Exemplars in practice
Finding the needle in your observability haystack

Gibbs Cullen, Chronosphere
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Who am I?

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→ CNCF O11y TAG member
→ Former AWS PM
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Agenda

- What are exemplars?
- Exemplars in practice
- Limitations to exemplars
- Exemplars and beyond
Life before exemplars

You receive an alert that the errors are spiking for a given service. Now what?
Context switch to look at trace data
What are exemplars?
Exemplars are...

Metric data

+ 

Some other data (i.e. a traceID) that relates to the metric data

= 

An easy way to jump from a metrics dashboard with many requests to a single example of a request

![Graph showing errors per second over time]
Exemplars are...

- Great for looking at binary problems
- A way for engineers to quickly jump between data types
- On the rise with open standards, like OpenTelemetry and OpenMetrics, as a way of linking open source metrics and tracing solutions
Exemplars in practice
You receive an alert

You are alerted that your authentication service for a mobile application is seeing a spike in errors.
You triage the alert

You go to the relevant dashboard to begin your investigation
You triage the alert

You click on an exemplar around the time of the spike, which sends you to a tracing solution to view the distributed trace.
You triage the alert

The distributed trace shows you the authentication request from an Android user has timed out.
You try to understand the alert... but have lots of questions!

- Is the spike in errors related only to Android users, or are iOS users affected as well?
- Does this affect all versions of Android?
- Is there any correlation between client geography and errors?

You need more information!
When exemplars are not enough
Good for homogeneous, but not heterogeneous traces

- Exemplars are tied to a single trace, not a population of traces
- A single trace rarely has enough context to resolve an issue

Issues A, B, C all active at time of alert, so how do you know for sure which one to focus on...

Issue B has larger impact, but not the problem causing the alert

Issue C has the largest impact and is causing the alert
Too hard to identify “relevant” traces

❌ Applications don’t have enough context to be able to publish the “right” exemplar

❌ It’s like looking for a needle in your observability haystack!
Exemplars and beyond
Query traces to go beyond exemplars

- Link 100% of your metrics and traces – no aggressive or forced sampling
- Flexibly query across a population of exemplars (not just one) to eliminate false positives or noisy data
- Get context and identify patterns for your traces by setting which variables to query for
### Trace Explorer

#### Search Summary

- **Time**: within the last 10m
- **Error**: Include any

#### Stats by Services

<table>
<thead>
<tr>
<th>Request Count</th>
<th>Error Percentage</th>
<th>Median Duration (P50)</th>
<th>Tail Duration (P99)</th>
</tr>
</thead>
<tbody>
<tr>
<td>demo_s3gateway &gt; GetObject</td>
<td>0.12%</td>
<td>demo_musicfe &gt; POST/play-track</td>
<td>11.54%</td>
</tr>
<tr>
<td>demo_musicfe &gt; POST/play-track</td>
<td>0.04%</td>
<td>demo_trackrights &gt; trackrights.TrackRights.CheckCa...</td>
<td>5.56%</td>
</tr>
<tr>
<td>demo_albumart &gt; albumart.AlbumArt.FetchImages</td>
<td>0.04%</td>
<td>demo_albumart &gt; albumart.AlbumArt.FetchImages</td>
<td>4.17%</td>
</tr>
<tr>
<td>demo_track &gt; TrackTrack/GetTrack</td>
<td>0.04%</td>
<td>demo_track &gt; TrackTrack/GetTrack</td>
<td>0.00%</td>
</tr>
<tr>
<td>demo_subscribe &gt; subscription.Subscription.CheckCa...</td>
<td>0.02%</td>
<td>demo_subscribe &gt; subscription.Subscription.CheckCa...</td>
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<tr>
<td>demo_trackrights &gt; trackrights.TrackRights.CheckCa...</td>
<td>0.00%</td>
<td>demo_trackrights &gt; trackrights.TrackRights.CheckCa...</td>
<td>0.00%</td>
</tr>
<tr>
<td>demo_mccached-subscription-1-dfw1 &gt; get</td>
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<tr>
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</tr>
<tr>
<td>demo_mccached-subscription-1-dfw1 &gt; set</td>
<td>0.00%</td>
<td>demo_mccached-subscription-1-dfw1 &gt; set</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

#### Trace Details

<table>
<thead>
<tr>
<th>Start time</th>
<th>Trace</th>
<th>Duration</th>
<th>Spans</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>03:51:52.785 PM</td>
<td>demo_musicfe &gt; POST/play-track</td>
<td>2.4s</td>
<td>N/A</td>
<td>Contains errors</td>
</tr>
<tr>
<td>03:51:52.097 PM</td>
<td>demo_musicfe &gt; POST/play-track</td>
<td>2.4s</td>
<td>N/A</td>
<td>No errors</td>
</tr>
<tr>
<td>03:51:55.888 PM</td>
<td>demo_musicfe &gt; POST/play-track</td>
<td>2.4s</td>
<td>N/A</td>
<td>No errors</td>
</tr>
<tr>
<td>03:51:54.196 PM</td>
<td>demo_musicfe &gt; POST/play-track</td>
<td>2.3s</td>
<td>N/A</td>
<td>No errors</td>
</tr>
</tbody>
</table>
Thank you!

Come see us at booth #200 or follow @chronospherelio on Twitter and LinkedIn