

Understand, Visualize & Improve Continuous Integration

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**How do you act on
your CI data?**

Everything is a search problem!



Ecommerce



Social networks



File Search



Location Search



Observability



3 solutions



Elastic Enterprise Search



Elastic Observability



Elastic Security

Powered by
the stack

Kibana

Elasticsearch

Beats

Logstash

Deployed
anywhere



Elastic Cloud



Elastic Cloud
Enterprise



Elastic Cloud
on Kubernetes



SaaS

Orchestration



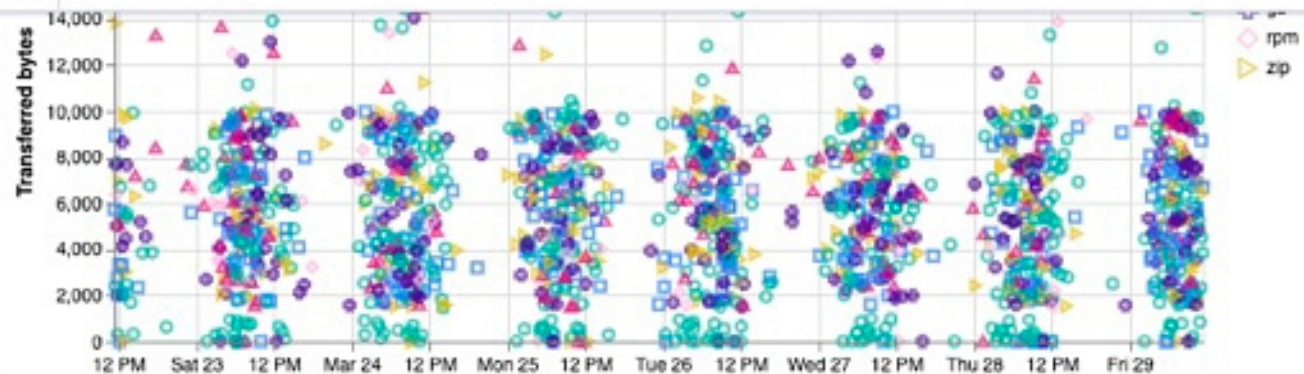
Elasticsearch in one minute

- Search Engine (FTS, Analytics, Geo), near real-time
- Distributed, scalable, highly available, resilient
- Interface: HTTP & JSON
- Heart of the Elastic Stack (Kibana, Logstash, Beats)



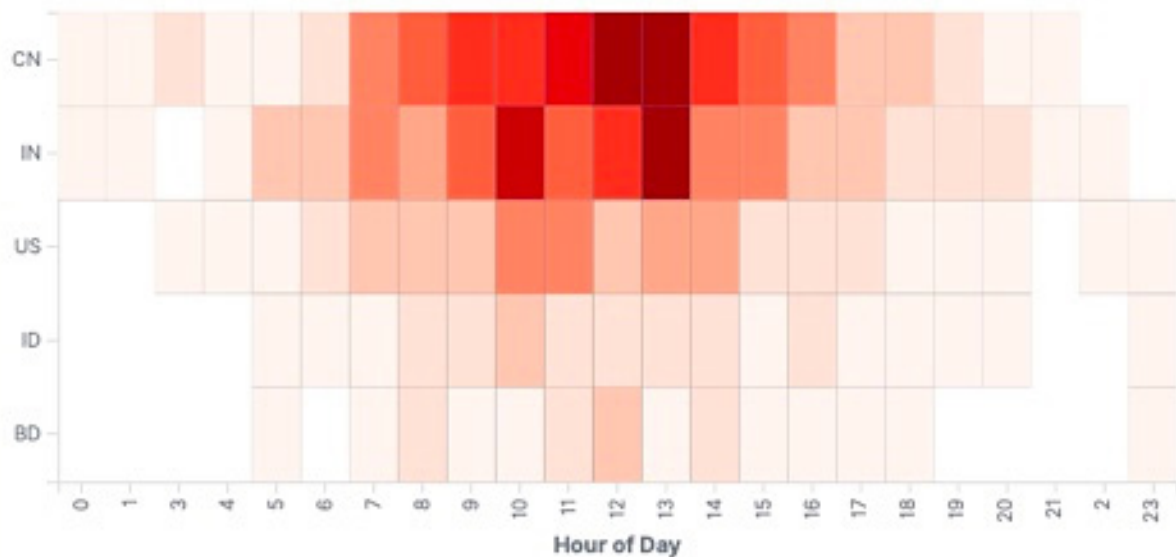
Kibana in one minute

- The window into the Elastic Stack
- Visualization & Dashboarding
- Management
- Monitoring



File Type	Size	Count	Change
gz	1.594MB	34.493KB	283 ↓
css	1.385MB	12.378KB	270 ↓
zip	1.257MB	6.654KB	212 ↓
deb	1.085MB	6.844KB	173 ↓
rpm	458.989KB	0B	71 ↓

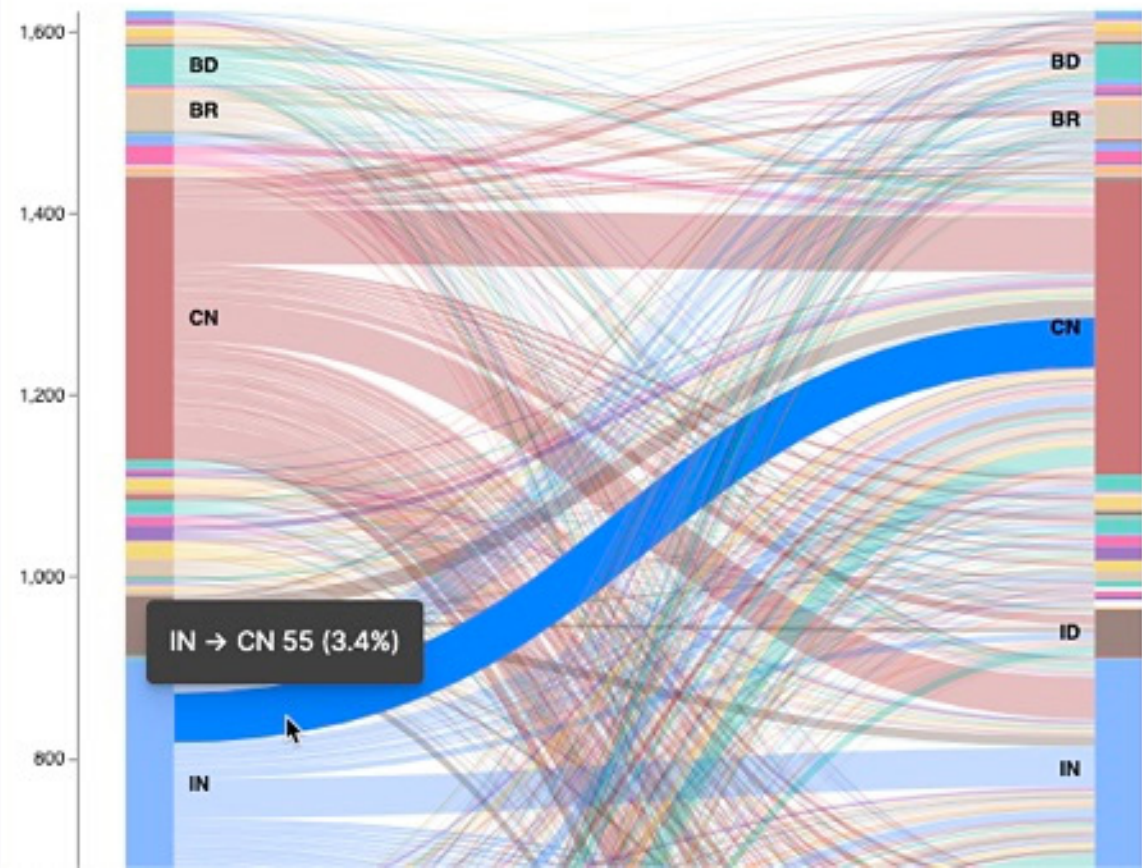
[Logs] Heatmap



[Logs] Unique Visitors by Country



[Vega] Source and Destination Sankey Chart



Save Share Inspect Refresh

Filters Search

KQL



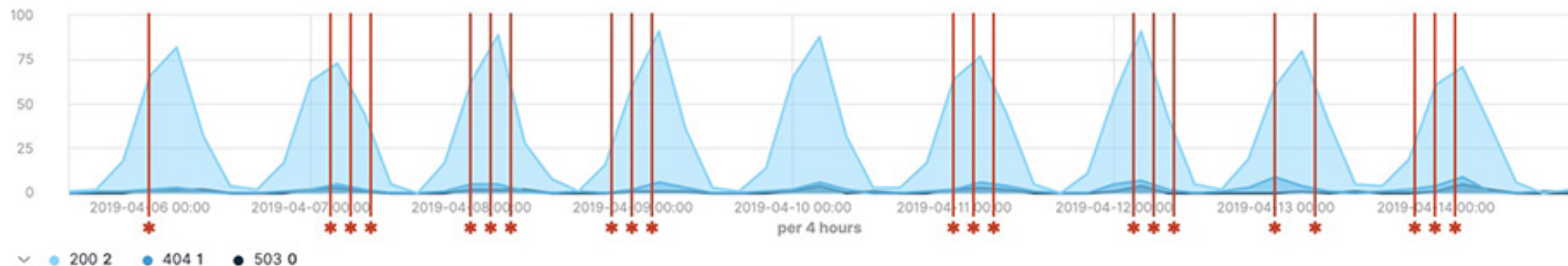
Last 7 days

Show dates

Refresh

+ Add filter





☒ Auto apply

The changes will be automatically applied.

Data Panel options Annotations

Data sources

Index pattern (required)

kibana_sample_data_logs

Time field (required)

timestamp

Query string

tags:error AND tags:security

Ignore global filters?

☒ Yes
 ☐ No

Ignore panel filters?

☒ Yes
 ☐ No

Icon (required)

Asterisk

Fields (required - comma separated paths)

geo.src, host

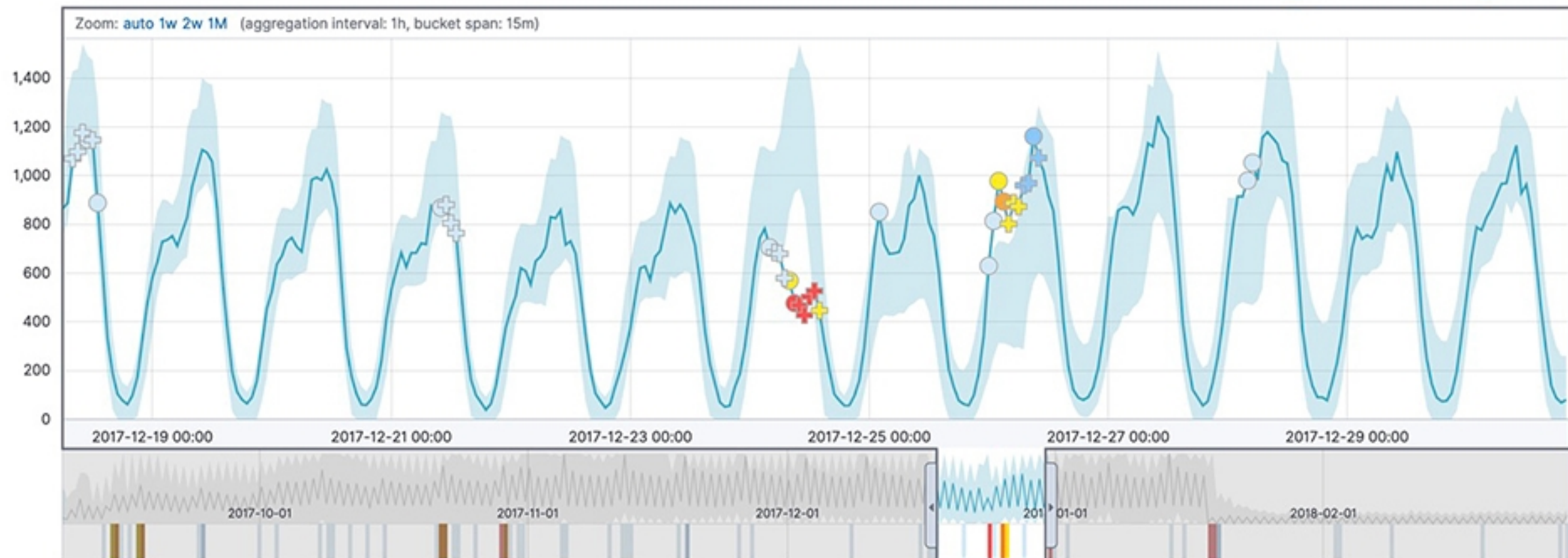
Row template (required)

Security Error from {{geo.src}} on {{host}}

eg. {{field}}



Single time series analysis of sum count

☒ show model bounds☒ annotations

Anomalies

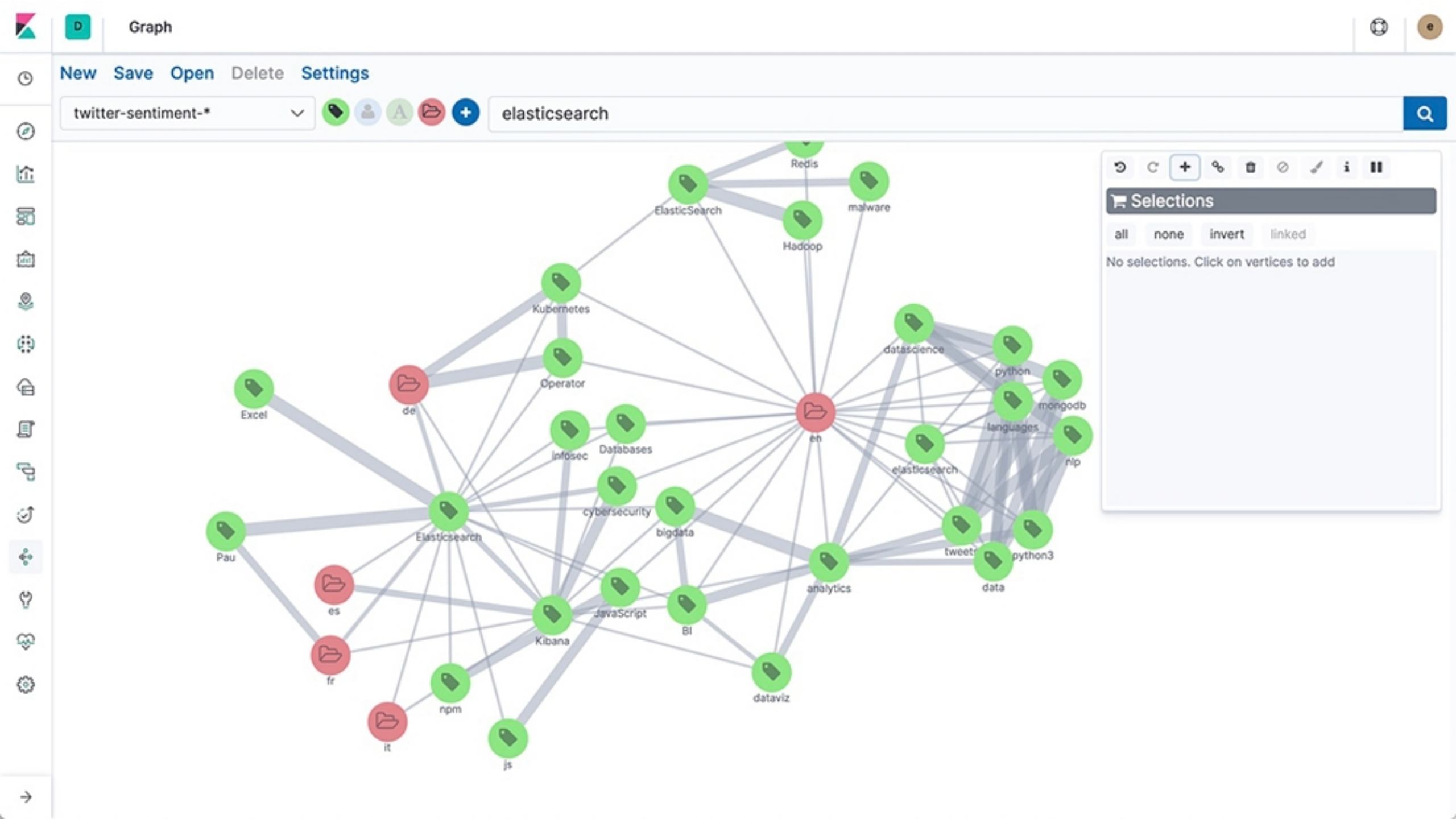
Severity threshold

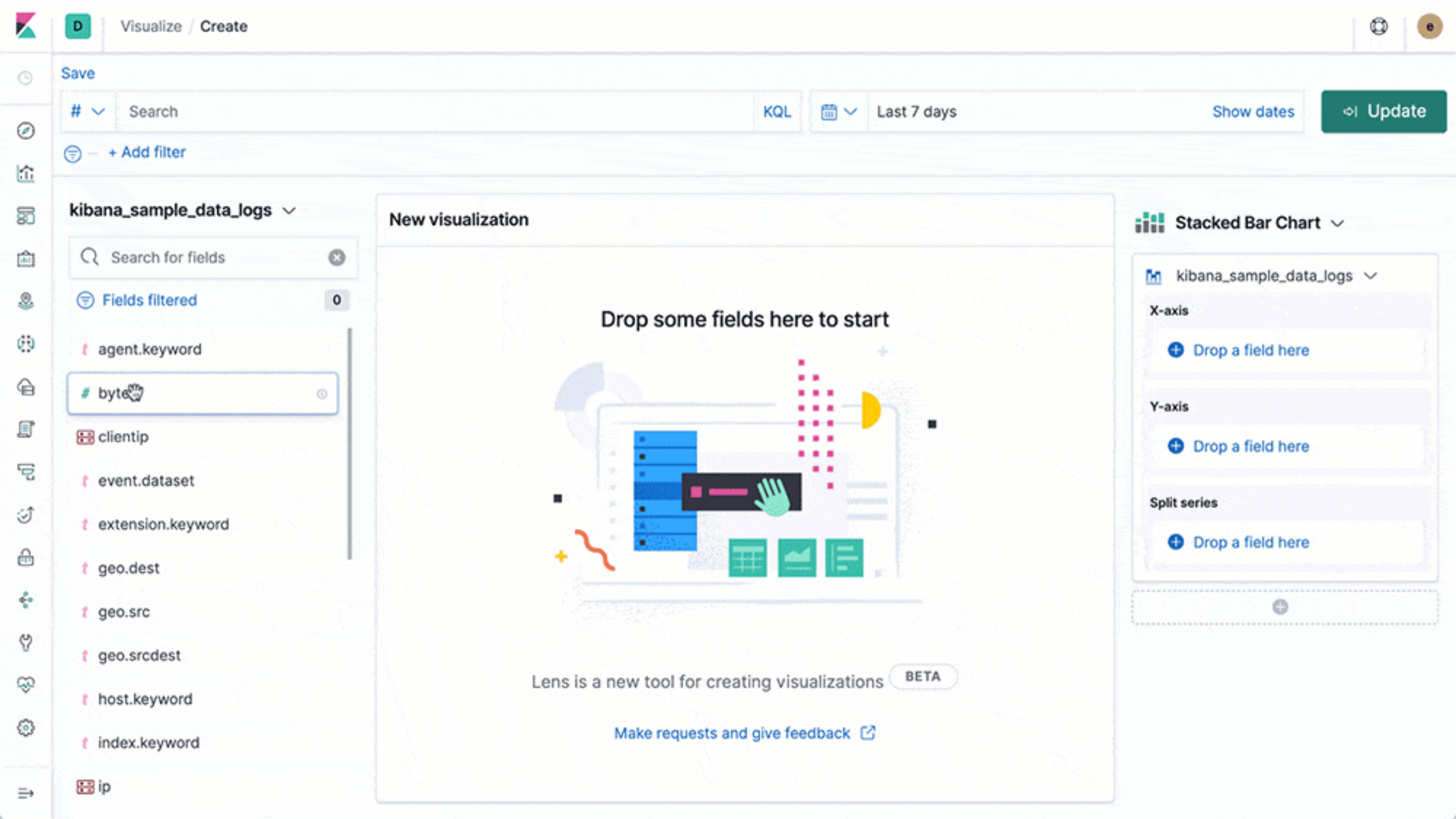
Interval

☒ minor

Auto

time	max severity ↓	detector	actual	typical	description	actions
> December 24th 2017, 11:00	● 96	non_zero_count	393	1186	↓ 3x lower	⚙
> December 24th 2017, 10:00	● 92	non_zero_count	437	1242.5	↓ 3x lower	⚙
> December 24th 2017, 12:00	● 90	non_zero_count	401	1122.8	↓ 3x lower	⚙







Survey time!



CI Tooling

- Jenkins, JenkinsX, TeamCity, Bamboo
- Travis, CircleCI, GitLab CI
- Azure Pipelines, AWS CI/CD, Google CI/CD
- Others?



CI infrastructure

- Self Hosted on own infrastructure
- Self Hosted in the cloud
- CI-as-a-service



CI as a role

- CI is part of ops role
- CI is part of dev role
- Infrastructure Engineer
- Build Engineer



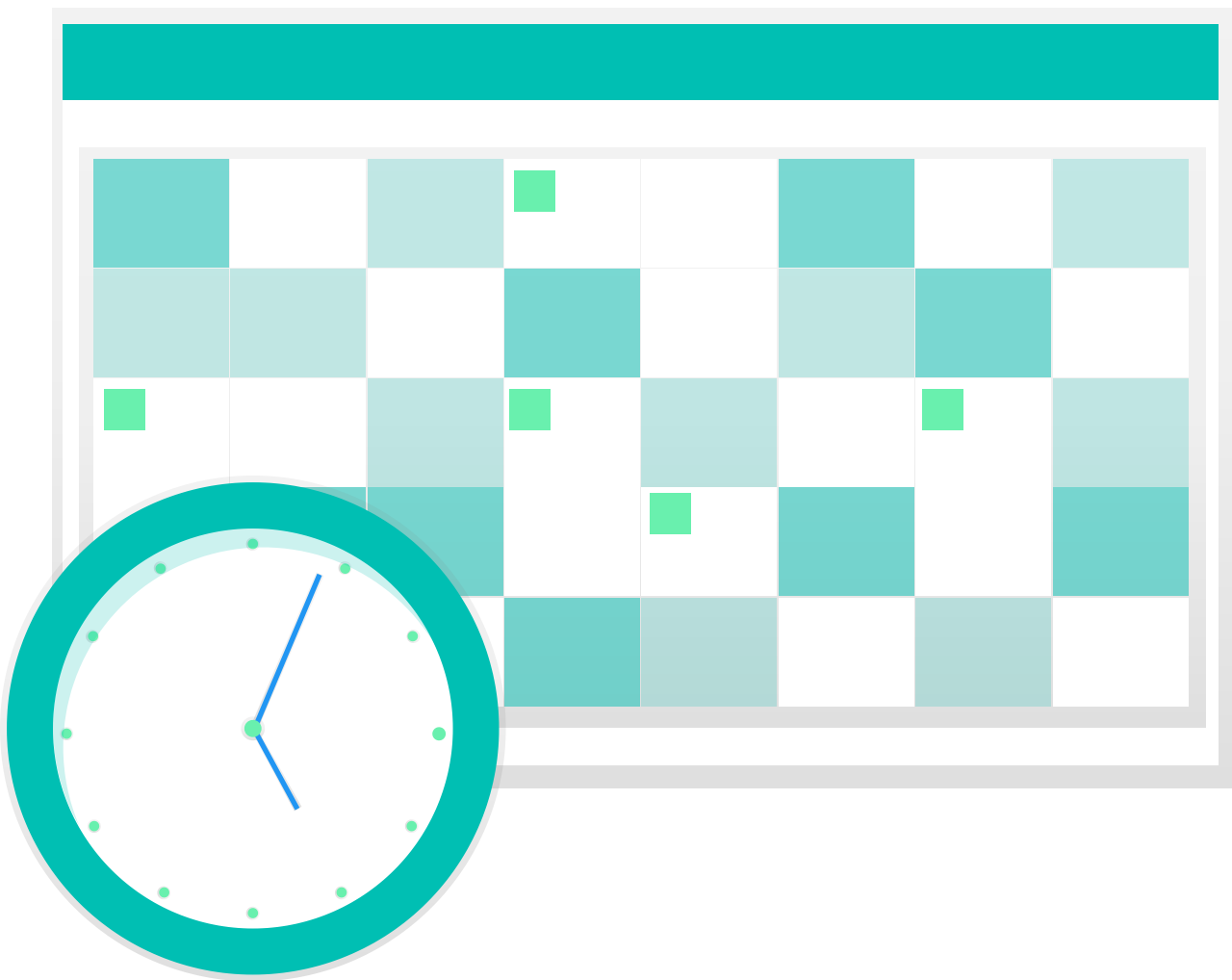
Test test test

- dev branches (master, 7.x)
- release branches (7.8, 6.8)
- feature branches
- PRs
- BWC
- Benchmarking
- Packaging tests
- JVM versions
- Garbage collectors
- Operating systems



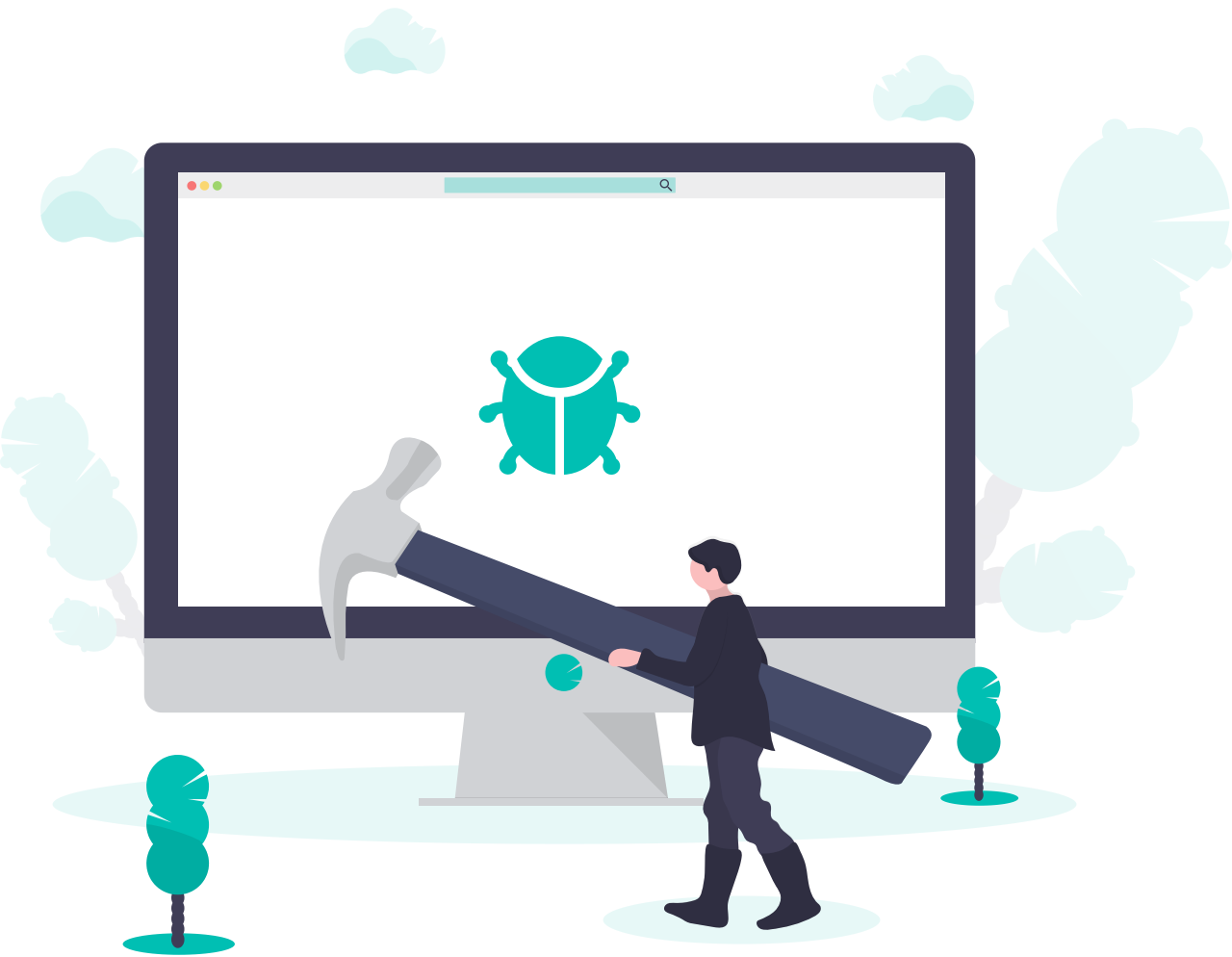
Do you act on CI results?

- If so, how?



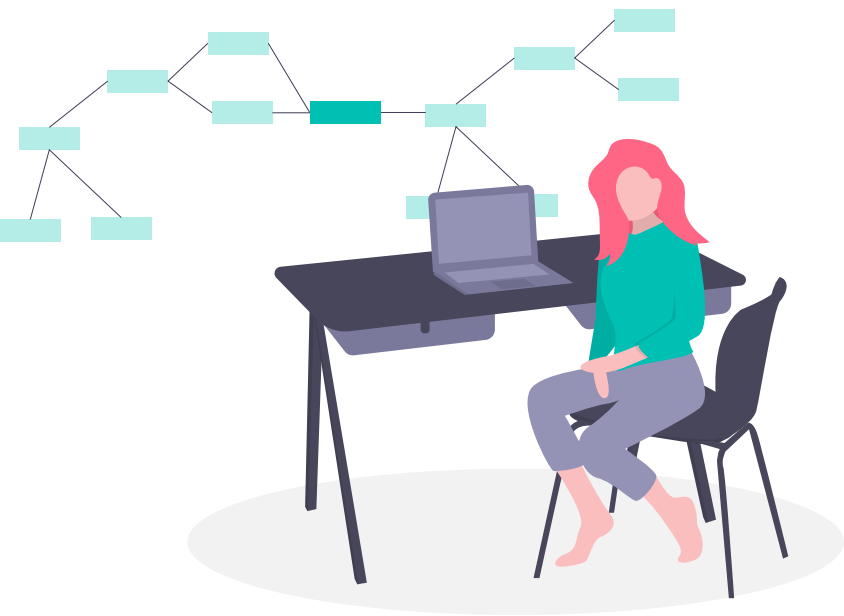
What is CI data?

- Time series
- Recency
- Locality
- Fragmentation



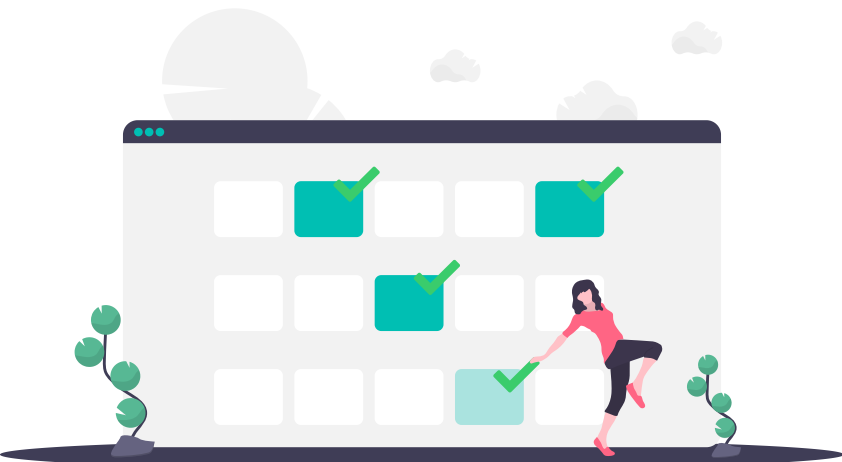
CI output

- unstructured
- huge
- needle in the haystack (`TRACE` loglevel)
- requires postprocessing
- security



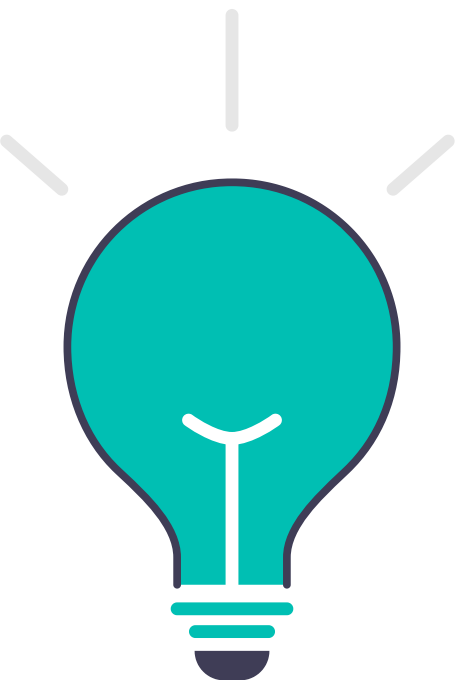
Analyzing CI results

- Detect seemingly random bugs
- Centralised lookup ability for the team
- Emails are not a good CI status medium
- Long term trends (failures, test count, coverage)



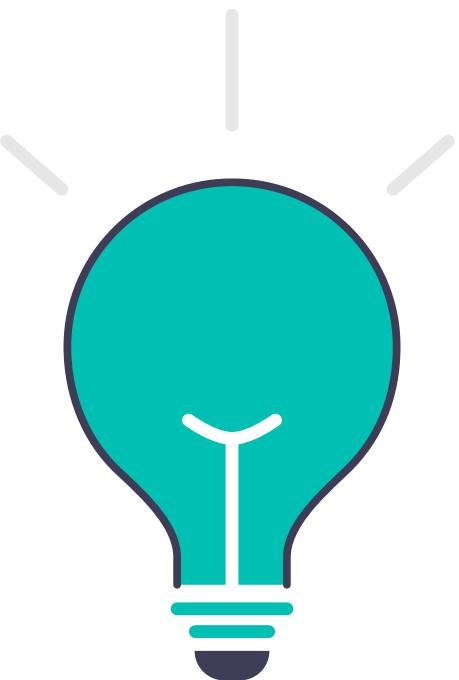
Requirements

- meta data enrichment - per branch, per test run, per test method run, failures only
- data model should be based on search requirements (query optimized)
- define search ability: by timestamp, by branch, by class, by test method, by success/failure



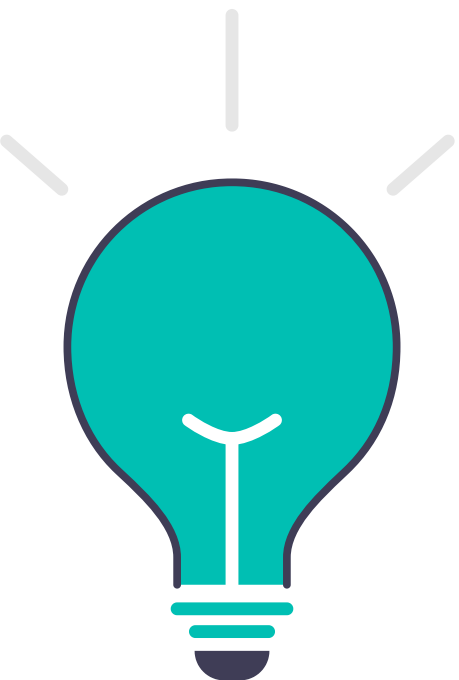
Ask your data

Did this test fail earlier this month?



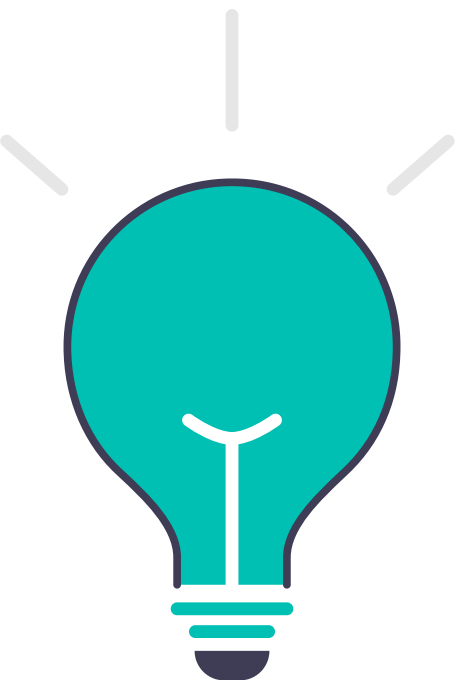
Ask your data

```
Show me all failed test runs of this class  
in this branch in the last month
```



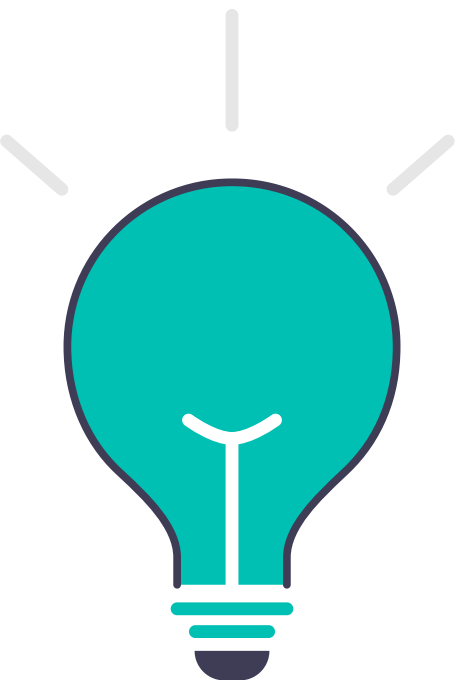
Ask your data

| Is this test failing only under this OS?



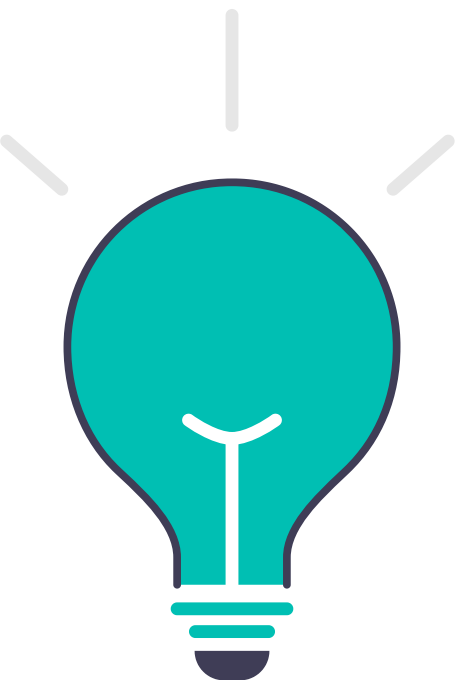
Ask your data

Is our test count increasing compared to our SLOC count?



Ask your data

Are our successful test runs decreasing
since we doubled the team size?



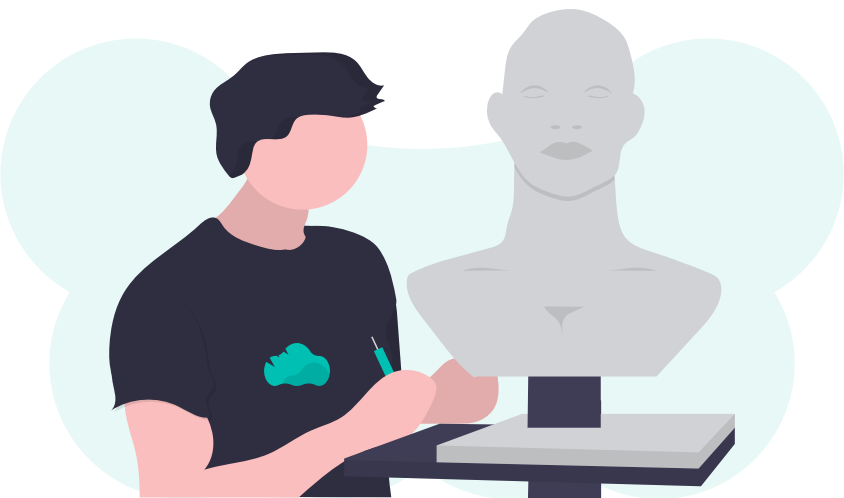
Ask your data

Do the holidays/000 hours have impact on our CI? Can we reduce costs?

crystal spec

```
elastic/community/slack-command-community > master ✓ crystal spec
.....

Finished in 267.99 milliseconds
62 examples, 0 failures, 0 errors, 0 pending
elastic/community/slack-command-community > master ✓
```



Structure test output

- xUnit
- Test Anything Protocol

TAP



```
elastic/community/slack-command-community / master ✓ crystal spec --tap
ok 1 - CustomLogHandler should not log access to '/' endpoint
ok 2 - CustomLogHandler should log access to any other endpoint
ok 3 - Objects Event can retrieve html_url
ok 4 - Objects Event can retrieve region
ok 5 - Objects Event can retrieve topics
ok 6 - Objects Event can retrieve country
ok 7 - Objects Event can retrieve languages
ok 8 - Objects Event can retrieve focus
ok 9 - Objects Event can retrieve date
ok 10 - Objects Event can retrieve last updated timestamp
ok 11 - Objects Event can retrieve created at timestamp
ok 12 - Objects Event can retrieve state
ok 13 - Objects Event can retrieve title
ok 14 - Objects Event can retrieve body
ok 15 - Objects Event can retrieve id
ok 16 - Objects Event can retrieve number
ok 17 - Objects Event matches when all tags are in event
ok 18 - Objects Event does not match when not all tags are in event
ok 19 - Objects Event does not match when tags are empty
ok 20 - Objects NotificationUser should match subscriptions
ok 21 - Objects NotificationUser should ignore accepted events
ok 22 - Objects NotificationUser should not subscriptions issues that already were notified about
ok 23 - Objects NotificationUser should not emit duplicate events if event matches twice
ok 24 - Objects NotificationUser should not notify about events in the past
ok 25 - Objects NotificationUser should only include events that are within not earlier than three days of current date
ok 26 - Elastic::CFP should be able to calculate next duration
ok 27 - Elastic::CFP Elastic::CFP::GithubClient should be able to retrieve labels
ok 28 - Elastic::CFP Elastic::CFP::GithubClient should be able to retrieve labels via pagination
ok 29 - Elastic::CFP Elastic::CFP::GithubClient should be able to filter out irrelevant labels
ok 30 - Elastic::CFP Elastic::CFP::GithubClient should be able to retrieve events
ok 31 - Elastic::CFP Elastic::CFP::GithubClient should be able to retrieve events and paginate
ok 32 - Elastic::CFP Elastic::CFP::SlackClient request verification should pass on matching signatures
ok 33 - Elastic::CFP Elastic::CFP::SlackClient request verification should detect replay attacks
ok 34 - Elastic::CFP Elastic::CFP::SlackClient request verification should raise on not matching signatures
ok 35 - Elastic::CFP Elastic::CFP::SlackClient can reply to a response URL with a message
ok 36 - Elastic::CFP Elastic::CFP::SlackClient can reply without attachments
ok 37 - Elastic::CFP Elastic::CFP::ElasticsearchClient can subscribe to a new list of tags
ok 38 - Elastic::CFP Elastic::CFP::ElasticsearchClient can unsubscribe from a single subscription
ok 39 - Elastic::CFP Elastic::CFP::ElasticsearchClient returns error if users tries to unsubscribe from unknown subscription
ok 40 - Elastic::CFP Elastic::CFP::ElasticsearchClient can retrieve notifications for user id
ok 41 - Elastic::CFP Elastic::CFP::ElasticsearchClient can retrieve all notifications
ok 42 - Elastic::CFP Elastic::CFP::ElasticsearchClient can add a notification to user data on version
ok 43 - Elastic::CFP Elastic::CFP::ElasticsearchClient can retrieve stats
ok 44 - MatchService should not send notifications when there are no users
ok 45 - MatchService should not send notifications when there are no events
ok 46 - MatchService should send notifications
ok 47 - SlackMessageProcessor should return unknown command error in response
ok 48 - SlackMessageProcessor should return help message to response
ok 49 - SlackMessageProcessor should return help message when text ends on help
ok 50 - SlackMessageProcessor should return error with empty tags
ok 51 - SlackMessageProcessor should return list tags to response
ok 52 - SlackMessageProcessor should list subscriptions via return URL
ok 53 - SlackMessageProcessor should tell when no subscriptions are found
ok 54 - SlackMessageProcessor should add a subscription via return URL
ok 55 - SlackMessageProcessor should show a help when calling /community events subscribe
ok 56 - SlackMessageProcessor should show a help when calling /community events unsubscribe
ok 57 - SlackMessageProcessor should not add a subscription based on unknown tags
ok 58 - SlackMessageProcessor should return an error when trying subscribe on two same tags
ok 59 - SlackMessageProcessor should delete a subscription via return URL
ok 60 - SlackMessageProcessor should show unreplied posts on discourse
ok 61 - DiscourseClient should retrieve noreplied posts and categories
ok 62 - DiscourseClient should paginate when more than one page is retrieved
1..62
```

xUnit output

```
<?xml version="1.0"?>
<testsuite tests="62" skipped="0" errors="0" failures="0" time="0.261869582"
  timestamp="2020-07-21T12:43:50Z" hostname="rhincodon">

  <testcase file="/Users/alr/devel/elastic/community/slack-command-community/spec/custom_log_handler_spec.cr"
    classname="spec.custom_log_handler_spec" name="CustomLogHandler should not log access to &#39;/&#39;
    endpoint" time="3.6394e-5"/>
  <testcase file="/Users/alr/devel/elastic/community/slack-command-community/spec/custom_log_handler_spec.cr"
    classname="spec.custom_log_handler_spec" name="CustomLogHandler should log access to any other endpoint"
    time="0.000250577"/>
  <testcase file="/Users/alr/devel/elastic/community/slack-command-community/spec/objects_spec.cr"
    classname="spec.objects_spec" name="Objects Event can retrieve html_url" time="7.589e-6"/>
  <testcase file="/Users/alr/devel/elastic/community/slack-command-community/spec/objects_spec.cr"
    classname="spec.objects_spec" name="Objects Event can retrieve region" time="7.438e-6"/>
```

That's it - right?

- Map standard output/error to tests
- Map logger output to tests
- Add run specific meta data (branch, OS, JVM)
- Indexing/Storing strategy
- Preaggregate data (test count, success/failure, failed tests)
- Code coverage metrics

Index data into Elasticsearch

- Message output data into proper JSON
- logstash/ `xml2json` /self written tool?
- Integration with CI

Java Output (file per class)

```
<?xml version="1.0" encoding="UTF-8"?>
<testsuite name="co.elastic.community.AdminServiceTests" tests="2"
  skipped="0" failures="0" errors="0" timestamp="2020-07-14T11:32:02"
  hostname="rhincodon" time="0.016">
  <properties/>

  <testcase name="testDefaultAdminService()"
    classname="co.elastic.community.AdminServiceTests" time="0.015"/>
  <testcase name="testCustomAdminService()"
    classname="co.elastic.community.AdminServiceTests" time="0.001"/>

  <system-out><![CDATA[TEST TEST TEST
]]></system-out>
  <system-err><![CDATA[]]></system-err>
</testsuite>
```

Java Output (test failure)

```
<?xml version="1.0" encoding="UTF-8"?>
<testsuite name="co.elastic.community.AdminServiceTests" tests="2" skipped="0"
  failures="1" errors="0" timestamp="2020-07-14T11:36:54" hostname="rhincodon" time="0.022">
  <properties/>
  <testcase name="testDefaultAdminService()" classname="co.elastic.community.AdminServiceTests" time="0.021">
    <failure
      message="org.opentest4j.AssertionFailedError: &#10;Expecting:&#10; &lt;true&gt;&#10;to be equal to:&#10; &lt;false&gt;&#10;but was not."
      type="org.opentest4j.AssertionFailedError">org.opentest4j.AssertionFailedError:
Expecting:
  &lt;true&gt;
to be equal to:
  &lt;false&gt;
but was not.
  at java.base/jdk.internal.reflect.NativeConstructorAccessorImpl.newInstance0(Native Method)
  at java.base/jdk.internal.reflect.NativeConstructorAccessorImpl.newInstance(NativeConstructorAccessorImpl.java:62)
  at java.base/jdk.internal.reflect.DelegatingConstructorAccessorImpl.newInstance(DelegatingConstructorAccessorImpl.java:45)
  at java.base/java.lang.reflect.Constructor.newInstanceWithCaller(Constructor.java:500)
  at co.elastic.community.AdminServiceTests.testDefaultAdminService(AdminServiceTests.java:13)

  ...
    
```

Crystal Output (single XML file)

```
<?xml version="1.0"?>
<testsuite tests="62" skipped="0" errors="0" failures="1" time="0.258457318"
  timestamp="2020-07-14T11:26:23Z" hostname="rhincodon">

  <testcase file="/Users/alr/devel/elastic/community/slack-command-community/spec/custom_log_handler_spec.cr"
    classname="spec.custom_log_handler_spec"
    name="CustomLogHandler should not log access to &#39;/&#39; endpoint" time="3.1523e-5"/>
  <testcase file="/Users/alr/devel/elastic/community/slack-command-community/spec/custom_log_handler_spec.cr"
    classname="spec.custom_log_handler_spec"
    name="CustomLogHandler should log access to any other endpoint" time="0.000282161">
    <failure message="Expected: 2
      got: 1">../../../../usr/local/Cellar/crystal/0.35.1_1/src/spec/methods.cr:76:5 in &#39;fail&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/spec/expectations.cr:447:9 in &#39;should&#39;
spec/custom_log_handler_spec.cr:33:5 in &#39;-&gt;&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/primitives.cr:255:3 in &#39;internal_run&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/spec/example.cr:33:16 in &#39;run&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/spec/context.cr:18:23 in &#39;internal_run&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/spec/context.cr:330:7 in &#39;run&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/spec/context.cr:18:23 in &#39;internal_run&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/spec/context.cr:147:7 in &#39;run&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/spec/dsl.cr:270:7 in &#39;-&gt;&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/primitives.cr:255:3 in &#39;run&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/crystal/main.cr:45:14 in &#39;main&#39;
../../../../usr/local/Cellar/crystal/0.35.1_1/src/crystal/main.cr:114:3 in &#39;main&#39;</failure>
    </testcase>

  ...
</testsuite>
```

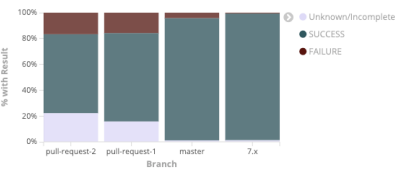
Demo

Elastic Build Stats

Elasticsearch CI



Gordon: Build success rate by branch



 SUCCESS

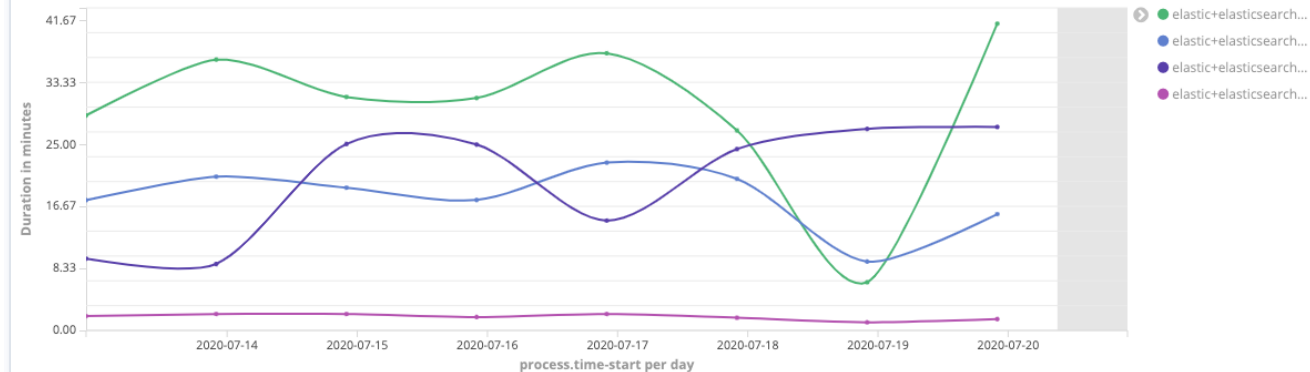
> Search... (e.g. status:200 AND extension:PHP)

Options

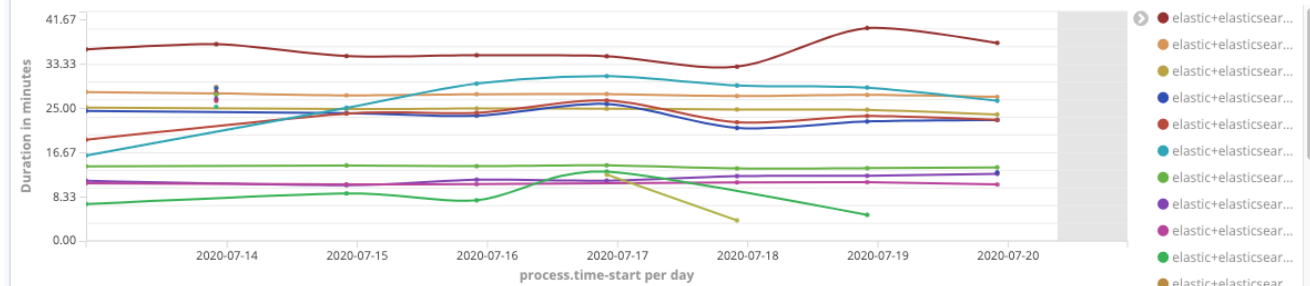
Refresh

Add a filter +

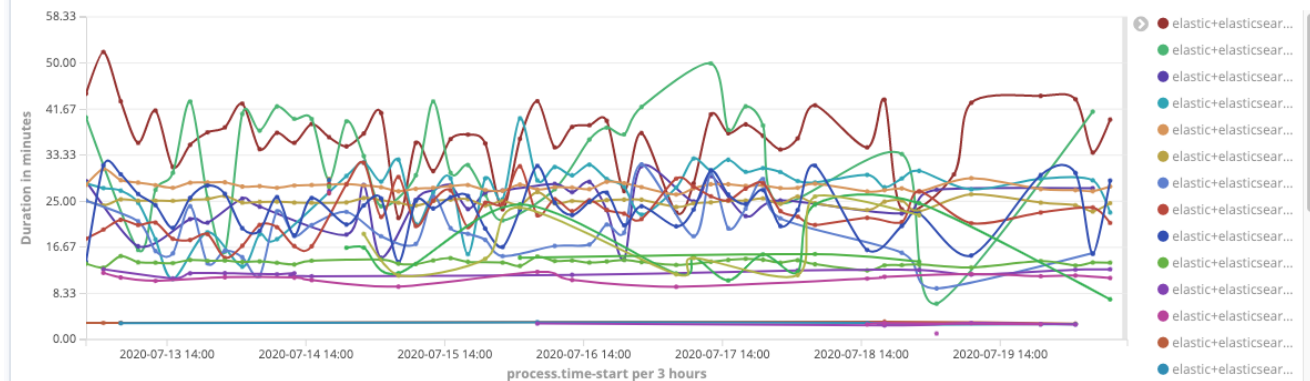
Alpar - Build duration intake



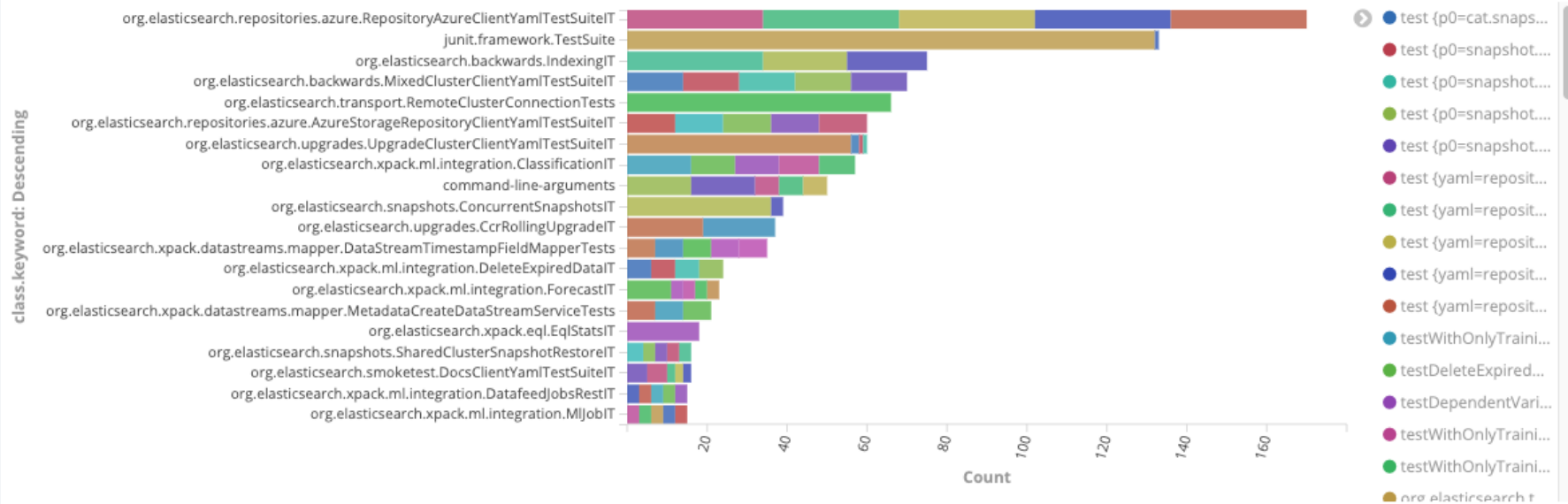
Alpar - Build duration PRs - daily AVG



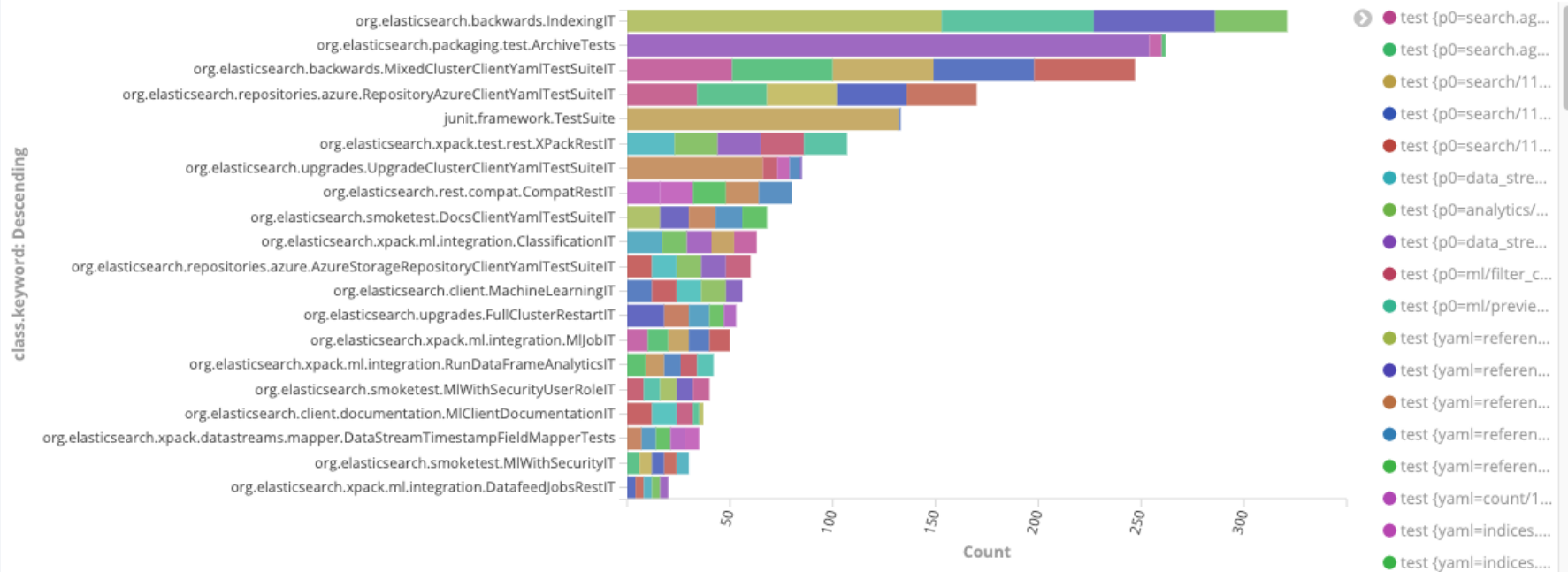
Alpar - Build duration master intake and PRs



Alpar: Elasticsearch top test failures excluding PR builds



Alpar: Elasticsearch top test failures





Summary

- Analytics use-case
- Not needed for operational tasks
- ML: Time series anomaly detection (network outage)
- Test triage!



Test triage

- Daily single person owner for test failures
- Check failure
- Assign team
- Disable tests to stabilize



The future[tm]

- Delivery pipeline as a service (K8s: [Tekton](#))
- Much more automated canary deployments
- Smarter test execution (affected code changes test cases first)
- Increase of specialization roles around CI/CD
- Analytics build into pipelines

Thanks for listening

Q & A

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Elastic Cloud



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Elastic CloudElastic on-premElastic on-prem

Elastic Stack subscriptions

The Elastic Stack — Elasticsearch, Kibana, Beats, and Logstash — powers a variety of use cases. And we have flexible plans to help you get the most out of your on-prem subscriptions.

FREE

Open Source

Apache 2.0: Now and always.

Feature highlights include:

- ✓ Clustering & high availability
- ✓ Powerful search and analysis
- ✓ Data visualization and dashboarding
- ✓ And more

Free download

Basic

The forever-free plan.

Everything in Open Source plus:

- ✓ Core security features
- ✓ Solutions such as APM, SIEM, Maps, and more
- ✓ Canvas
- ✓ And more

Gold

More features. Dedicated support.

Everything in Basic plus:

- ✓ Alerting
- ✓ Reporting
- ✓ Ingest management
- ✓ Business hours support
- ✓ And more

Contact us

Platinum

Advanced functionality. Around the clock support.

Everything in Gold plus:

- ✓ Advanced security features
- ✓ Machine learning
- ✓ Cross-cluster replication
- ✓ 24/7/365 support
- ✓ And more

Contact us

Enterprise

Stack orchestration and endpoint protection by default.

Everything in Platinum plus:

- ✓ Endpoint prevention
- ✓ Endpoint detection and response mapped to MITRE ATT&CK
- ✓ Endpoint event collection
- ✓ Access to ECE & ECK orchestration features

Contact us

Getting more help

Discuss Forum

<https://discuss.elastic.co>



elastic

all categories ▾

all tags ▾

Categories

Latest

New (117)

Unread (917)

Top

+ New Topic

Category

Topics

Latest

Announcements

Release announcements, end of life notifications and other bits about Elastic products that we think will be useful to everyone.

Community Ecosystem

385

5 unread

Beats

Any questions regarding Beats, forwarders and shippers for various types of data.

Filebeat 1 unread 7 new

Packetbeat 1 new

Metricbeat 3 new

Winlogbeat 2 new

Heartbeat 1 new

Auditbeat

Functionbeat

Journalbeat

Beats Developers

Community Beats 1 new

Topbeat

Central Management

61 / week

1 unread

15 new

Elasticsearch

Any questions related to Elasticsearch, including specific features, language clients and plugins.

Rally 1 unread

178 / week

831 unread

36 new

Logstash

Everything related to your favorite centralized logging platform, including plugins and recipes.

95 / week

29 unread

24 new

Kibana

All things about visualizing data in Elasticsearch & Logstash, including how to use Kibana and extending the platform.

113 / week

42 unread

19 new

APM

Everything related to APM – whether it is the APM Server, the Kibana dashboards, or the agents.

12 / week

5 new

Logs

Everything related to the Logs app – setup with Filebeat, Filebeat modules, and using the Kibana Logs app.

55

Metrics

Everything related to metrics - Metricbeat, integrations and modules, Kibana dashboards and the Metrics app.

1 / week

⚙️ Notes on Using These Forums

Meta Elastic

2

Apr 2017

Couldn't push logs to elasticsearch using filebeat

Filebeat

1

3m

<BarSeries> configuration

Kibana

0

6m

Dec 15th, 2019: [EN] Elasticsearch Snapshot Lifecycle Management (SLM) with Minio.io S3

advent-staging

0

7m

Invalid IP network, skipping {<network=>"10.13.7.0/10.13.7.24"

Logstash

0

10m

FScrawler stuck at 2.6gb index size

Elasticsearch

2

11m

Elastic APM Java agent - sanitize_fields_names on application/json* data

APM

java

1

21m

Metricbeat Failed to connect EOF

Metricbeat

5

22m

Mix free and paid licenses

Elasticsearch

license

0

23m

Filebeat CPU utilization metrics are not normalized by default

Beats

stack-monitoring

2

23m

How do i aggregate these documets

Logstash

6

26m

Metricbeat error

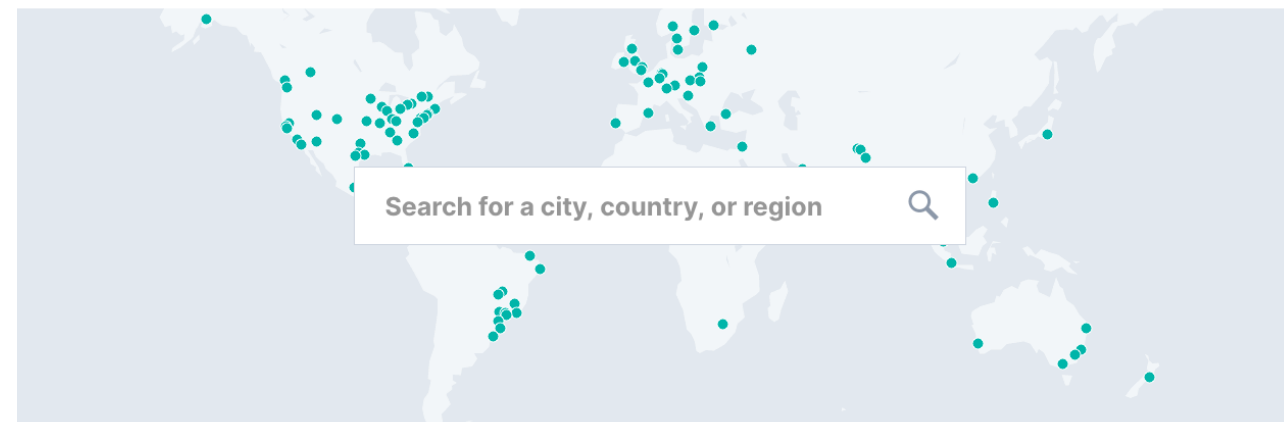
Metricbeat

1

28m

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Thanks for listening

Q & A

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Community Advocate

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