What's new in the Elastic Stack?

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Agenda

- What's new in 6.x?
- What's new in 7.x?
- Q & A

What's new in 6.x?

Elasticsearch 6.x

- 6.0
  - Zero downtime upgrades
  - Cross cluster search
  - Sequence id based recoveries
  - Index sorting
  - range based datatypes
- 6.1
  - Index splitting
- 6.2
  - Rank evaluation API
- 6.3
  - Rollup
  - Java 10 support
- 6.4
  - Reloadable secure settings
  - Field Aliases
  - Korean analyzer
- 6.5
  - G1GC support, Java 11
  - Minimal snapshots (50% less)
- 6.6
  - Frozen indices
  - BKD backed geoshapes
- 6.7
  - CCR
  - SQL
  - ILM
  - Upgrade Assistant
- 6.8
  - ECK (Elastic for Kubernetes)
  - Move security features into basic

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Elasticsearch 6.7 - CCR

- Cross Cluster Replication + UI
- Replicate data across data centers
- Leader index requires soft deletes to be set
- Follower index configures cluster and leader index
- Follower index can also be a pattern

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Elasticsearch 6.7 - SQL

- REST API
- CLI
- JDBC
- ODBC

Elasticsearch 6.7 - ILM

```
PUT _ilm/policy/full_policy
{
  "policy": {
    "phases": {
      "hot": {
        "actions": {
          "rollover": {
            "max_age": "7d",
            "max_size": "50G"
          }
        }
      },
      "warm": {
        "min_age": "30d",
        "actions": {
          "forcemerge": {
            "max_num_segments": 1
          },
          "shrink": {
            "number_of_shards": 1
          },
          "allocate": {
            "number_of_replicas": 2
          }
        }
      },
```

```
     "cold": {
        "min_age": "60d",
        "actions": {
          "allocate": {
            "require": {
              "type": "cold"
            }
          }
        }
      },
      "delete": {
        "min_age": "90d",
        "actions": {
          "delete": {}
        }
      }
    }
  }
}
```

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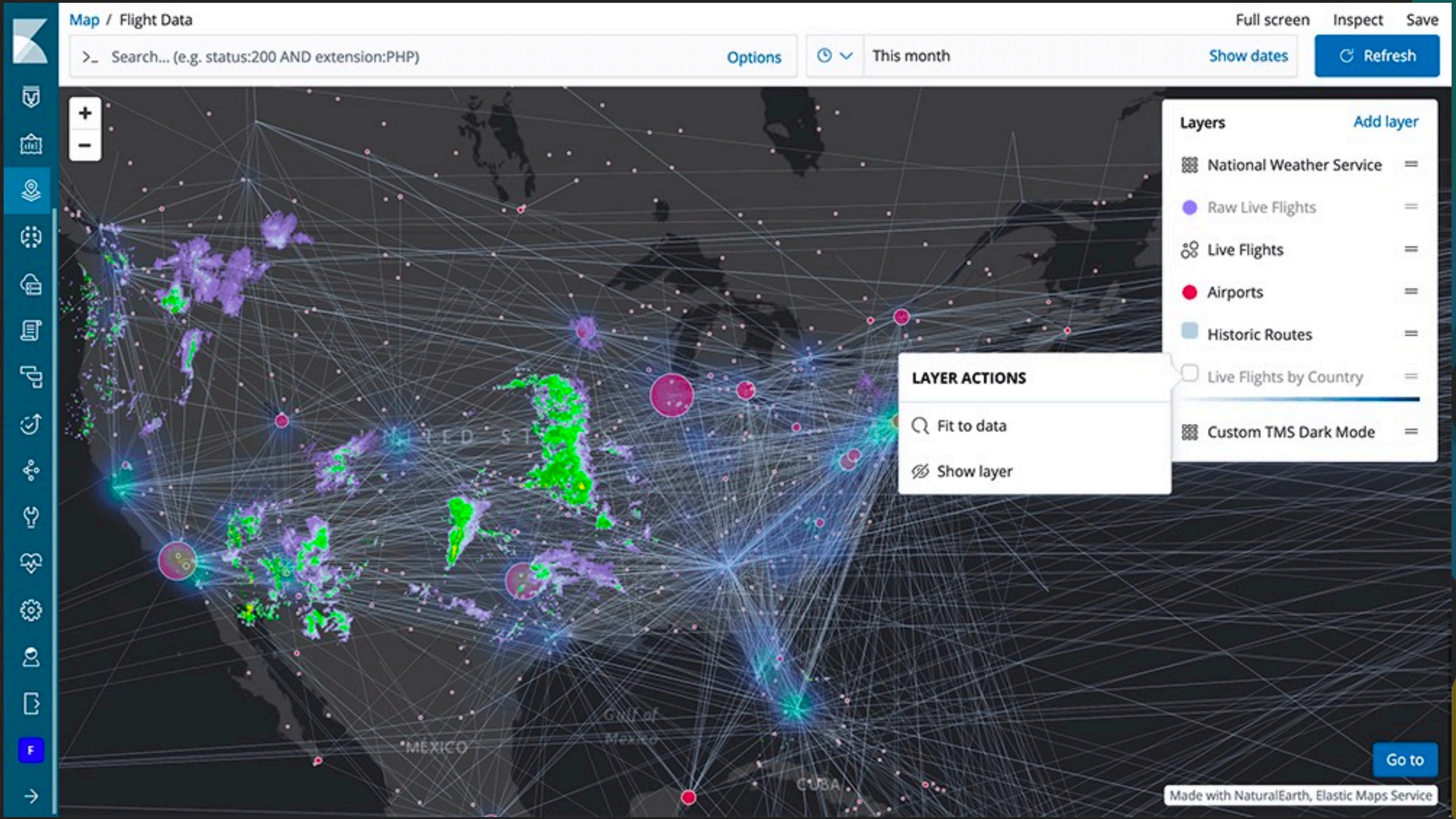
Kibana 6.7

- Maps
- Uptime
- Canvas
- Infrastructure is GA
- Logs is GA
- Localization
- Upgrade Assistant

Kibana 6.7 - Maps



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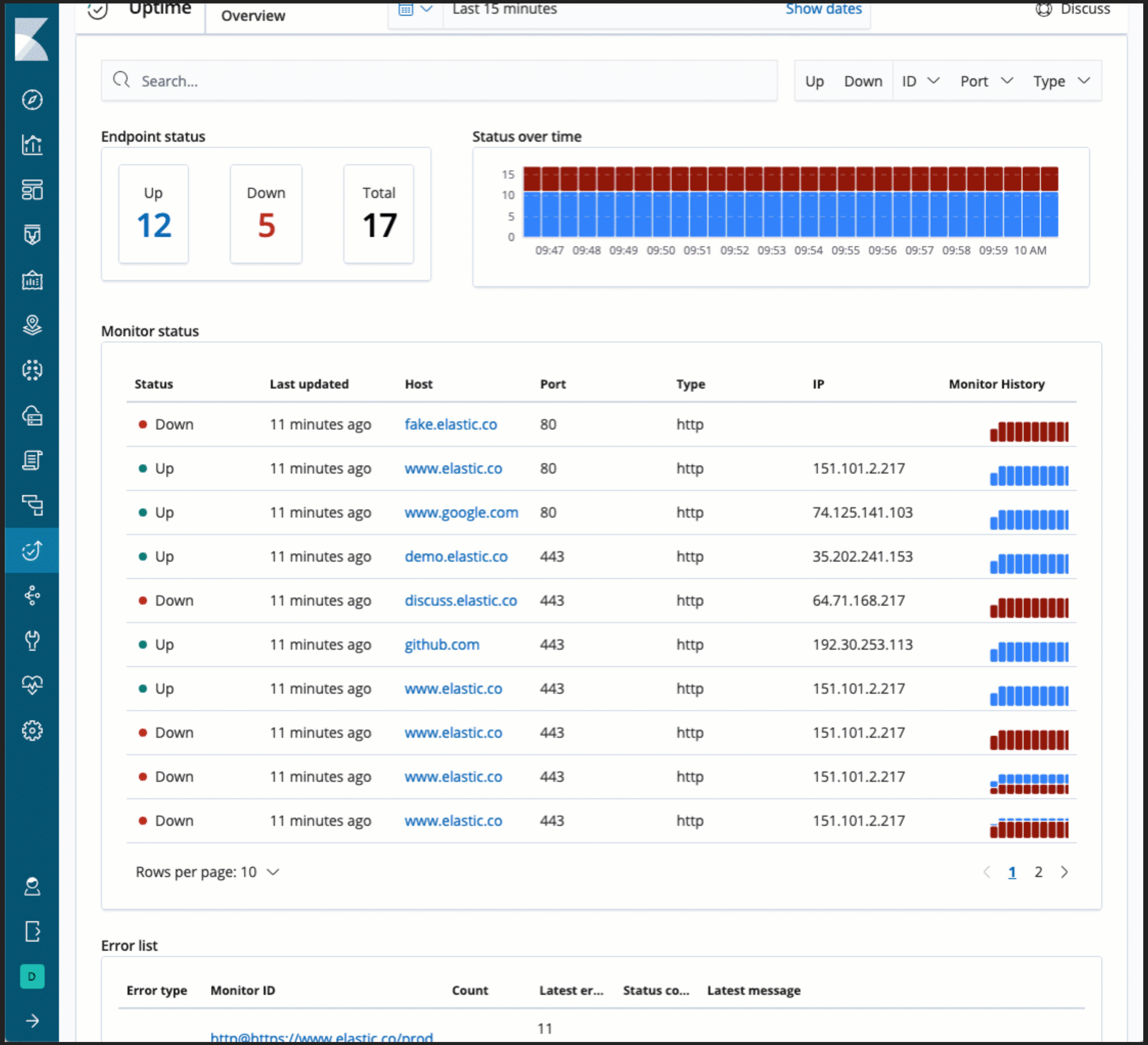
Kibana 6.7 - Uptime



Uptime | Overview | Last 15 minutes | Show dates | Discuss

Search...

Up | Down | ID | Port | Type

Endpoint status

Up	Down	Total
12	5	17

Status over time

Monitor status

Status	Last updated	Host	Port	Type	IP	Monitor History
● Down	11 minutes ago	fake.elastic.co	80	http		
● Up	11 minutes ago	www.elastic.co	80	http	151.101.2.217	
● Up	11 minutes ago	www.google.com	80	http	74.125.141.103	
● Up	11 minutes ago	demo.elastic.co	443	http	35.202.241.153	
● Down	11 minutes ago	discuss.elastic.co	443	http	64.71.168.217	
● Up	11 minutes ago	github.com	443	http	192.30.253.113	
● Up	11 minutes ago	www.elastic.co	443	http	151.101.2.217	
● Down	11 minutes ago	www.elastic.co	443	http	151.101.2.217	
● Down	11 minutes ago	www.elastic.co	443	http	151.101.2.217	
● Down	11 minutes ago	www.elastic.co	443	http	151.101.2.217	

Rows per page: 10 | 1 2

Error list

Error type	Monitor ID	Count	Latest er...	Status co...	Latest message
	http@https://www.elastic.co/prod		11		

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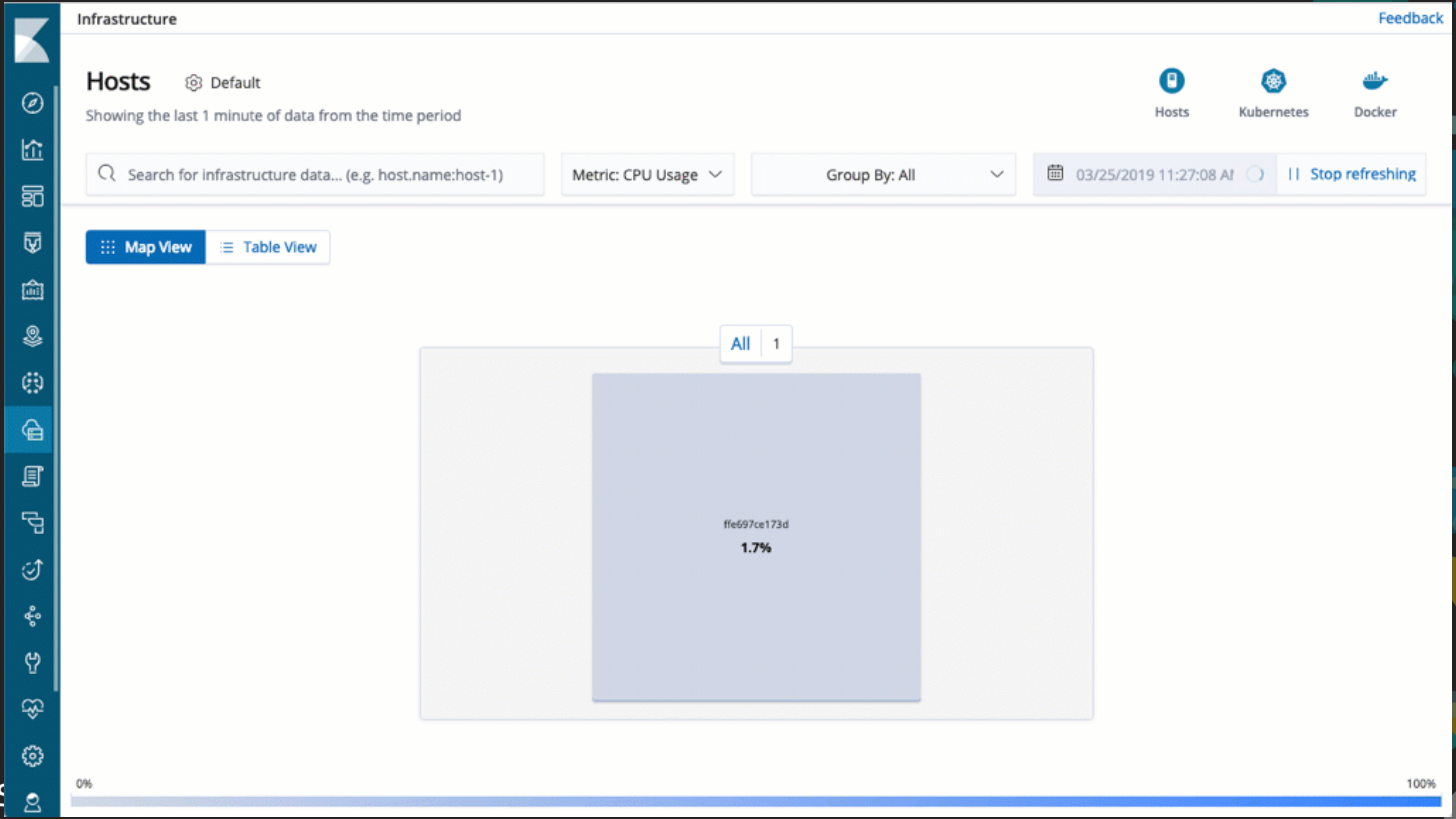
Kibana 6.7 - Infrastructure UI



Infrastructure

Hosts

Showing the last 1 minute of data from the time period

Search for infrastructure data... (e.g. host.name:host-1)

Metric: CPU Usage

Group By: All

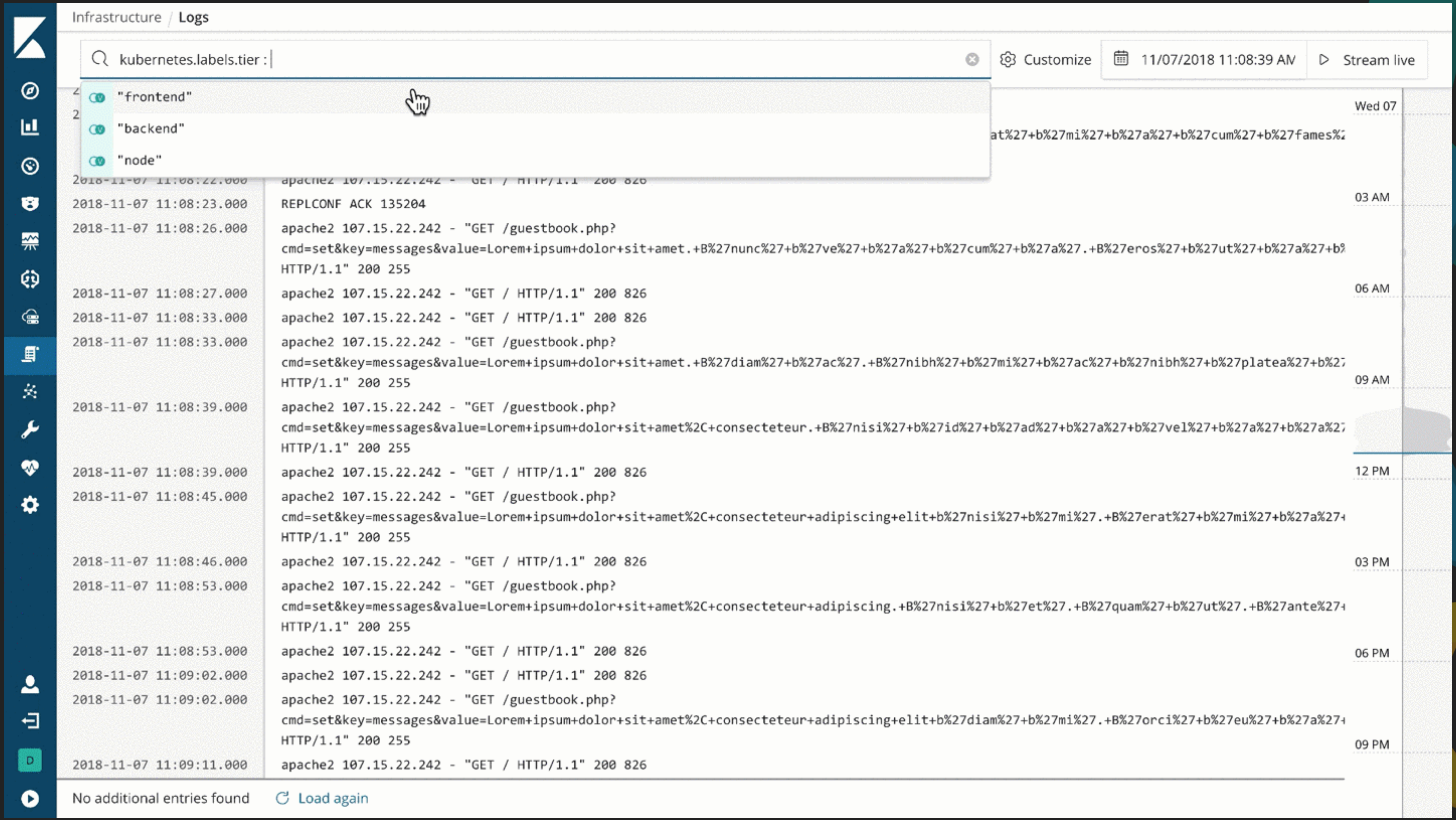
03/25/2019 11:27:08 AI

ffe697ce173d

1.7%

elas

Kibana 6.7 - Logs UI



```
                                                                    at%27+b%27mi%27+b%27a%27+b%27cum%27+b%27fames%2
2018-11-07 11:08:22.000   apache2 107.15.22.242 - "GET / HTTP/1.1" 200 826
2018-11-07 11:08:23.000   REPLCONF ACK 135204
2018-11-07 11:08:26.000   apache2 107.15.22.242 - "GET /guestbook.php?
                          cmd=set&key=messages&value=Lorem+ipsum+dolor+sit+amet.+B%27nunc%27+b%27ve%27+b%27a%27+b%27cum%27+b%27a%27.+B%27eros%27+b%27ut%27+b%27a%27+b%
                          HTTP/1.1" 200 255
2018-11-07 11:08:27.000   apache2 107.15.22.242 - "GET / HTTP/1.1" 200 826
2018-11-07 11:08:33.000   apache2 107.15.22.242 - "GET / HTTP/1.1" 200 826
2018-11-07 11:08:33.000   apache2 107.15.22.242 - "GET /guestbook.php?
                          cmd=set&key=messages&value=Lorem+ipsum+dolor+sit+amet.+B%27diam%27+b%27ac%27.+B%27nibh%27+b%27mi%27+b%27ac%27+b%27nibh%27+b%27platea%27+b%27
                          HTTP/1.1" 200 255
2018-11-07 11:08:39.000   apache2 107.15.22.242 - "GET /guestbook.php?
                          cmd=set&key=messages&value=Lorem+ipsum+dolor+sit+amet%2C+consecteteur.+B%27nisi%27+b%27id%27+b%27ad%27+b%27a%27+b%27vel%27+b%27a%27+b%27a%27
                          HTTP/1.1" 200 255
2018-11-07 11:08:39.000   apache2 107.15.22.242 - "GET / HTTP/1.1" 200 826
2018-11-07 11:08:45.000   apache2 107.15.22.242 - "GET /guestbook.php?
                          cmd=set&key=messages&value=Lorem+ipsum+dolor+sit+amet%2C+consecteteur+adipiscing+elit+b%27nisi%27+b%27mi%27.+B%27erat%27+b%27mi%27+b%27a%27+
                          HTTP/1.1" 200 255
2018-11-07 11:08:46.000   apache2 107.15.22.242 - "GET / HTTP/1.1" 200 826
2018-11-07 11:08:53.000   apache2 107.15.22.242 - "GET /guestbook.php?
                          cmd=set&key=messages&value=Lorem+ipsum+dolor+sit+amet%2C+consecteteur+adipiscing.+B%27nisi%27+b%27et%27.+B%27quam%27+b%27ut%27.+B%27ante%27+
                          HTTP/1.1" 200 255
2018-11-07 11:08:53.000   apache2 107.15.22.242 - "GET / HTTP/1.1" 200 826
2018-11-07 11:09:02.000   apache2 107.15.22.242 - "GET / HTTP/1.1" 200 826
2018-11-07 11:09:02.000   apache2 107.15.22.242 - "GET /guestbook.php?
                          cmd=set&key=messages&value=Lorem+ipsum+dolor+sit+amet%2C+consecteteur+adipiscing+elit+b%27diam%27+b%27mi%27.+B%27orci%27+b%27eu%27+b%27a%27+
                          HTTP/1.1" 200 255
2018-11-07 11:09:11.000   apache2 107.15.22.242 - "GET / HTTP/1.1" 200 826
```

No additional entries found   Load again

elastic

Elasticsearch 6.8 - Security & ECK

- Native & file realm now free
- TLS now free
- Elastic Cloud on Kubernetes (Operator)

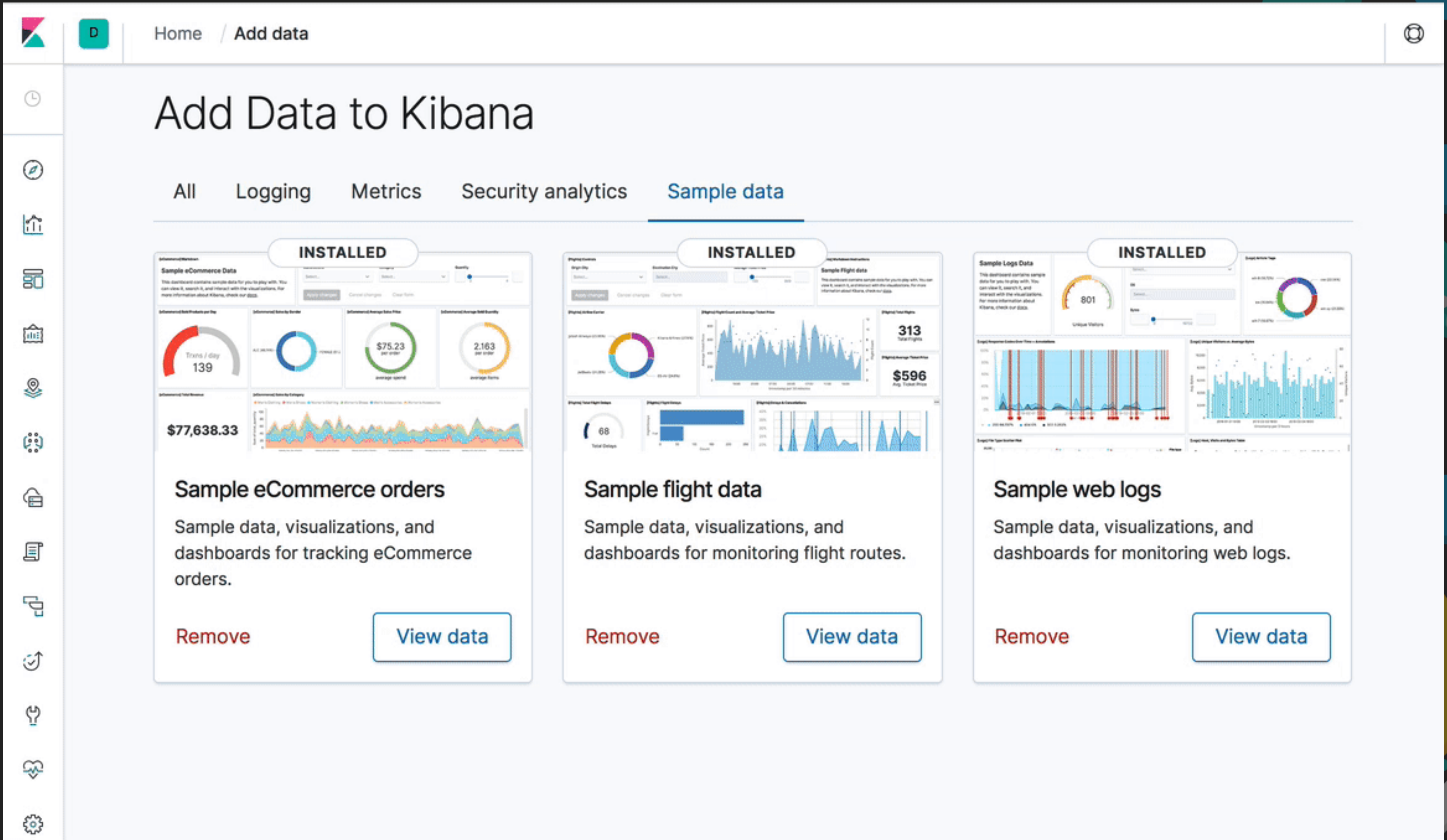
What's new in 7.0?

elastic

Kibana 7.0

- Elastic UI Library
- KQL by default (+ autocomplete)
- Responsive dashboards

Kibana 7.0



Home / Add data

Add Data to Kibana

All | Logging | Metrics | Security analytics | Sample data

INSTALLED

Sample eCommerce orders

Sample data, visualizations, and dashboards for tracking eCommerce orders.

Remove | View data

INSTALLED

Sample flight data

Sample data, visualizations, and dashboards for monitoring flight routes.

Remove | View data

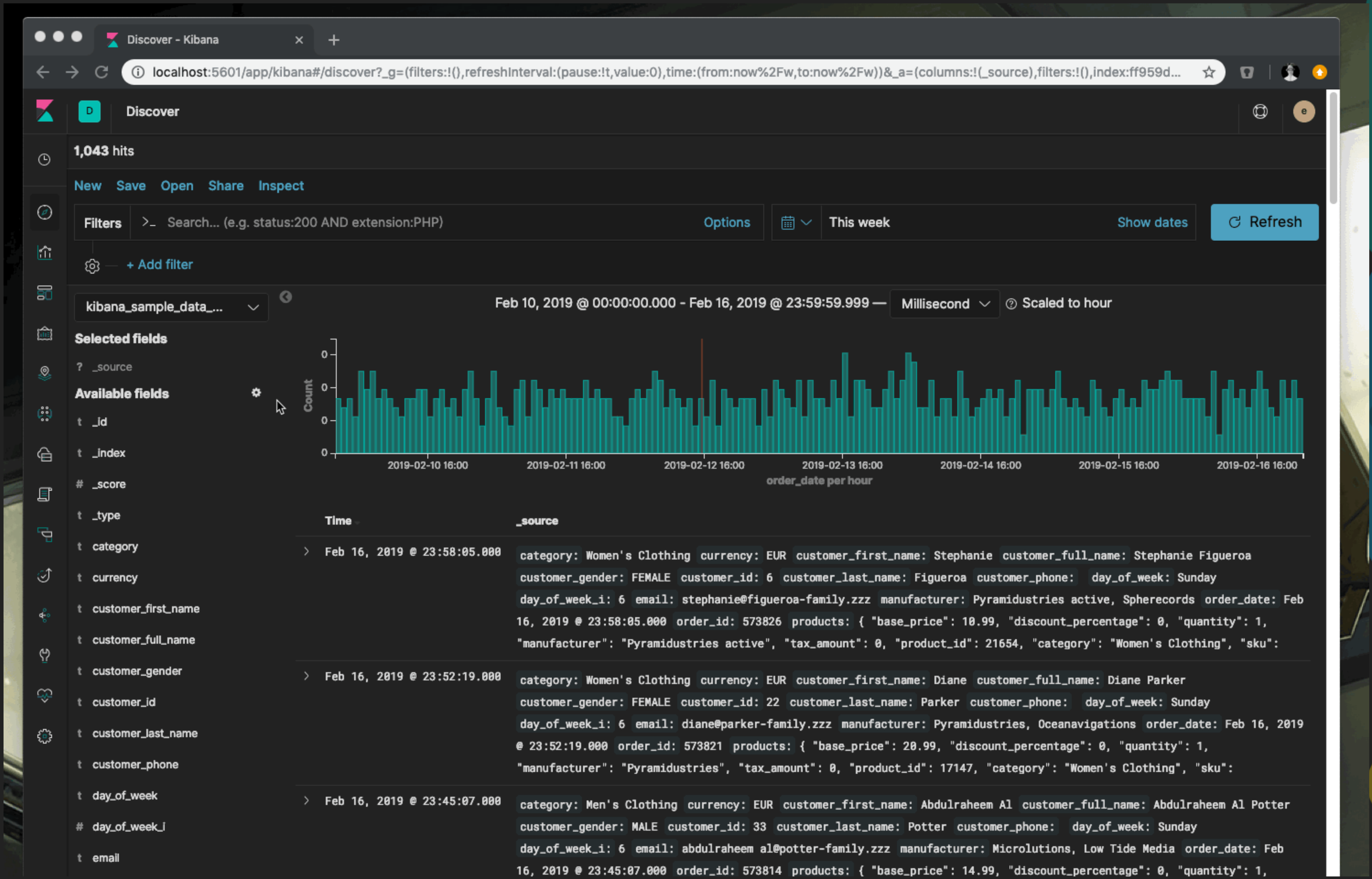
INSTALLED

Sample web logs

Sample data, visualizations, and dashboards for monitoring web logs.

Remove | View data

Kibana 7.0



Discover - Kibana

localhost:5601/app/kibana#/discover?_g=(filters:!(),refreshInterval:(pause:!t,value:0),time:(from:now%2Fw,to:now%2Fw))&_a=(columns:!(_source),filters:!(),index:ff959d...

Discover

1,043 hits

New Save Open Share Inspect

Filters >_ Search... (e.g. status:200 AND extension:PHP) Options | This week Show dates | Refresh

+ Add filter

kibana_sample_data_...

Selected fields

- ? _source

Available fields

- t _id
- t _index
- # _score
- t _type
- t category
- t currency
- t customer_first_name
- t customer_full_name
- t customer_gender
- t customer_id
- t customer_last_name
- t customer_phone
- t day_of_week
- # day_of_week_i
- t email

Feb 10, 2019 @ 00:00:00.000 - Feb 16, 2019 @ 23:59:59.999 — Millisecond ⌄ Scaled to hour

```
   Time                          _source

>  Feb 16, 2019 @ 23:58:05.000   category: Women's Clothing currency: EUR customer_first_name: Stephanie customer_full_name: Stephanie Figueroa
                                 customer_gender: FEMALE customer_id: 6 customer_last_name: Figueroa customer_phone:  day_of_week: Sunday
                                 day_of_week_i: 6 email: stephanie@figueroa-family.zzz manufacturer: Pyramidustries active, Spherecords order_date: Feb
                                 16, 2019 @ 23:58:05.000 order_id: 573826 products: { "base_price": 10.99, "discount_percentage": 0, "quantity": 1,
                                 "manufacturer": "Pyramidustries active", "tax_amount": 0, "product_id": 21654, "category": "Women's Clothing", "sku":

>  Feb 16, 2019 @ 23:52:19.000   category: Women's Clothing currency: EUR customer_first_name: Diane customer_full_name: Diane Parker
                                 customer_gender: FEMALE customer_id: 22 customer_last_name: Parker customer_phone:  day_of_week: Sunday
                                 day_of_week_i: 6 email: diane@parker-family.zzz manufacturer: Pyramidustries, Oceanavigations order_date: Feb 16, 2019
                                 @ 23:52:19.000 order_id: 573821 products: { "base_price": 20.99, "discount_percentage": 0, "quantity": 1,
                                 "manufacturer": "Pyramidustries", "tax_amount": 0, "product_id": 17147, "category": "Women's Clothing", "sku":

>  Feb 16, 2019 @ 23:45:07.000   category: Men's Clothing currency: EUR customer_first_name: Abdulraheem Al customer_full_name: Abdulraheem Al Potter
                                 customer_gender: MALE customer_id: 33 customer_last_name: Potter customer_phone:  day_of_week: Sunday
                                 day_of_week_i: 6 email: abdulraheem al@potter-family.zzz manufacturer: Microlutions, Low Tide Media order_date: Feb
                                 16, 2019 @ 23:45:07.000 order_id: 573814 products: { "base_price": 14.99, "discount_percentage": 0, "quantity": 1,
```

Ingest 7.0

- Beats: ECS/ILM integration
- Filebeat: zeek, santa, netflow support, encodings
- Auditbeat: system module
- Metricbeat
  - Elasticsearch, Logstash & Kibana modules
  - NATS, MSSQL, EC2, CouchDB
- Logstash
  - Native Java Plugins
  - Java execution engine on by default

Stack 7.0

- ECS
- ES-Hadoop
  - Kerberos Integration
  - Java 8 required
  - Cascading support removed
- Clients
  - Rewritten JavaScript client
  - New Go Client
  - Java: High Level REST Client

Elasticsearch 7.0

- Mapping types
  - date_nanos
  - rank_feature
  - rank_features
  - dense_vector
  - sparse_vector
- Queries
  - intervals query
  - script_score query (supercedes function_score)
  - rank_feature query
- Searches
  - faster top-k retrieval
  - adaptive replica selection enabled by default
  - No refresh on idle shards (faster indexing)
- Others
  - Rewritten cluster coordination
  - Lucene 8
  - High Level REST client
  - Docker part of the build
  - Single shard index by default
  - Rewritten memory circuit breaker
  - Type is optional now
  - TLS 1.3
  - Ships with OpenJDK

Elasticsearch 7.0 - Rewritten cluster coordination

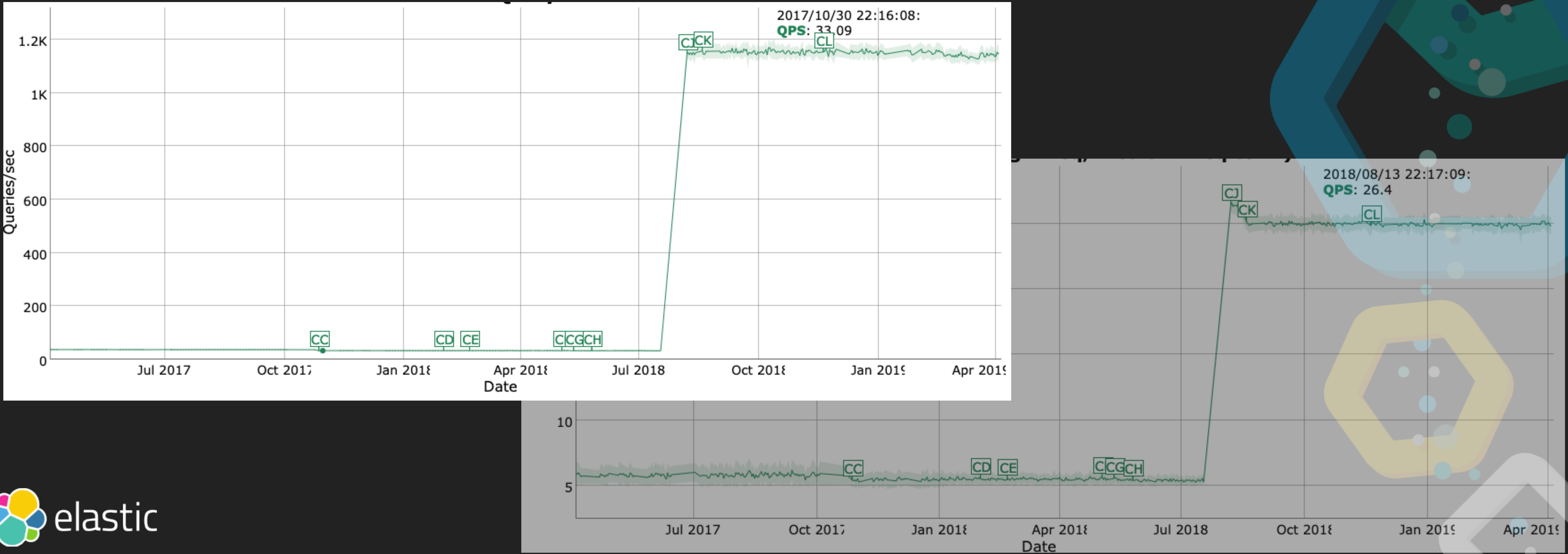
- Gone: `discovery.zen.minimum_master_nodes`
- Sub-second master election
- Simplifying growing/shrinking of cluster
- Cluster bootstrapping/Voting configuration
- Rolling upgrades from 6 to 7 work
- Formal verification via TLA+

Elasticsearch 7.0 - Faster top-k retrieval

- While querying, exclude documents that cannot make it into the top hits
- Search: Elasticsearch OR Kibana
- Term 1: Elasticsearch (max score 5.0)
- Term 2: Kibana (max score 3.0)
- If first k results all have a score > 3.0, then documents only containing Kibana can be ignored
- Number of potential candidates is reduced while running

Elasticsearch 7.0 - Faster top-k retrieval

- Scores may no longer be negative
- Total hits are not counted by default



Elasticsearch - Adaptive Replica Selection

- Problem: Coordinating node round robins requests between data nodes
- Underperforming node harms the whole cluster
- Adaptive replica selection
  - Response time of previous requests
  - Search execution time of the data node
  - Queue size of the search threadpool on the data node

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Elasticsearch - Rank feature

- New `rank_feature` type
- New `rank_feature` query

- Index numbers than can be used to boost queries
- Modifies the scoring formula to in-/decrease score based on the value of the document
- Query functions: `saturation`, `logarithm`, `sigmoid`

Elasticsearch - Rank feature

```
PUT test
{
  "mappings": {
    "properties": {
      "pagerank": {
        "type": "rank_feature"
      },
      "url_length": {
        "type": "rank_feature",
        "positive_score_impact": false
     }
    }
  }
}
```

Elasticsearch - Rank feature

```
PUT test/_doc/1
{
  "url": "http://en.wikipedia.org/wiki/2016_Summer_Olympics",
  "content": "Rio 2016",
  "pagerank": 50.3,
  "url_length": 42,
}

PUT test/_doc/2
{
  "url": "http://en.wikipedia.org/wiki/2016_Brazilian_Grand_Prix",
  "content": "Formula One motor race held on 13 November 2016 at the Autódromo José Carlos Pace in São Paulo, Brazil",
  "pagerank": 50.3,
  "url_length": 47,
}

PUT test/_doc/3
{
  "url": "http://en.wikipedia.org/wiki/Deadpool_(film)",
  "content": "Deadpool is a 2016 American superhero film",
  "pagerank": 50.3,
  "url_length": 37,
}
```

Elasticsearch - Rank feature

```
GET test/_search
{
  "query": {
    "bool": {
      "must": [ { "match": { "content": "2016" } } ],
      "should": [
        { "rank_feature": { "field": "pagerank" } },
        { "rank_feature": { "field": "url_length", "boost": 0.1 } }
      ]
    }
  }
}
```

Elasticsearch - Rank features

- New `rank_features` type

- Key/Value pairs instead of single values

elastic

Elasticsearch - Rank feature

```
PUT test/_doc/1
{
  "url": "http://en.wikipedia.org/wiki/2016_Summer_Olympics",
  "content": "Rio 2016",
  "pagerank": 50.3,
  "url_length": 42,
  "topics": {
    "sports": 50,
    "brazil": 30
  }
}
```

Elasticsearch - Rank feature

```
GET test/_search
{
  "query": {
    "bool": {
      "must": [ { "match": { "content": "2016" } } ],
      "should": [
        { "rank_feature": { "field": "pagerank" } },
        { "rank_feature": { "field": "url_length", "boost": 0.1 } },
        { "rank_feature": { "field": "topics.sports", "boost": 0.4 } }
      ]
    }
  }
}
```

Elasticsearch - Rank feature

```
GET test/_search
{
  "query": {
    "rank_feature": {
      "field": "pagerank",
      "saturation": {
        "pivot": 8
      }
    }
  }
}
```

Elasticsearch - Rank feature Limitations

- Field values must be single-valued and positive
- rank_feature fields do not support querying, sorting or aggregating
- Field values are not exact (relative error of about 0.4%)
- Uses top-k faster retrieval mechanism for speed (hit count!)

elastic

Elasticsearch - script_score query

- replaces the `function_score` query
- full painless scripting
- predefined functions:

```
saturation, sigmoid, randomScore,
decay(Numeric|Date|Geo)(Linear|Exp|Gauss)
```

elastic

Elasticsearch - Nanosecond support

- new datatype: **`date_nanos`**
- stores nanoseconds since the epoch (reduced range!)
- internally: moved from Joda-Time to java time
- Aggregations: millisecond resolution!

- Beware: Upgrade path from 6.x!

elastic

What's new in 7.1?

Elasticsearch 7.1

- security features moved into basic

- ECK (Elastic Cloud on Kubernetes/K8s)

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What's new in 7.2?

Elasticsearch 7.2

- `search_as_you_type` mapping
- `distance_feature` query
- Replication of closed indices
- `dense/sparse_vector` datatype

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Elasticsearch - vector datatypes

- `dense_vector`: stores dense vectors of float values, supplied as an array
- `sparse_vector`: stores sparse vectors of float values, supplied as map

- Use-Case: User centric recommendation based on past decisions

elastic

Elasticsearch - vector datatypes

```
PUT my_index
{
  "mappings": {
    "properties": {
      "sparse": {
        "type": "sparse_vector"
      },
      "dense": {
        "type": "dense_vector"
      },
      "my_text" : {
        "type" : "keyword"
      }
    }
  }
}
```

Elasticsearch - vector datatypes

```
PUT my_index/_doc/1
{
  "my_text" : "text1",
  "dense" : [0.5, 10, 6]
  "sparse" : {"1": 0.5, "5": -0.5,  "100": 1}
}

PUT my_index/_doc/2
{
  "my_text" : "text2",
  "dense" : [-0.5, 10, 10, 4]
  "sparse" : {"103": 0.5, "4": -0.5,  "5": 1, "11" : 1.2}
}
```

Elasticsearch - script_score query

- sparse/dense functions:

```
cosineSimilarity(Sparse)
dotProduct(Sparse)
```

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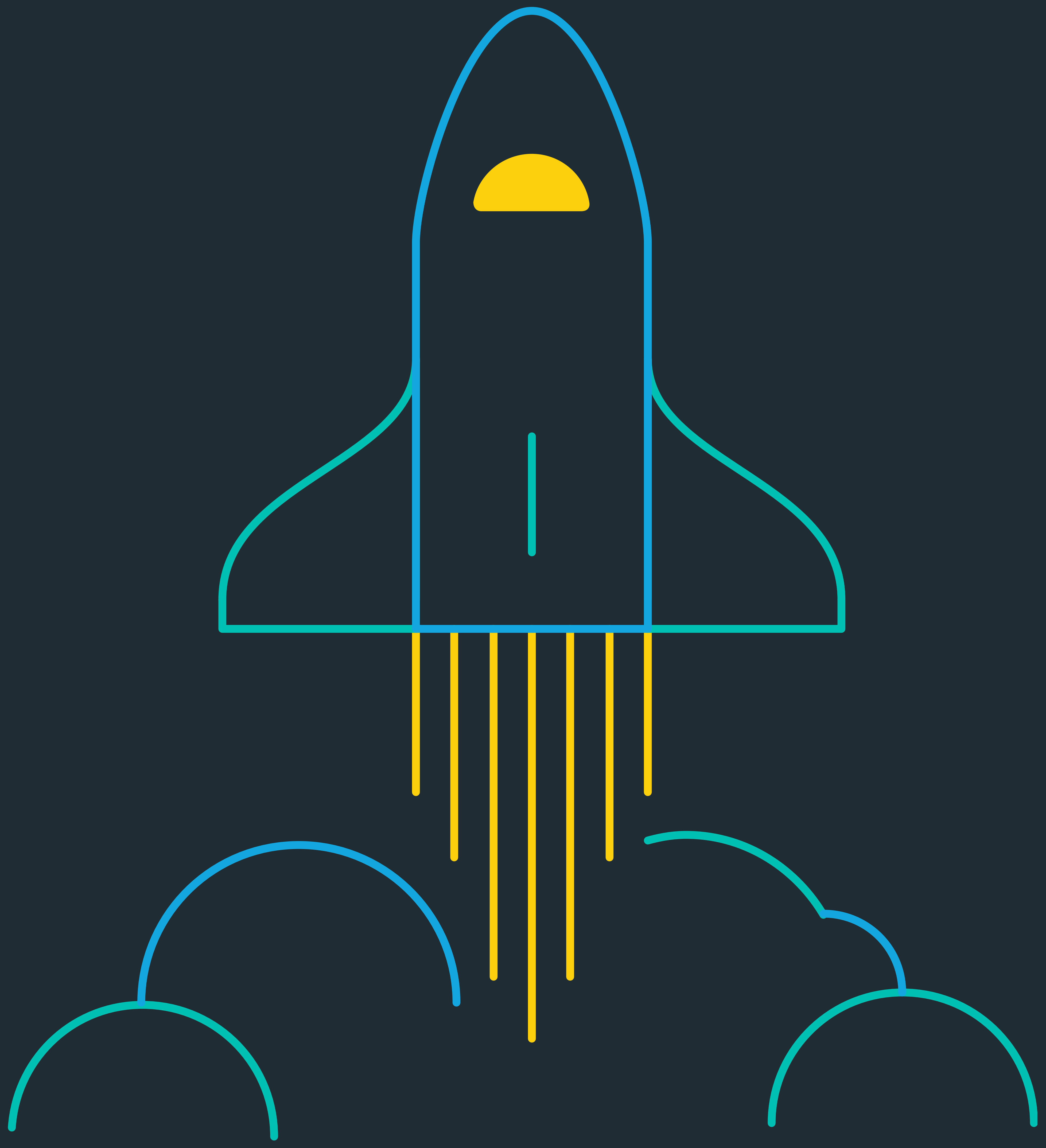
Discussion

… ask all the things!



Links

- Elasticsearch
  - https://www.elastic.co/blog/easier-relevance-tuning-elasticsearch-7-0
  - https://www.elastic.co/blog/faster-retrieval-of-top-hits-in-elasticsearch-with-block-max-wand
  - https://www.elastic.co/blog/creating-frozen-indices-with-the-elasticsearch-freeze-index-api
  - https://www.elastic.co/blog/follow-the-leader-an-introduction-to-cross-cluster-replication-in-elasticsearch
  - https://www.elastic.co/blog/moving-from-types-to-typeless-apis-in-elasticsearch-7-0
  - https://www.elastic.co/blog/improving-node-resiliency-with-the-real-memory-circuit-breaker
  - https://www.elastic.co/blog/a-new-era-for-cluster-coordination-in-elasticsearch
  - https://www.elastic.co/elasticon/conf/2018/sf/reliable-by-design-applying-formal-methods-to-distributed-systems
  - https://github.com/elastic/elasticsearch-formal-models
  - C3: https://www.usenix.org/system/files/conference/nsdi15/nsdi15-paper-suresh.pdf
- Beats
  - https://www.elastic.co/blog/introducing-auditbeat-system-module

Links

- https://www.elastic.co/blog/security-for-elasticsearch-is-now-free
- https://www.elastic.co/blog/introducing-elastic-cloud-on-kubernetes-the-elasticsearch-operator-and-beyond