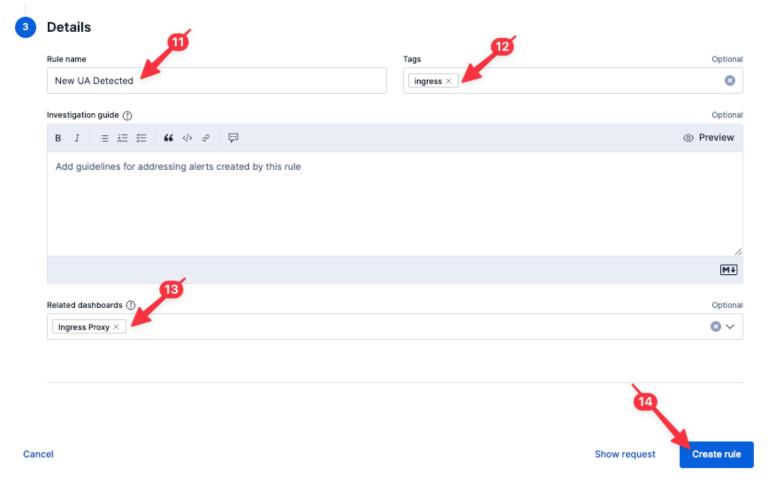
11. Set Rule name to

New UA Detected

12. Set Tags to

ingress

- 13. Set Related dashboards to Ingress Proxy
- 14. Click Create rule
- 15. Click Save rule in the resulting pop-up



[!NOTE] We are intentionally choosing very aggressive settings here strictly for demonstration purposes (e.g., to quickly trigger an alert). In practice, you would use more a more practical frequency, for example.

Testing our alert

- 1. Open the button label="Terminal" Instrugt tab
- 2. Run the following command:

curl -X POST http://kubernetes-vm:32003/err/browser/chrome

This will create a new Chrome UA v137. Let's go to our dashboard and see if we can spot it.

- 1. Open the button label="Elasticsearch" Instrugt tab
- 2. Go to Dashboards using the left-hand navigation pane
- 3. Open Ingress Proxy (if it isn't already open)

Look at the table of UAs that we added and note the addition of Chrome v137! You'll also note a new active alert New UA Detected!

Summary

Let's take stock of what we know:

- a small percentage of requests are experiencing 500 errors
- the errors started occurring around 80 minutes ago
- the only error type seen is 500
- the errors occur over all APIs
- the errors occur only in the TH region
- the errors occur only with browsers based on Chrome v136

And what we've done:

- Created a dashboard to monitor our ingress proxy
- · Created graphs to monitor status codes over time
- Created a simple alert to let us know if we ever return non-200 error codes

- Parsed the logs at ingest-time for quicker and more powerful analysis
- Create a SLO (with alert) to let us know if we ever return a significant number of non-200 error codes over time
- Created visualizations to help us visually locate clients and errors
- Created graphs in our dashboard showing the breakdown of User Agents
- Created a table in our dashboard iterating seen User Agents
- · Created a nightly report to snapshot our dashboard
- Created an alert to let us know when a new User Agent string appears ____

Sometimes our data contains PII information which needs to be restricted to a need-to-know basis and kept only for a limited time.

Limiting access

With Elastic's in-built support for RBAC, we can limit access at the index, document, or field level.

In this example, we've created a limited_user with a limited_role which restricts access to the client.ip and body.text fields (to avoid implicitly leaking the client.ip).

In the Elasticsearch tab, we are logged in as a user with full privileges. Let's check our access. 1. Open the button label="Elasticsearch" tab 2. Open a log record and click on the Table tab in the flyout 3. Note access to the client.ip and body.text fields

In the Elasticsearch (Limited) tab, we are logged in as a user with limited privileges. Let's check our access.

- 1. Open the button label="Elasticsearch (Limited)" tab
- 2. Open a log record and click on the Table tab in the flyout
- 3. Note that client.ip and body.text fields don't exist

Let's change permissions and see what happens:

- 1. Open the button label="Elasticsearch" tab
- 2. Go to Management > Stack Management > Security > Roles using the left-hand navigation pane
- 3. Select limited_viewer
- 4. For Indices logs-proxy.otel-default, update Denied fields to remove body.text (it should only contain client.ip)
- 5. Click Update role

Now let's ensure our limited user has access to body.text.

- 1. Open the button label="Elasticsearch (Limited)" Instrugt tab
- 2. Close the open log record flyout
- 3. Run the search query again
- 4. Open a log record
- 5. Note that client.ip doesn't exist, but body.text now does!

Limiting retention

Say your records department requires you to keep these logs generally accessible only for a very specific period of time. We can ask Elasticsearch to automatically delete them after some number of days.

- 1. Open the button label="Elasticsearch" Instrugt tab
- 2. Go to Streams using the left-hand navigation pane
- 3. Select logs-proxy.otel-default from the list of Streams
- 4. Click on the Data retention tab
- 5. Click Edit data retention
- 6. Select Set specific retention days
- 7. Set to 30 days

Elasticsearch will now remove this data from its online indices after 30 days. At that time, it will only be available in backups.

Summary

Let's take stock of what we know:

- a small percentage of requests are experiencing 500 errors
 - the errors started occurring around 80 minutes ago
 - the only error type seen is 500

- the errors occur over all APIs
- the errors occur only in the TH region
- the errors occur only with browsers based on Chrome v136

And what we've done:

- Created a dashboard to monitor our ingress proxy
- Created graphs to monitor status codes over time
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- Create a SLO (with alert) to let us know if we ever return a significant number of non-200 error codes over time
- Created visualizations to help us visually locate clients and errors
- · Created graphs in our dashboard showing the breakdown of User Agents
- Created a table in our dashboard iterating seen User Agents
- · Created a nightly report to snapshot our dashboard
- Created an alert to let us know when a new User Agent string appears
- Setup RBAC to restrict access to client.ip
- · Setup retention to keep the logs online for only 30 days

Wrap-Up

Over the course of this lab, we learned about:

- Using ES QL to search logs
- Using ES QL to parse logs at query-time
- Using ES QL to do advanced aggregations, analytics, and visualizations
- Creating a dashboard
- Using ES QL to create Alerts
- Using Al Assistant to help write ES QL gueries
- Using Streams to setup ingest-time log processing pipeline (GROK parsing, geo-location, User Agent parsing)
- · Setting up SLOs
- Using Maps to visualize geographic information
- · Scheduling dashboard reports
- Setting up a Pivot Transform and Alert
- Setting up RBAC
- · Setting up data retention

We put these technologies to use in a practical workflow which quickly took us from an unknown problem to a definitive Root Cause. Furthermore, we've setup alerts to ensure we aren't caught off-guard in the future. Finally, we built a really nice custom dashboard to help us monitor the health of our Ingress Proxy.

All of this from just a lowly nginx access file. That's the power of your logs unlocked by Elastic. ___