Streaming data case study

STREAMING DATA WITH AWS KINESIS AND LAMBDA

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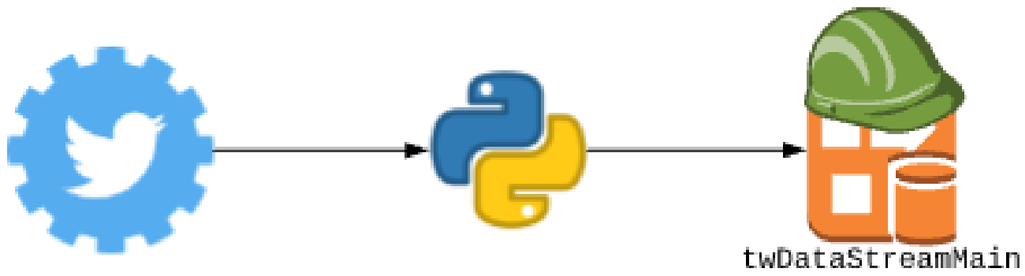
This chapter

- Send incoming data to Firehose
- Store data
- Visualize data
- Set alerts in real-time
- Monitor the stream
- Meet a set of requirements

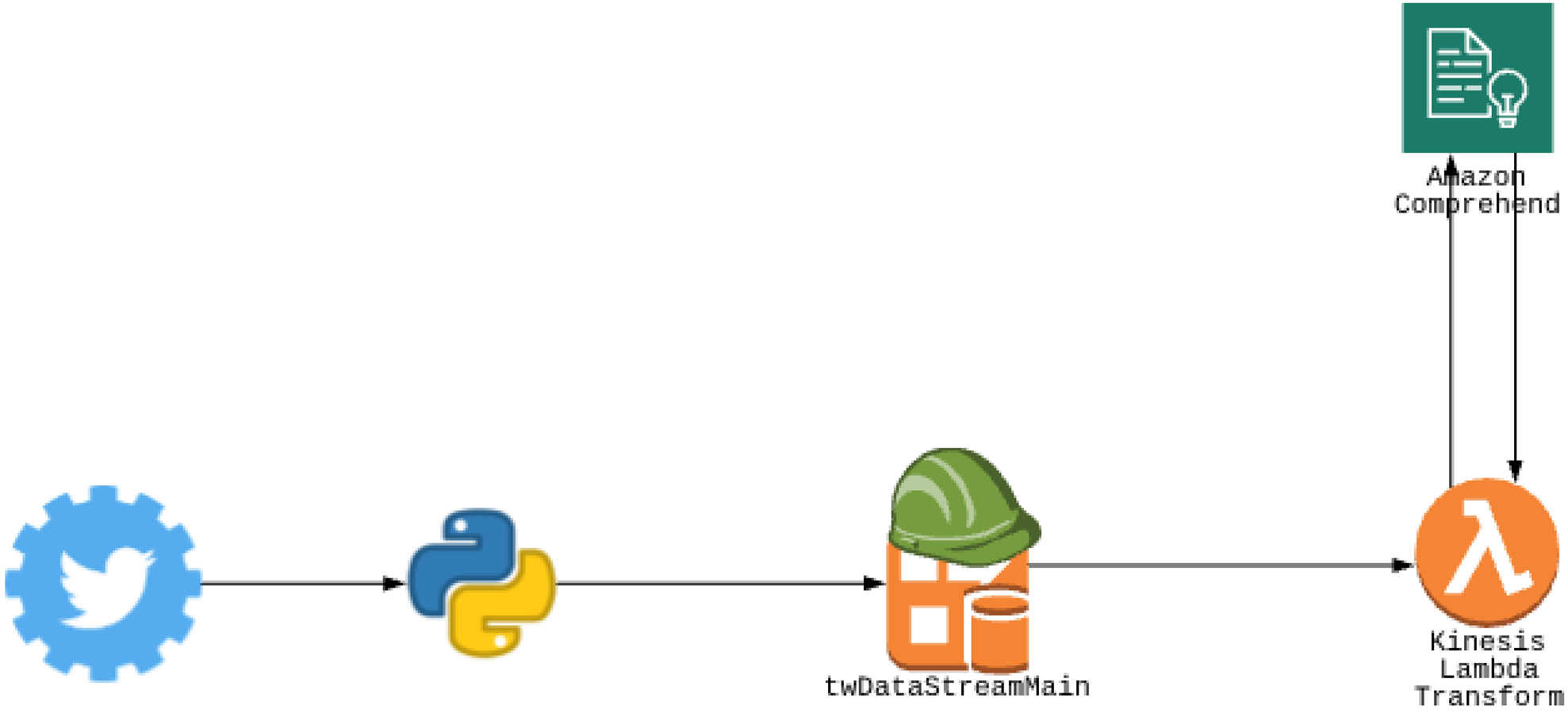
Requirements

- Tweets must include #sandiego hashtag
- Tweets must come in real time
- Tweets must come enriched with sentiment
- Visualize last 15 minutes of data
- Notify manager if >3 negative tweets in 5 minute interval
- The stream should minimize data loss due to downtime
- Data must persist to be analyzed later

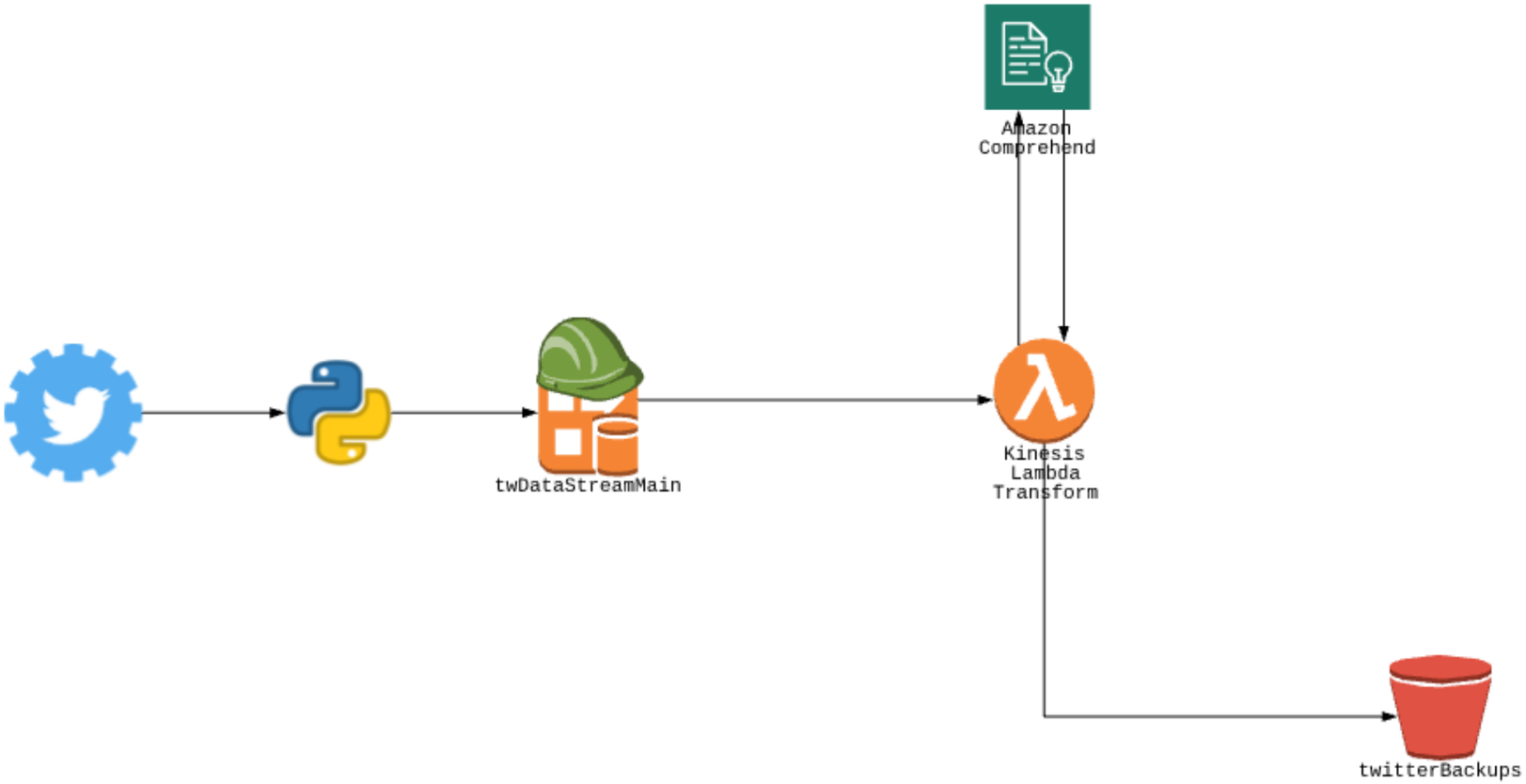
Tweets come in real-time



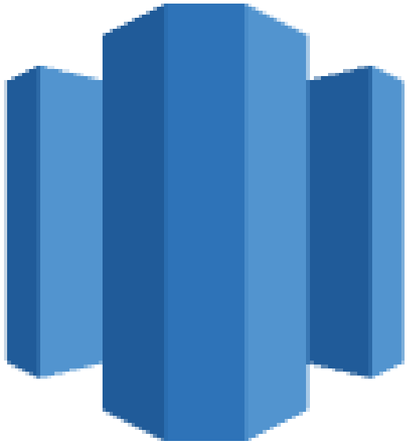
Enriched with sentiment



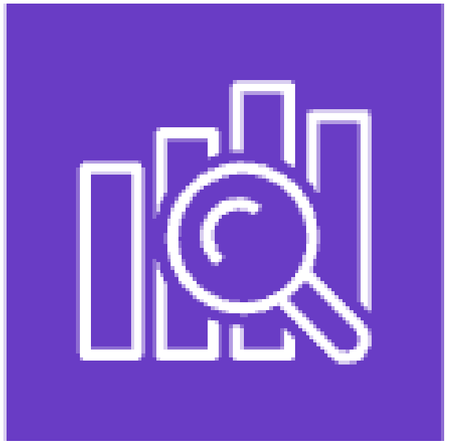
Data must persist for later analysis



Visualize last 15 minutes



Amazon Redshift



Amazon Elasticsearch Service

Redshift vs Elasticsearch

Redshift

- Designed for storing clean tables of data
- Schema is defined in database
- SQL for queries
- Works great with BI tools like Tableau

Elasticsearch

- Schemaless - good for logs and text
- Schema is created during query
- Uses its own language for queries
- Has its own UI - Kibana

Let's practice!

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Creating an Elasticsearch cluster

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Monitoring performance

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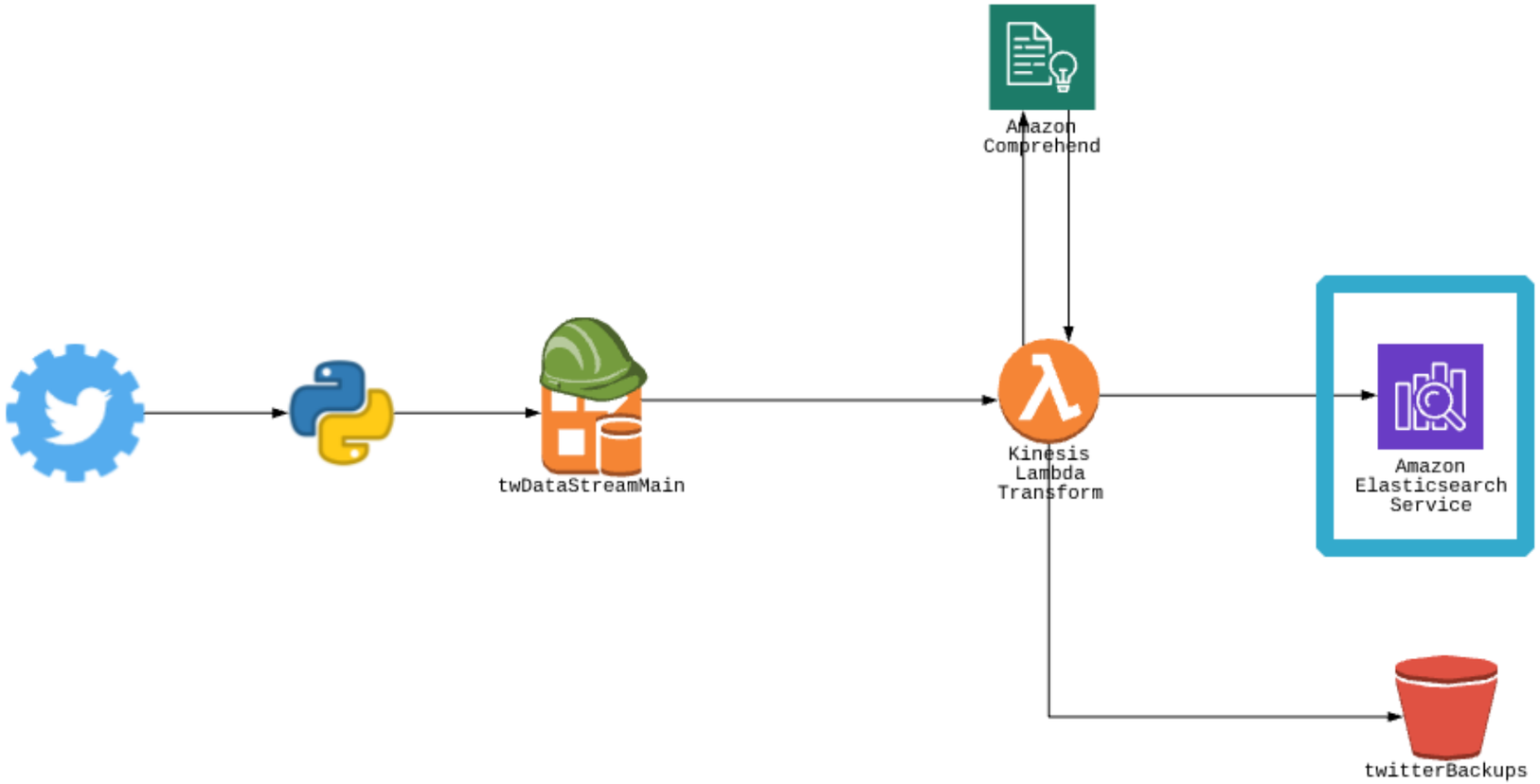
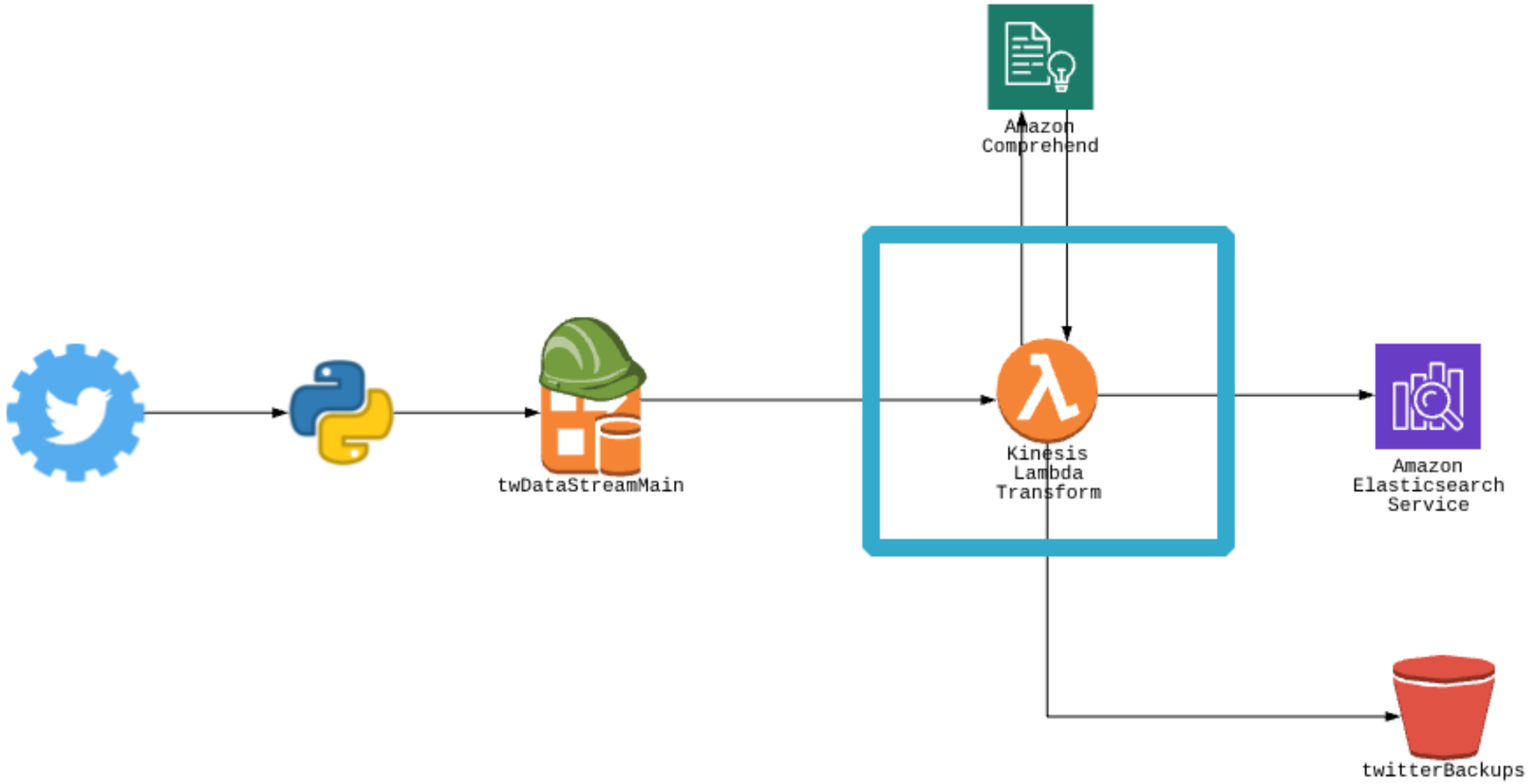
Last lesson


Amazon
Comprehend
twDataStreamMain
Kinesis
Lambda
Transform
Amazon
Elasticsearch
Service
twitterBackups

Lambda transform



Lambda transform

```
def lambda_handler(event, context):
    comprehend = boto3.client('comprehend',
                              region_name='us-east-1',
                              aws_access_key_id = AWS_KEY,
                              aws_secret_access_key=AWS_SECRET)
    output = []
    for record in event['records']:
        ...
```

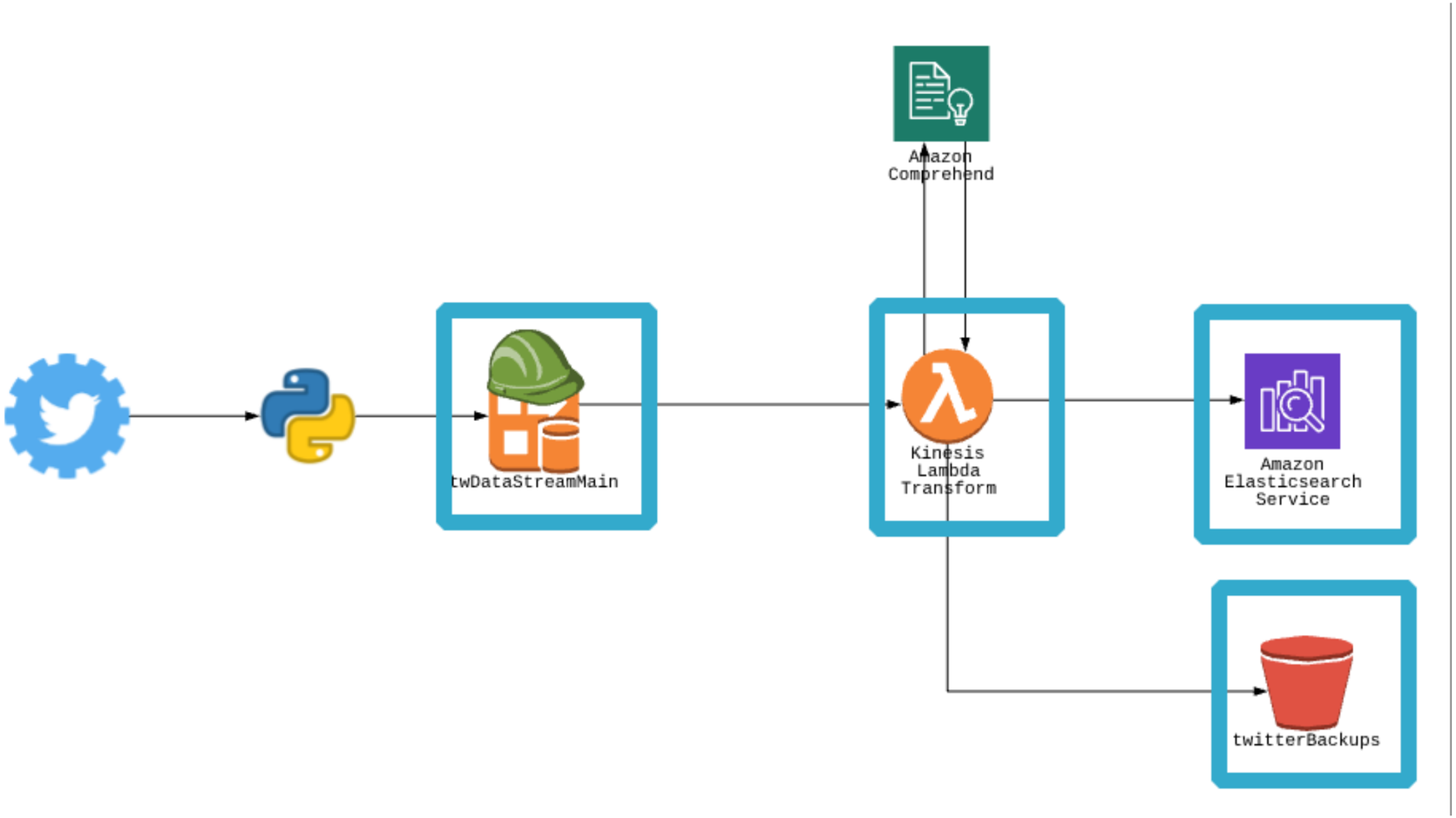
Lambda transform

```
def lambda_handler(event, context):
    ...
    for record in event['records']:
        dict_data = base64.b64decode(record['data']).decode('utf-8').strip()
        dict_data = json.loads(dict_data)
        sentiment_all = comprehend.detect_sentiment(
          Text=dict_data['text'],
          LanguageCode=dict_data['lang'])
        dict_data['sentiment'] = sentiment_all['Sentiment']
        ...
```

Lambda transform

```
def lambda_handler(event, context):
    ...
    for record in event['records']:
        ...
        output_record = {
            'recordId': record['recordId'],
            'result': 'Ok',
            'data': base64.b64encode(json.dumps(dict_data).encode('utf-8'))
        }
        output.append(output_record)
    return {'records': output}
```

Wiring it up


Amazon
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Lambda
Transform
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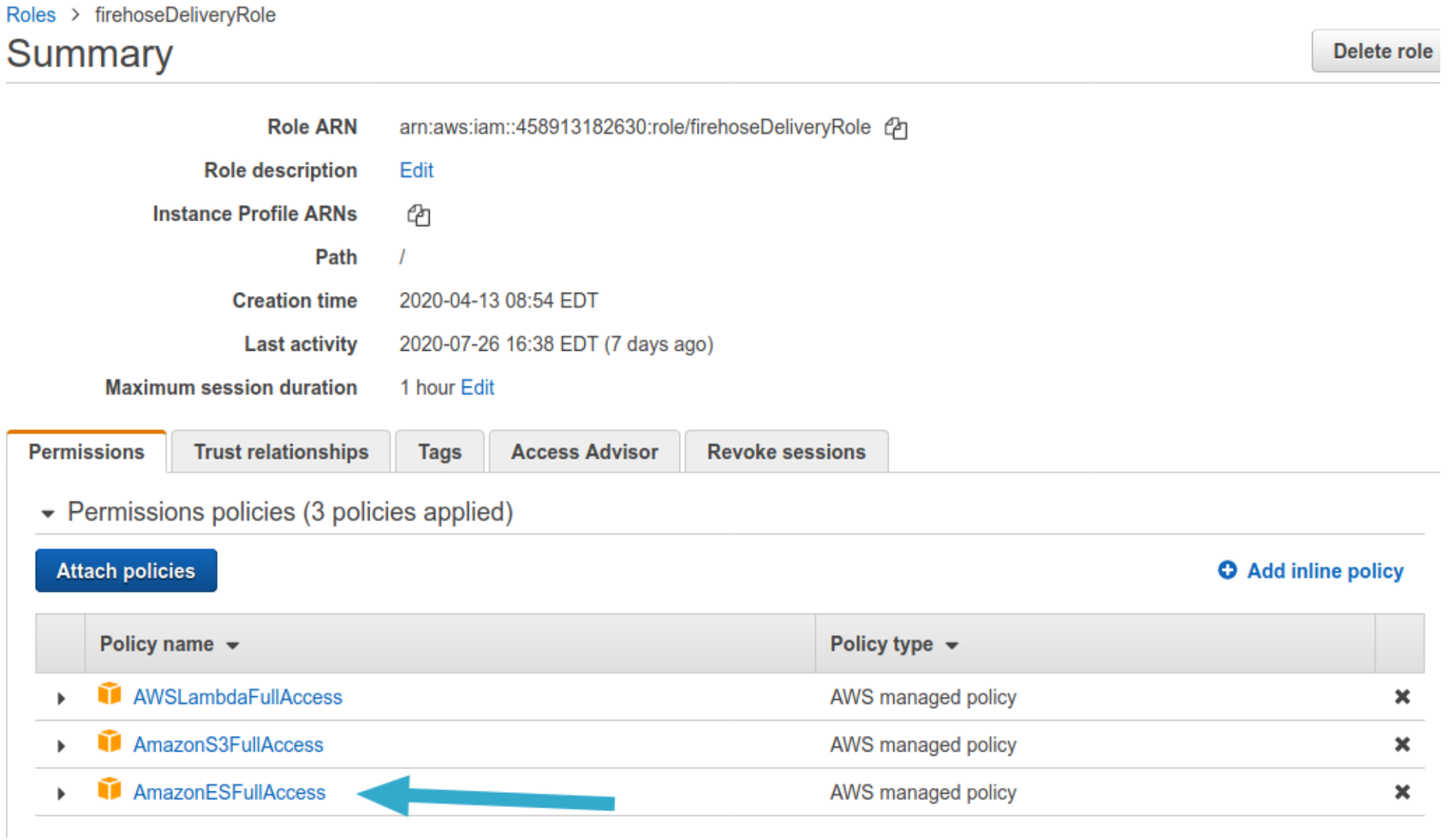
Service
twitterBackups

Update firehoseDeliveryRole



Create delivery stream

Amazon Elasticsearch Service destination

Domain

You can select a domain that resides within a VPC or one that uses a public endpoint. If your domain uses a public endpoint, you don't need to configure this delivery stre

Learn more

tw-data-domain-1

Create new

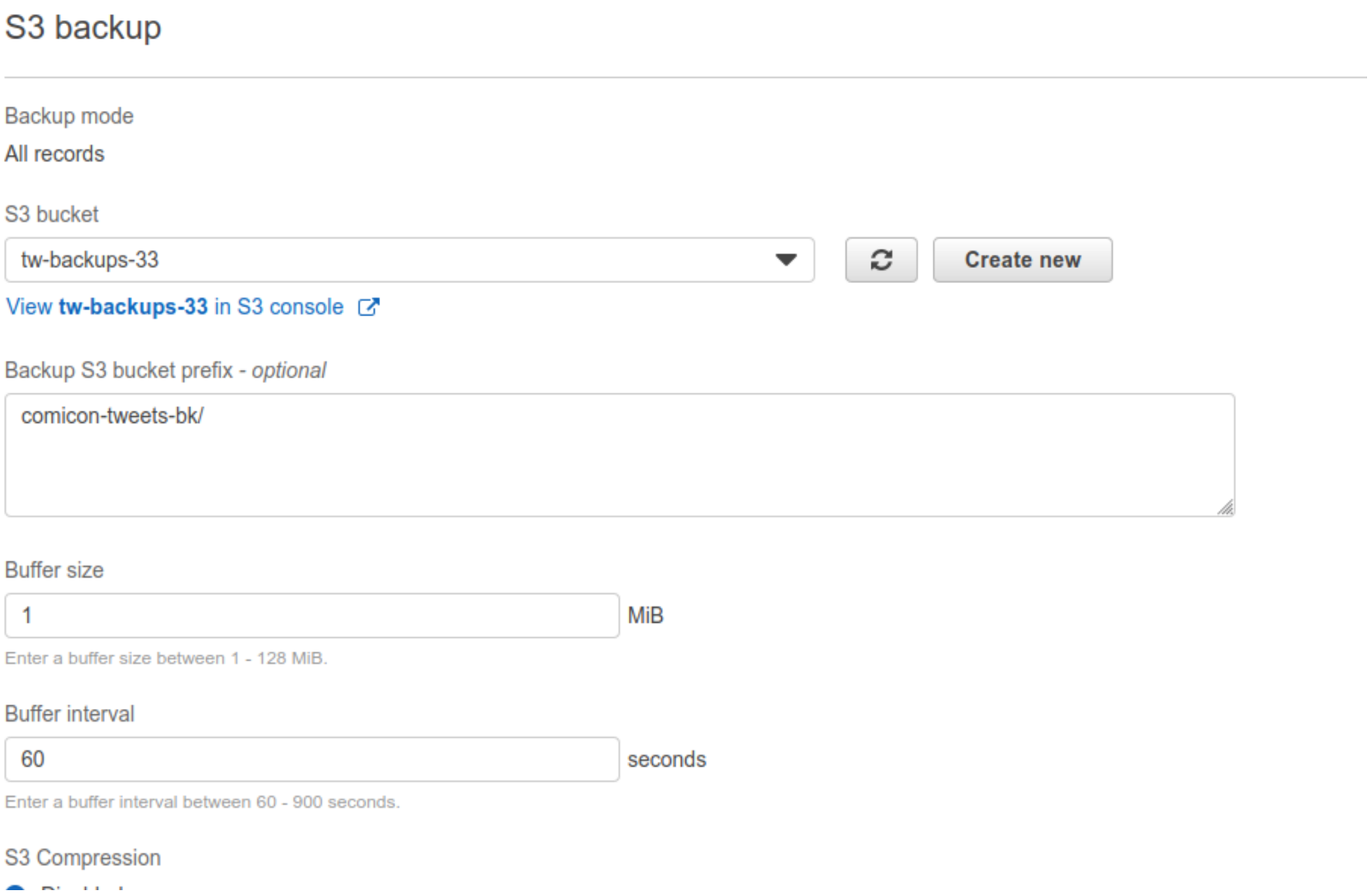
View **tw-data-domain-1** in Amazon Elasticsearch Service

Index

sd_tweets_tr

A new index will be created if the the specified index name does not exist.

Create delivery stream

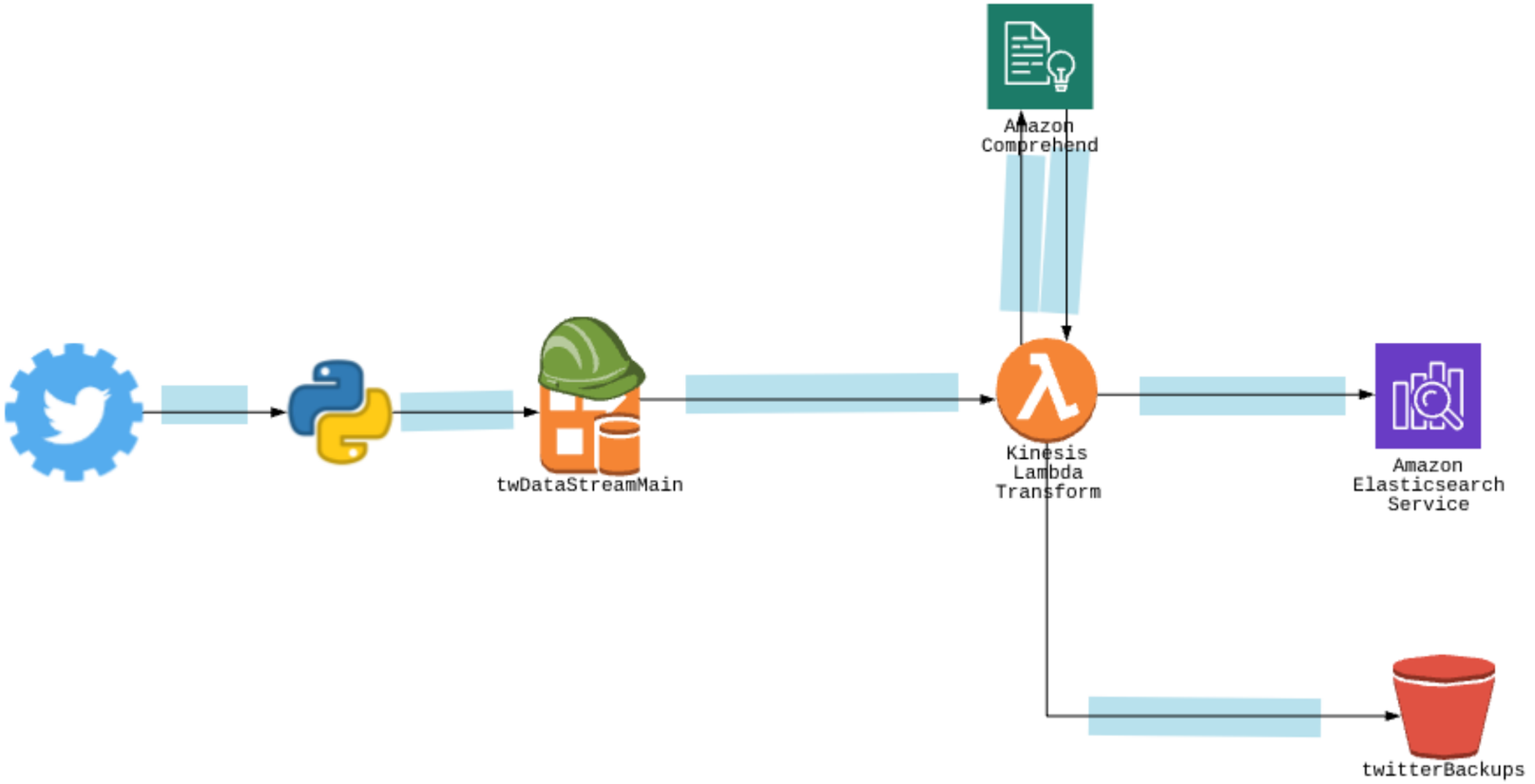


Cloudwatch

> The stream should minimize data loss due to downtime.

- Logs (raw data)
- Metrics (measures of various activities of the service)
- Alarms (notifications when a metric is out of a specified range)
- Dashboards (metrics visualization)

Failure points



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Cloudwatch dasbhoards and alarms

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Visualizing streaming data

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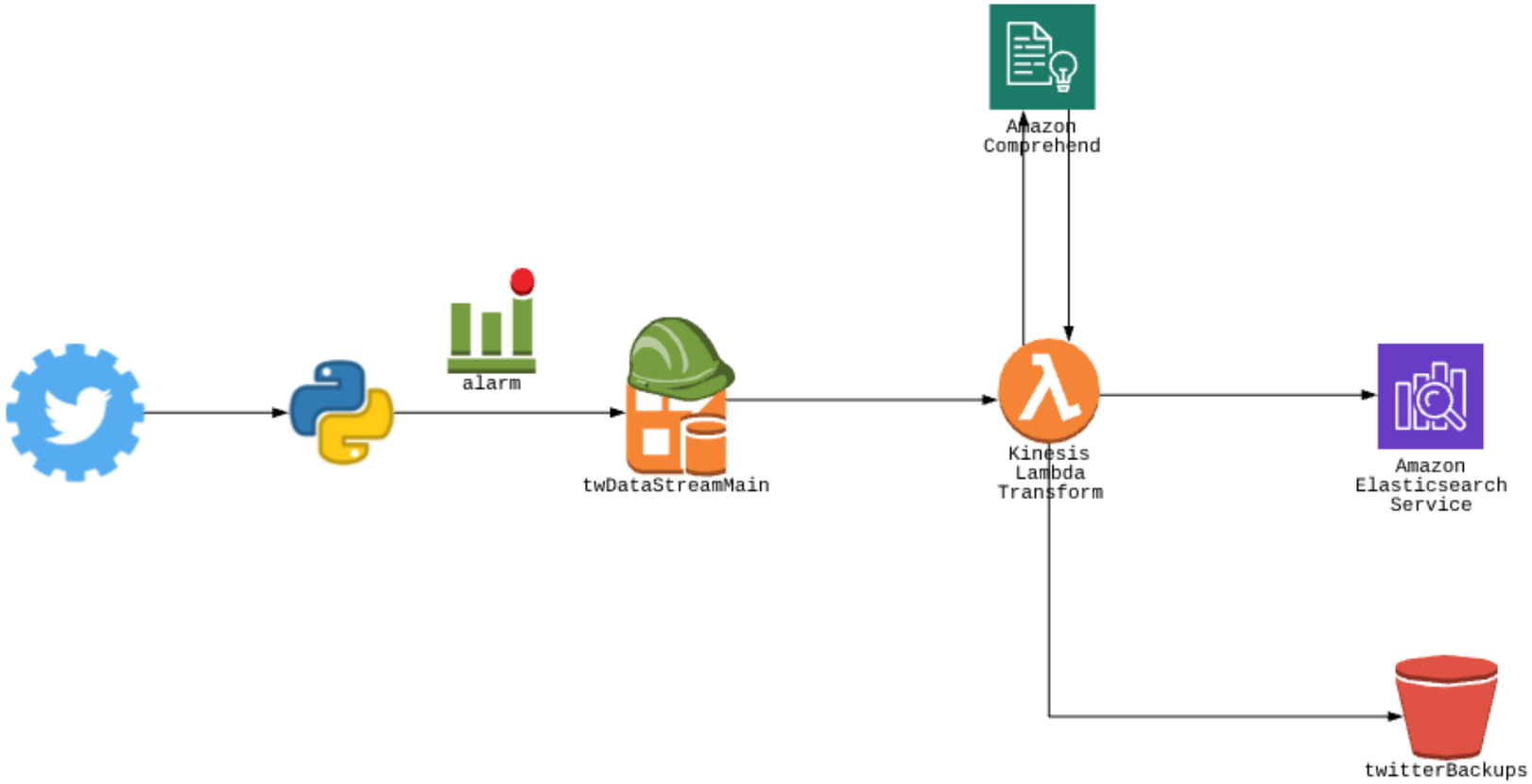
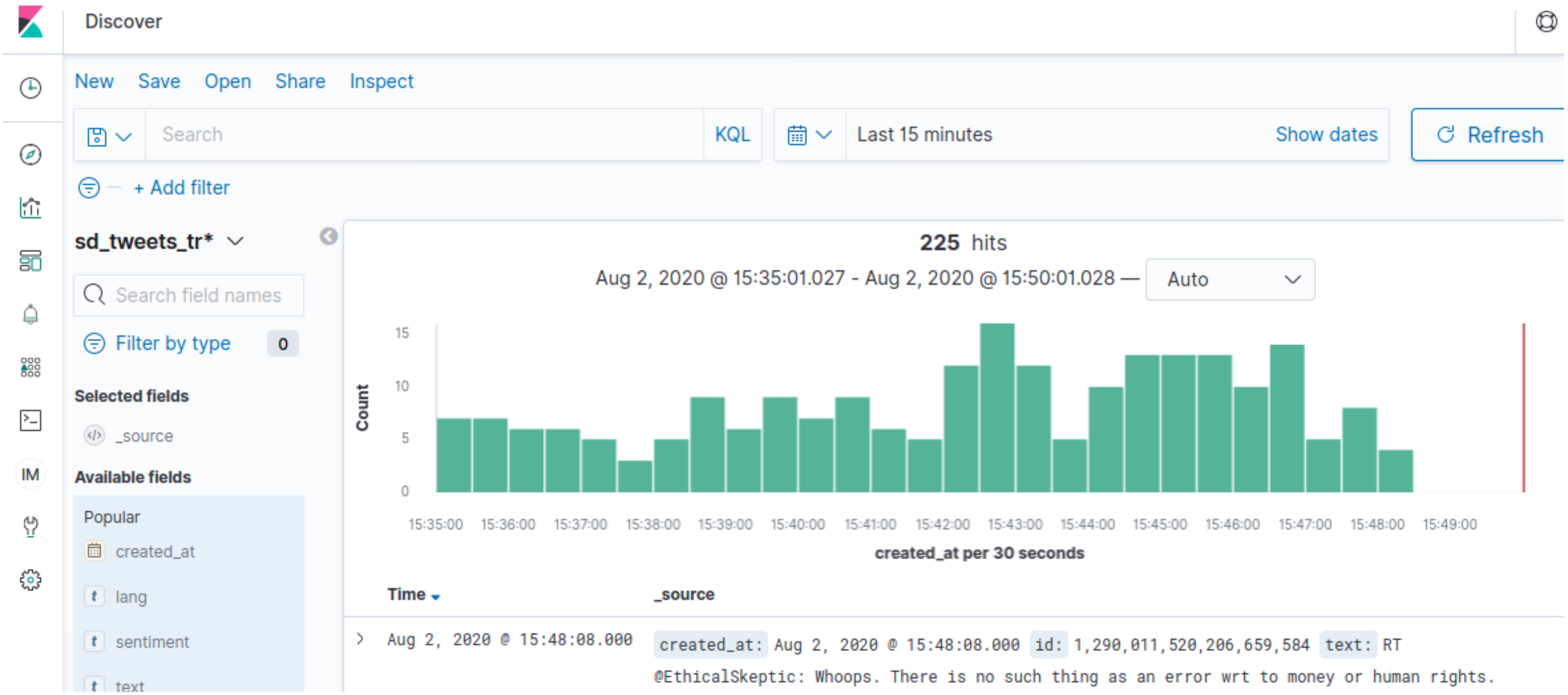
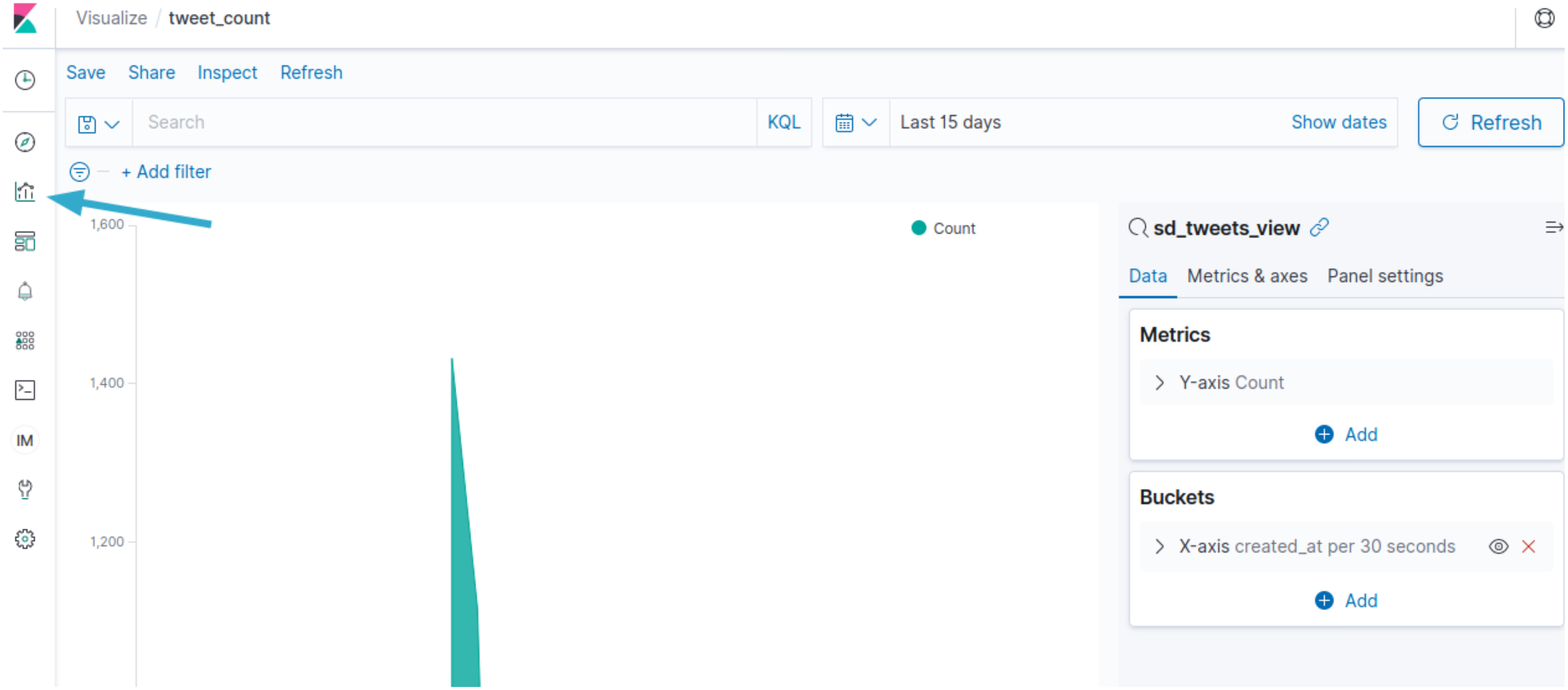
Our pipeline so far



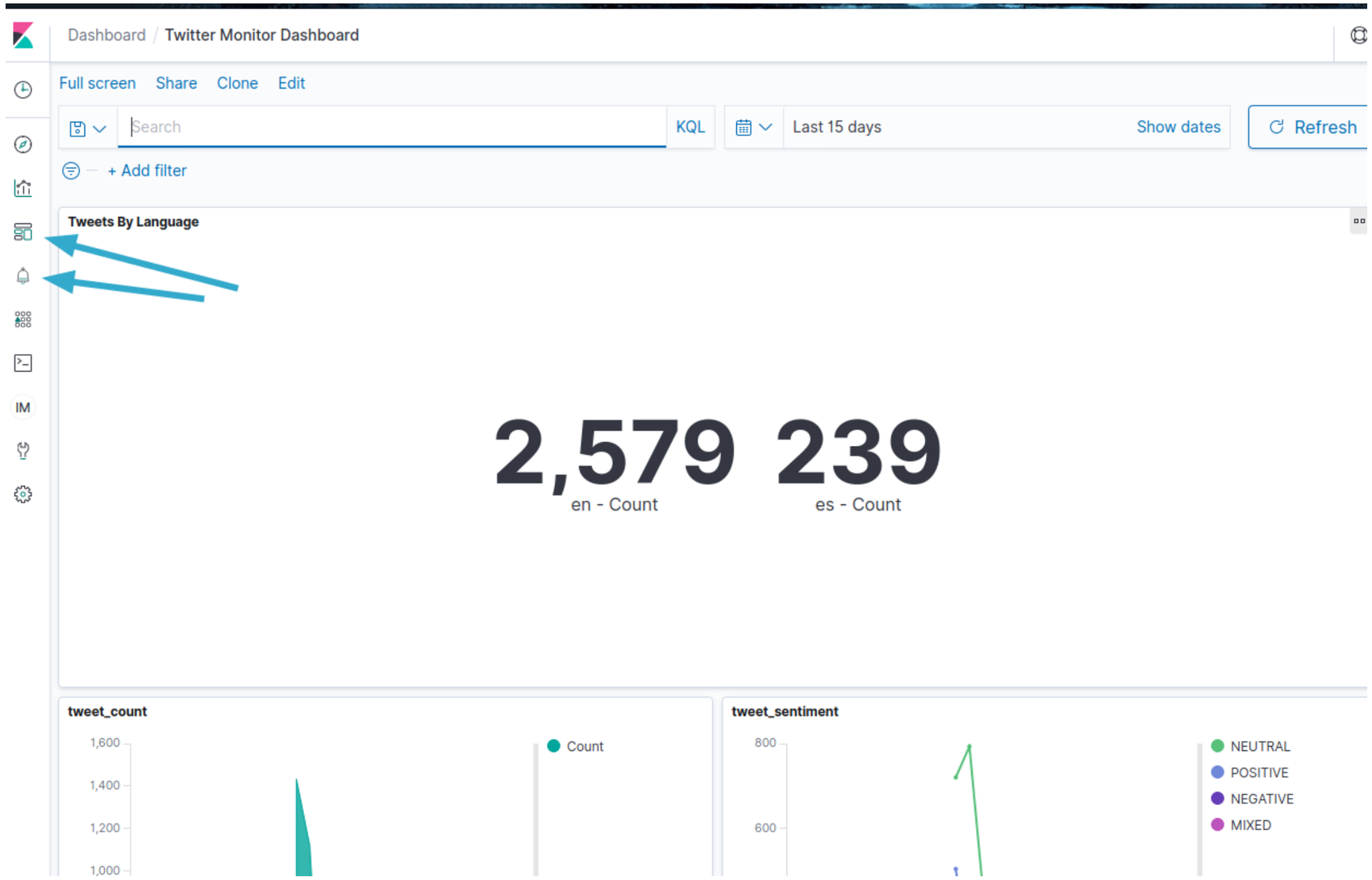
Kibana Discover view



Kibana visualizations



Dashboards and alerts



Elasticsearch vs CloudWatch

CloudWatch

- AWS centric
- Can accept custom data, but not primary use case
- Great for working with logs

Elasticsearch

- General, open source tool
- Accepts custom data, including logs
- Better viz than CloudWatch
- Robust plugin ecosystem

Let's practice!

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Working with ElasticSearch using Kibana

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