PYCON ODESSA

Go && Python
Event driven ML

Lalafo case

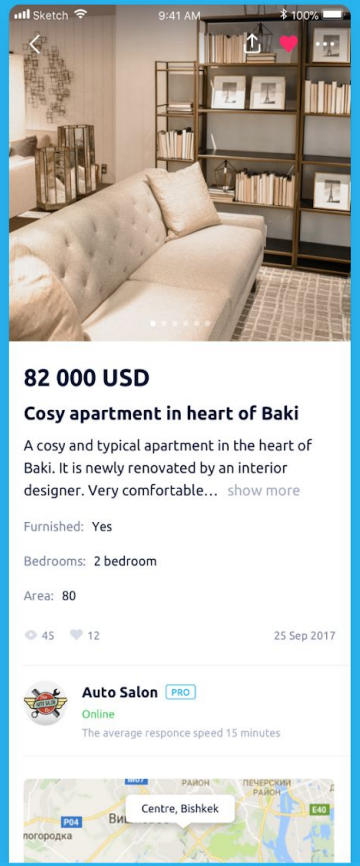
Новые функции

Искусственный интеллект помогает продавать

lalafo использует собственную технологию компьютерного зрения и распознает товары по фотографии.

Bicycle

Loudspeakers



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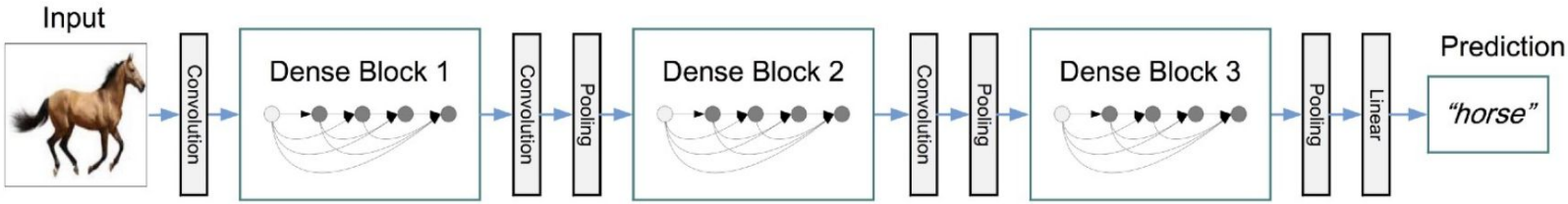
How it all started

Part 1. The Phantom Menace



PYTORCH

python™

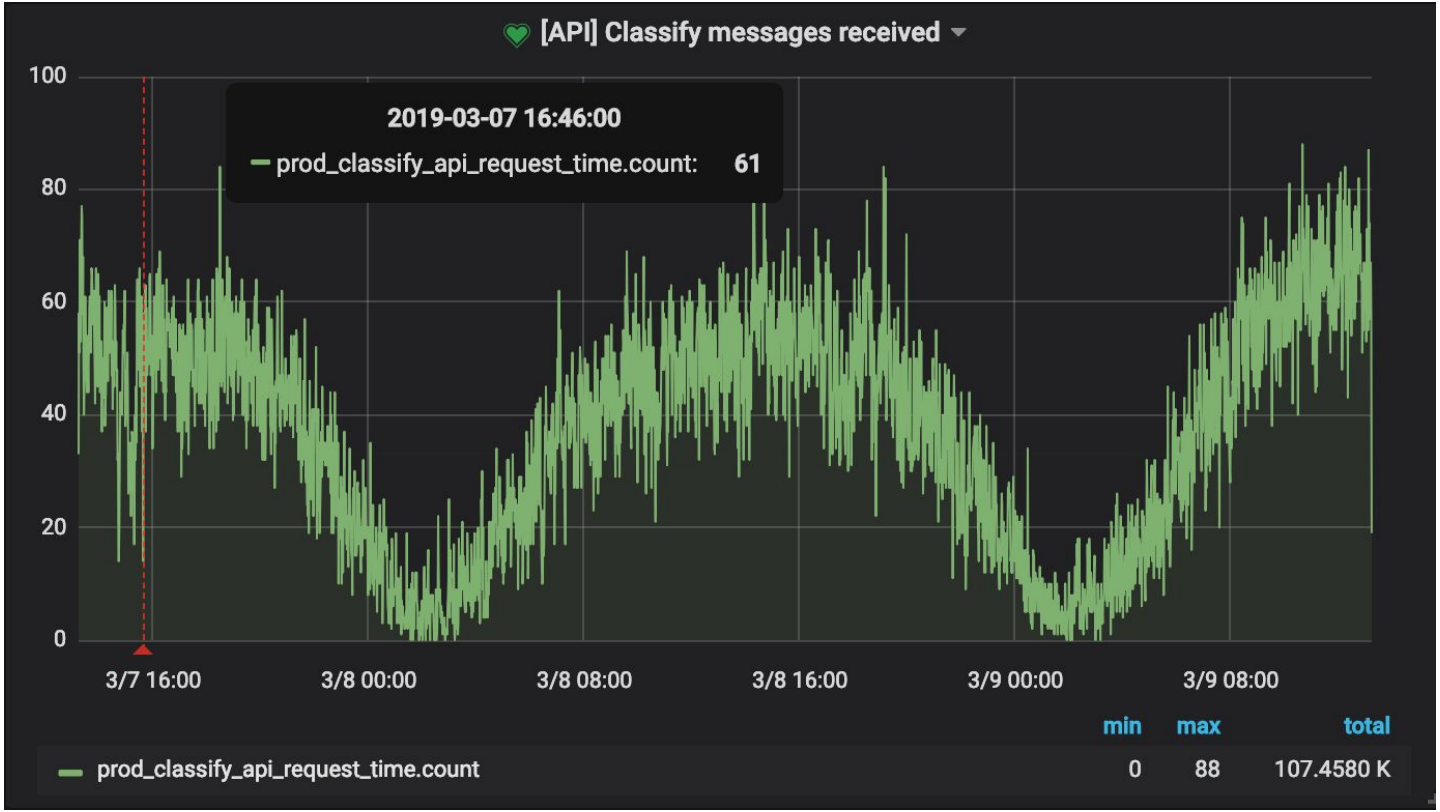
Tornado

amazon web services™

```python
class ClassifyHandler(tornado.web.RequestHandler):
    executor = ThreadPoolExecutor(2)

    @run_on_executor
    def predict(self, data):
        results = self.classifier.predict(data)
        self.storage: RedisStorage = self.get_storage()
        self.storage.save(results)

    async def post(self):
        # get data
        request_data = self.get_request_data()
        await self.predict(request_data)

class GetClassifyHandler(tornado.web.RequestHandler):
    async def get(self):
        ad_id = self.get_request_data()['ad_id']
        self.storage: RedisStorage = self.get_storage()
        results = self.storage.get(ad_id)
        self.finish({"status": "Success", "results": results})

application = tornado.web.Application([
    (r"/classify", ClassifyHandler),
    (r"/classify/results", GetClassifyHandler),
])
```

StackOverflow: Ready to rescue

200 RPM


[API] Classify messages received
100
80
60
40
20
0
2019-03-07 16:46:00
prod_classify_api_request_time.count: 61
3/7 16:00
3/8 00:00
3/8 08:00
3/8 16:00
3/9 00:00
3/9 08:00
min
max
total
prod_classify_api_request_time.count
0
88
107.4580 K

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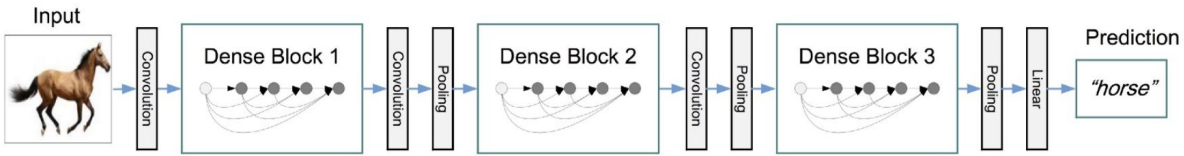


PYTORCH

python™

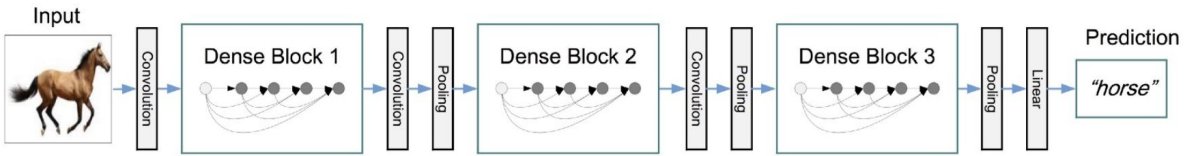
Tornado

$

amazon web services™

mongoDB.

Feedback



PYTORCH

python™

Processes Monitoring

Tornado

$

amazon web services™

RAM - expiration?

Relational DB?

mongoDB.

Feedback

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Any issues there?

1. Request monitoring (?)
2. Hard to reason GPU usage (varies 3 to 7GB)
3. ~5Gb RAM out of the box (scale?)
4. Redis is in-memory storage (temporary)
5. Threading != Parallel

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PRESS IN DIRE SITUATIONS

If you're reading this on and Android, we've released the Noooooooooooooo button as a Free App

http://www.noooooooooooooooo.com/

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What if we split API and ML

Part 2. A new hope

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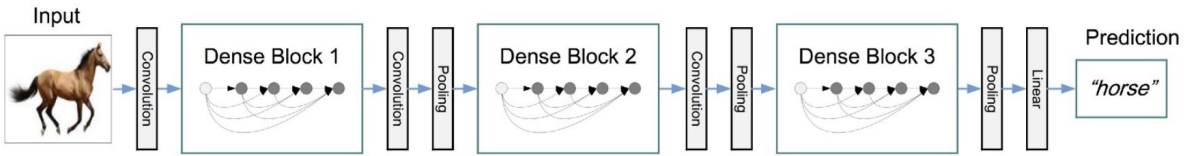
Requirements

1. Single image/request processing time: < 2 seconds
2. Visibility
3. Persistence
4. Scalability
5. Make it extendable for new features
    a. Price prediction
    b. Similarity search
    c. Segmentation
6. SDK friendly (well documented, tested etc)

Lalafo case



PYTORCH

python™

Processes Monitoring

Tornado

$

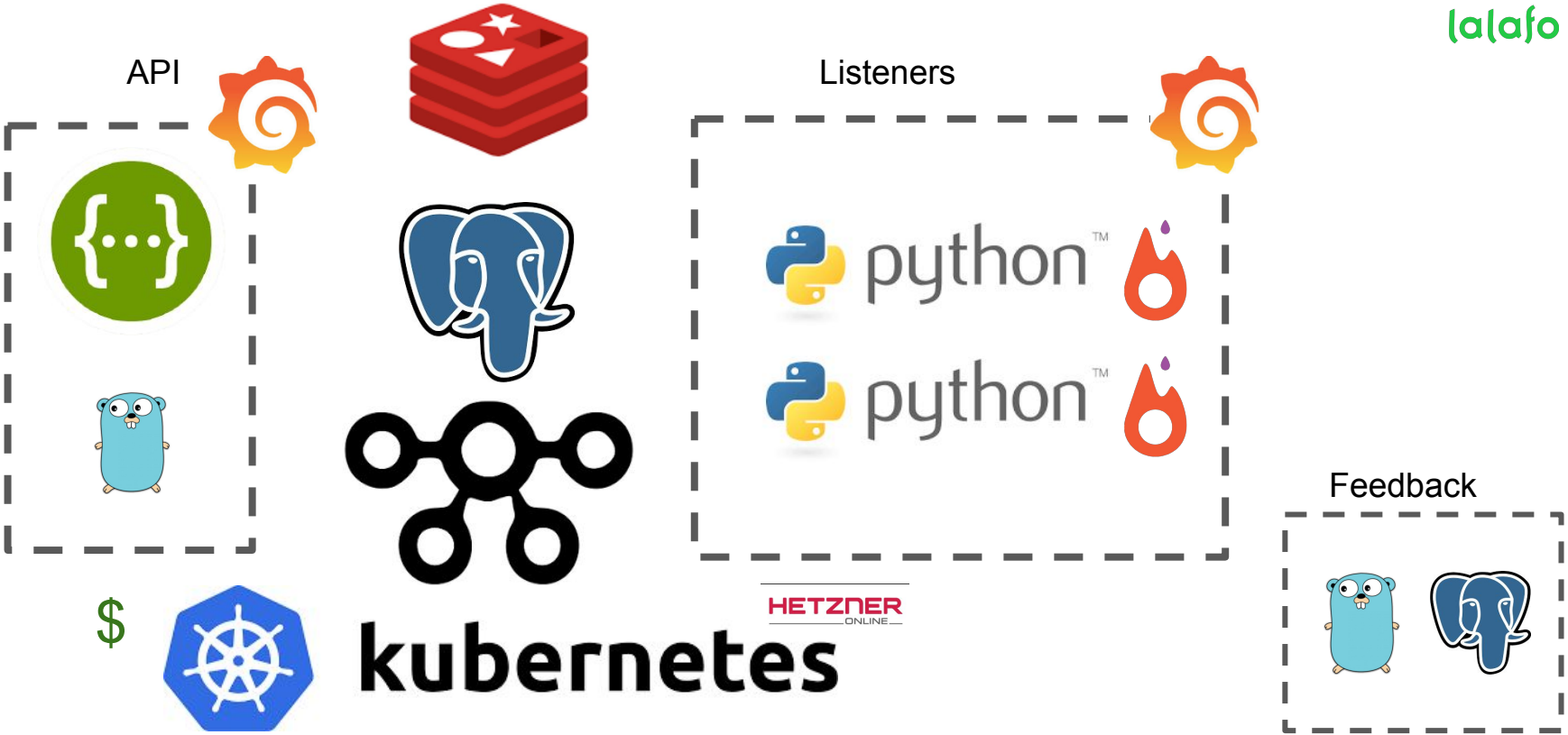
amazon web services™

RAM - expiration?

Relational DB?

mongoDB.

Feedback



After 2 months

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Requirements

1. Single image/request processing time: < 2 seconds
2. Visibility - Decouple request and prediction
3. Persistence
4. Scalability kubernetes
5. Make it extendable for new features
   a. Price prediction
   b. Similarity search
   c. Segmentation
6. SDK friendly (well documented, tested etc)

Lalafo case

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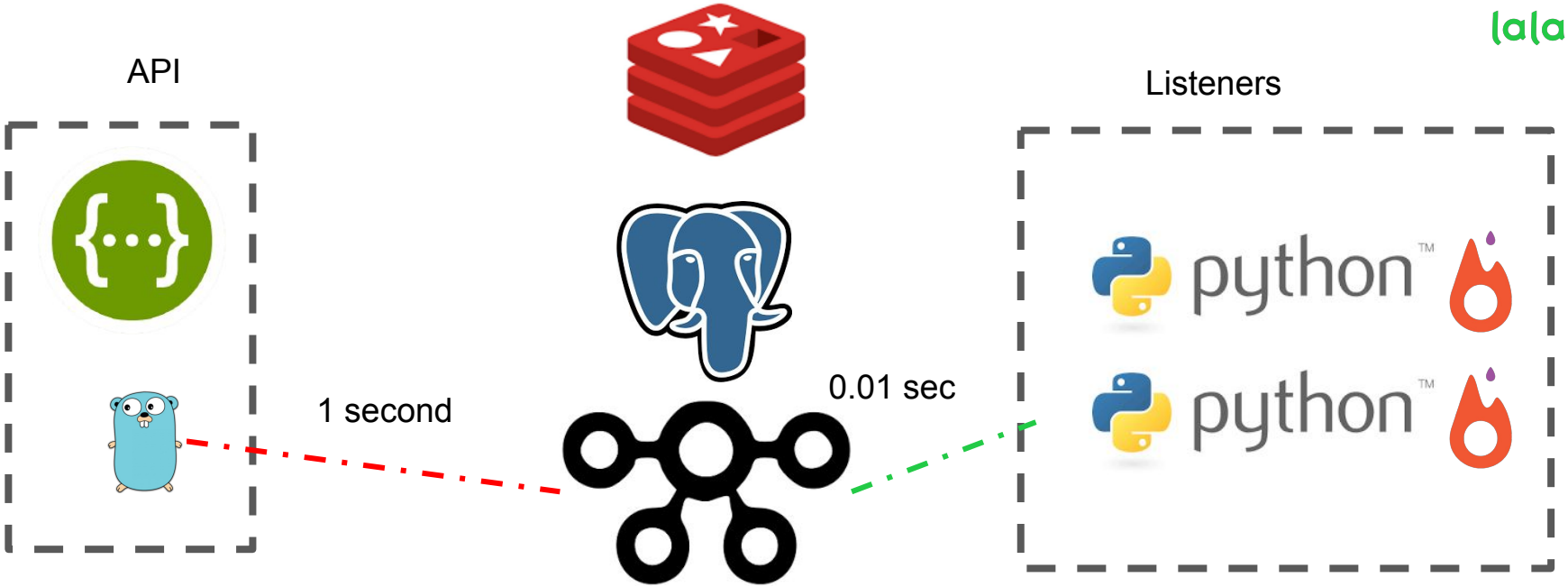
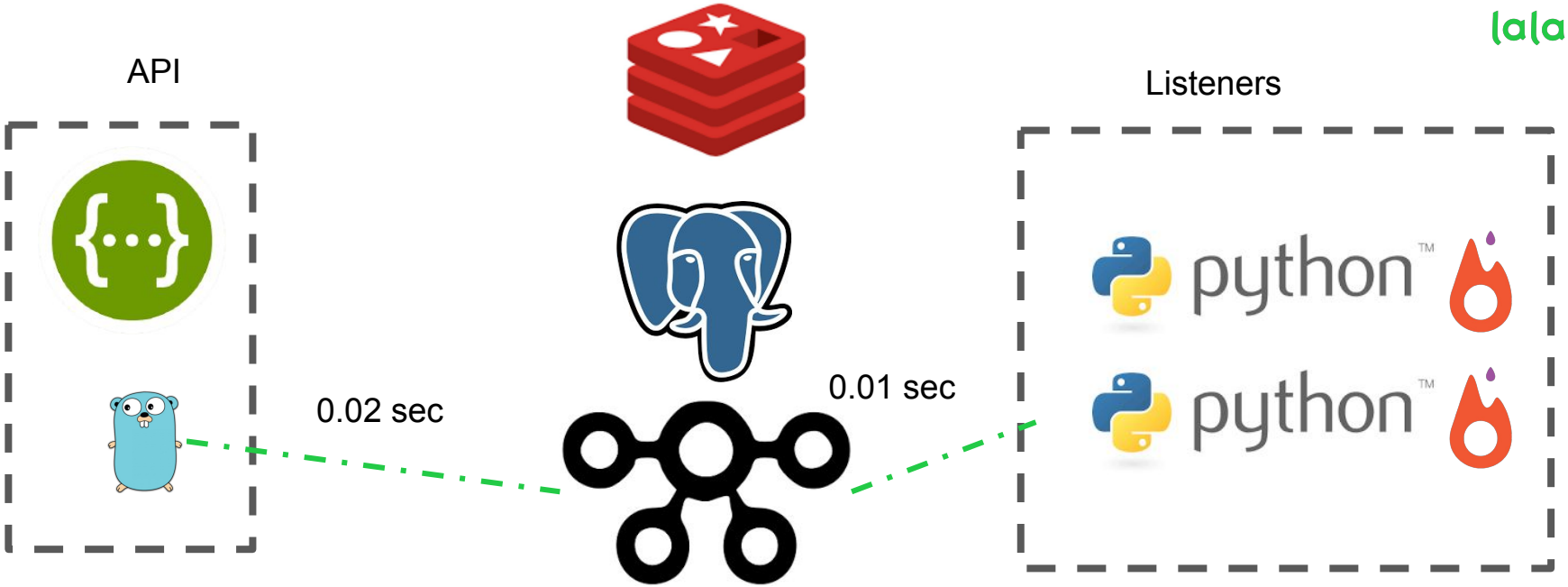
2 seconds per request

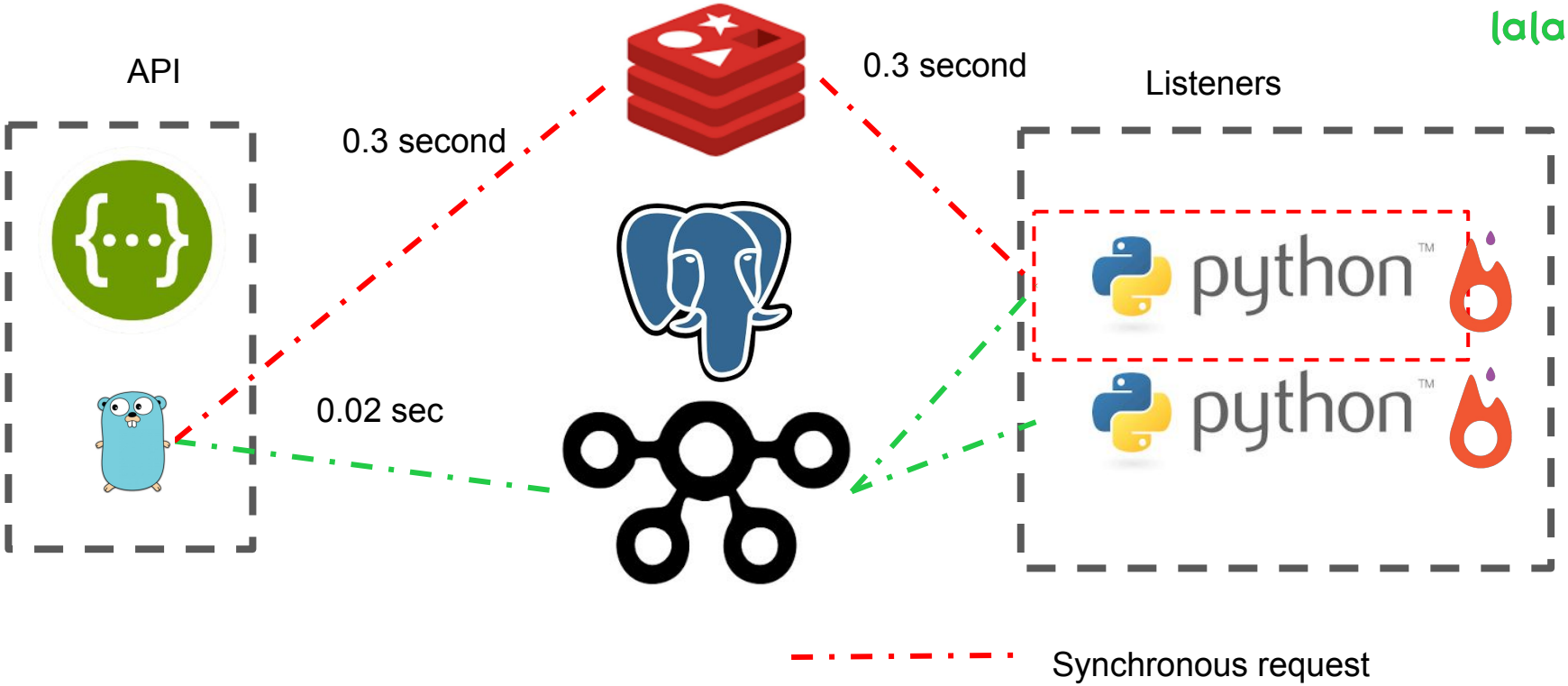
Part 3. The Empire Strikes Back



4 seconds per request



segmentio/kafka-go -> shopify/sarama



3 seconds per request

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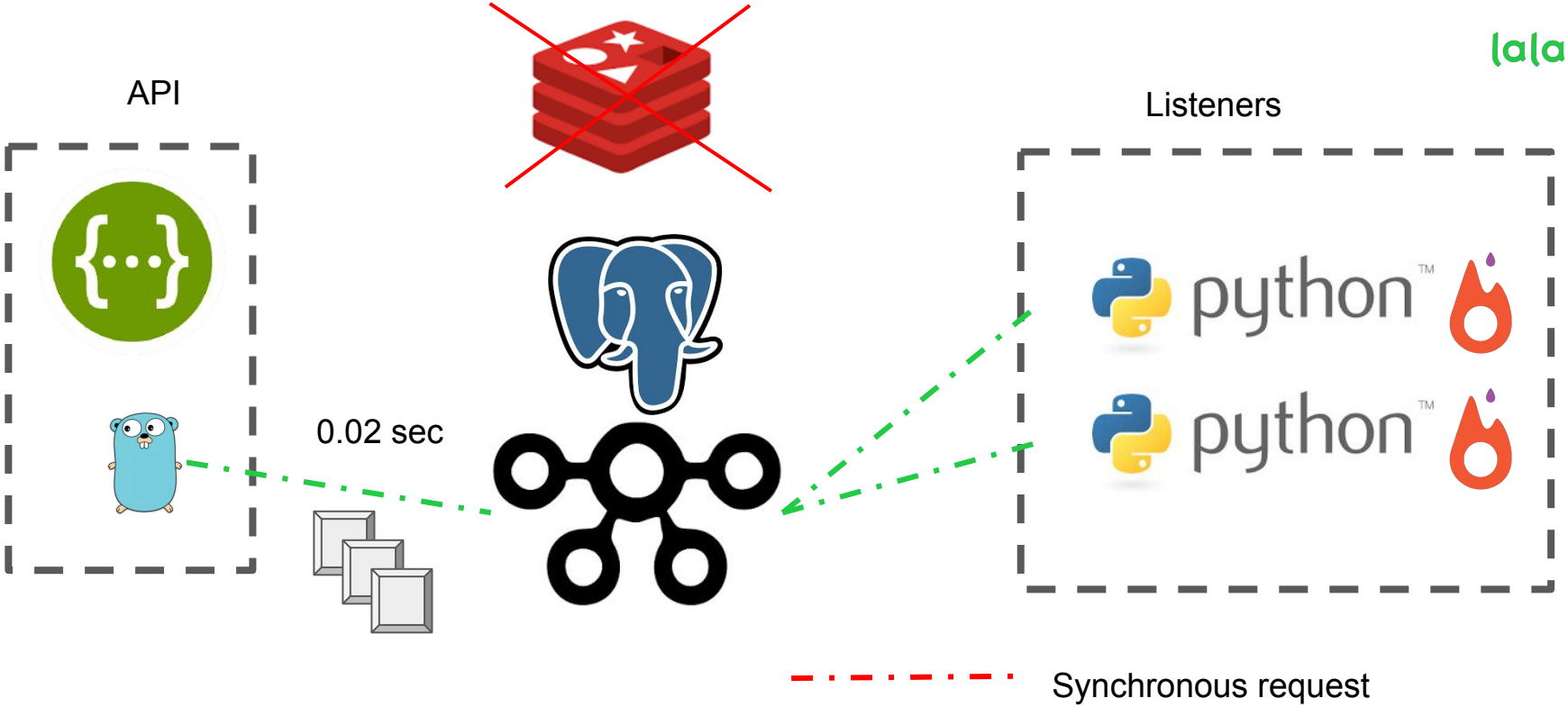
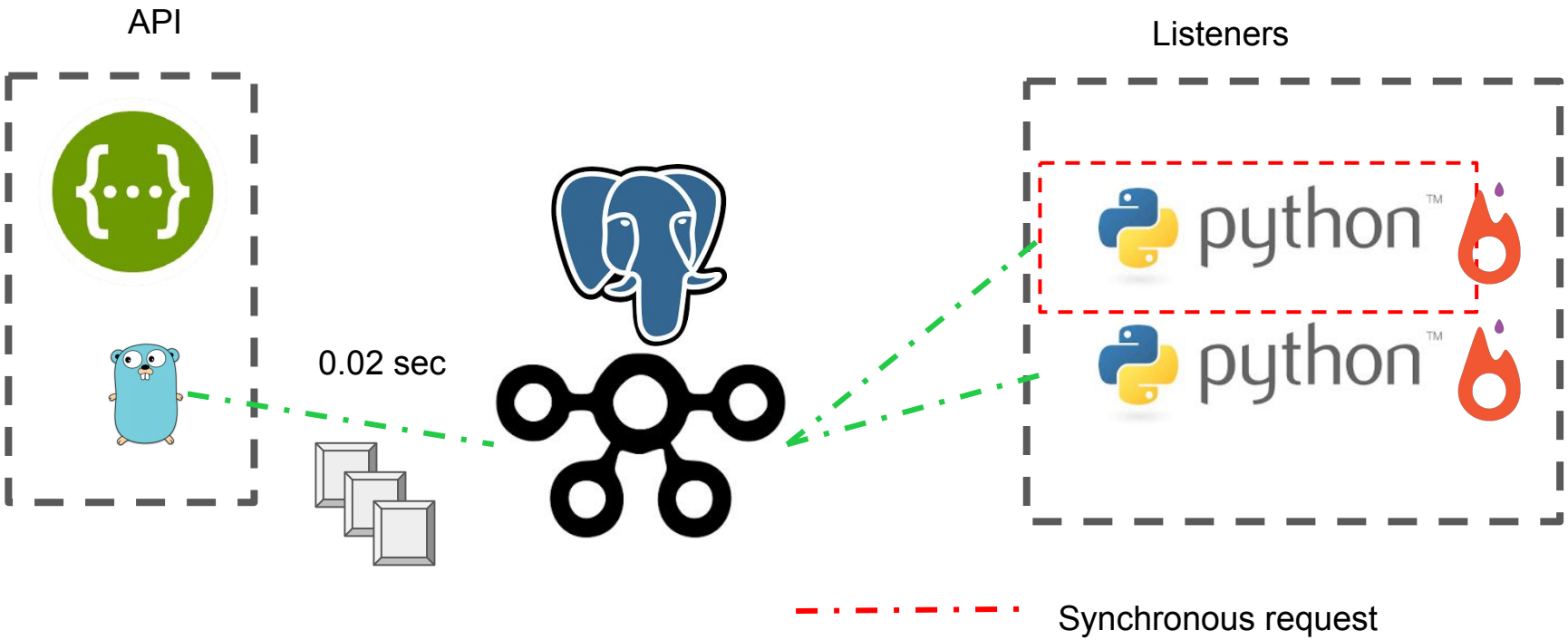
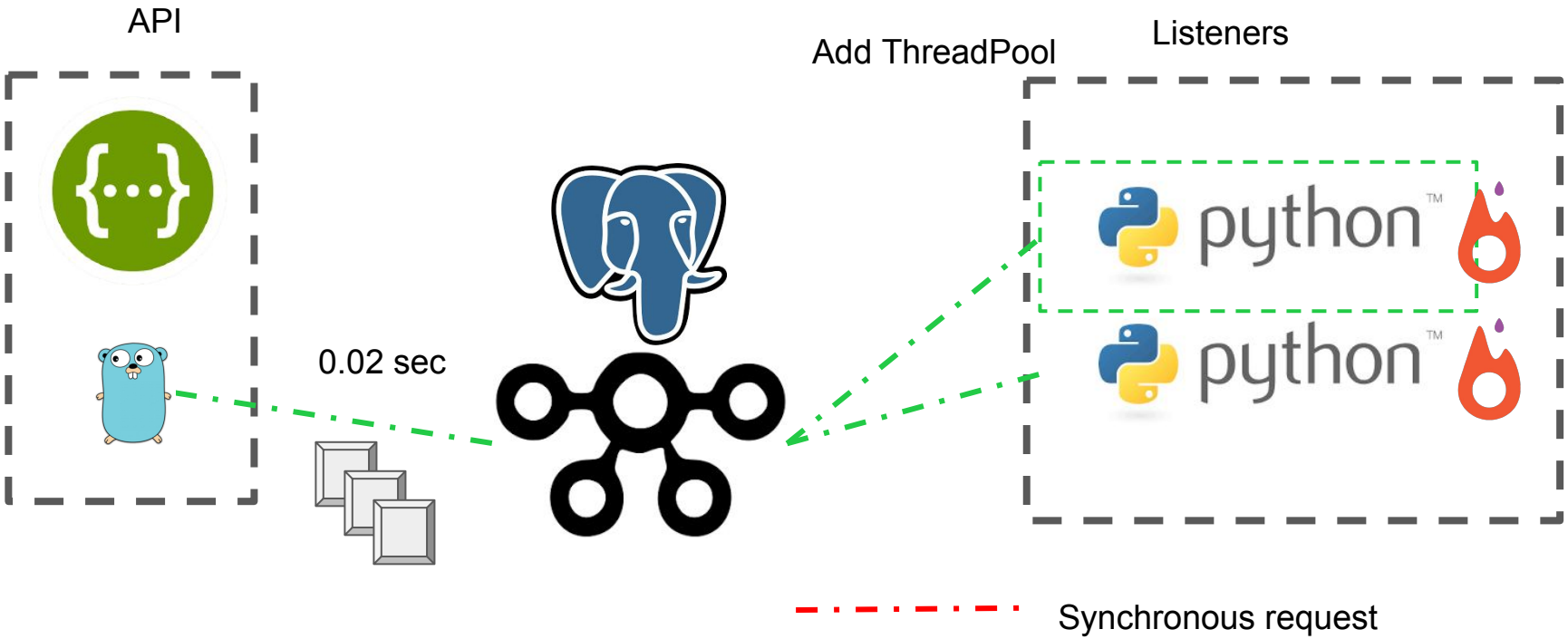
How large is every image



2.4 seconds per request



2.4 seconds per request



2 seconds per request

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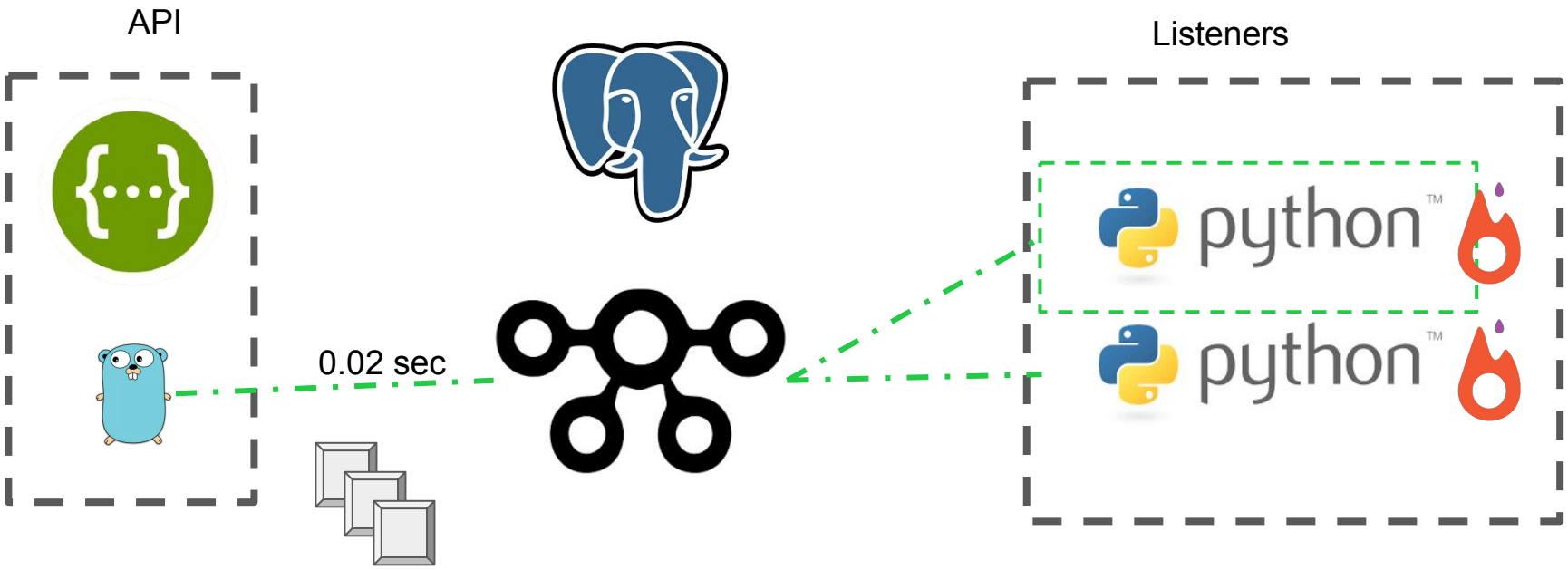
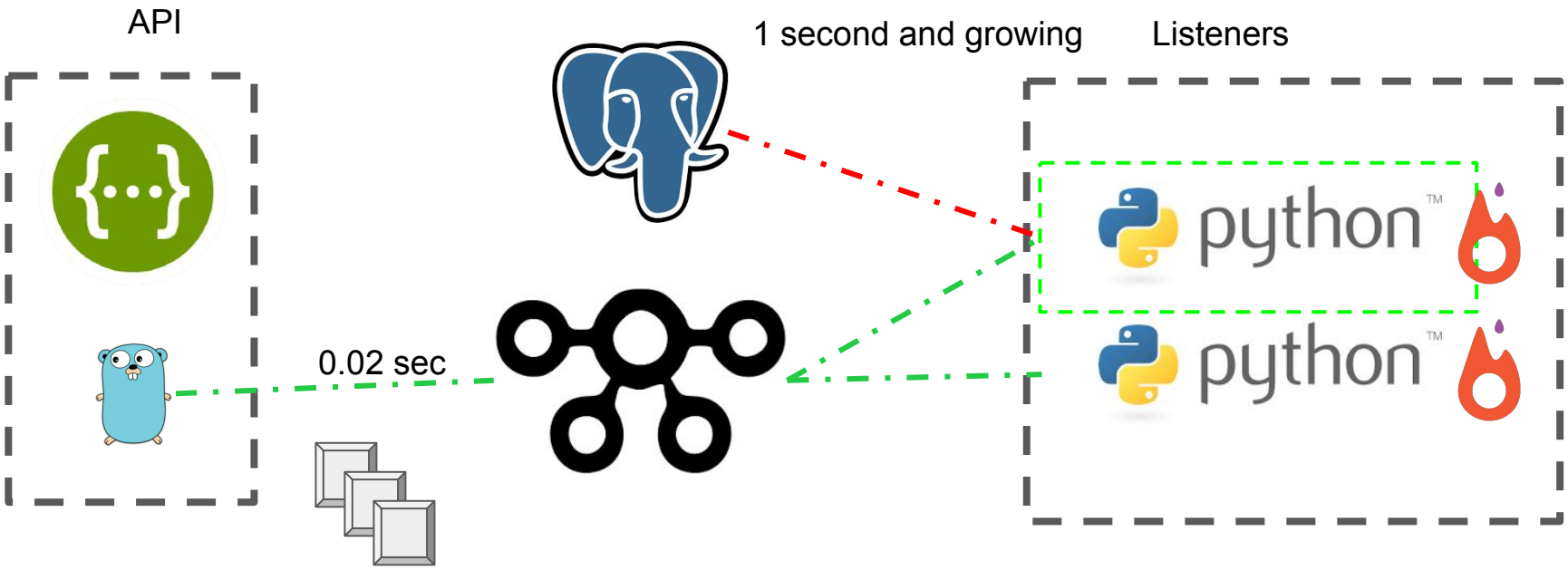
Success?
Not yet

2 seconds per request



3 seconds per request



3 seconds per request

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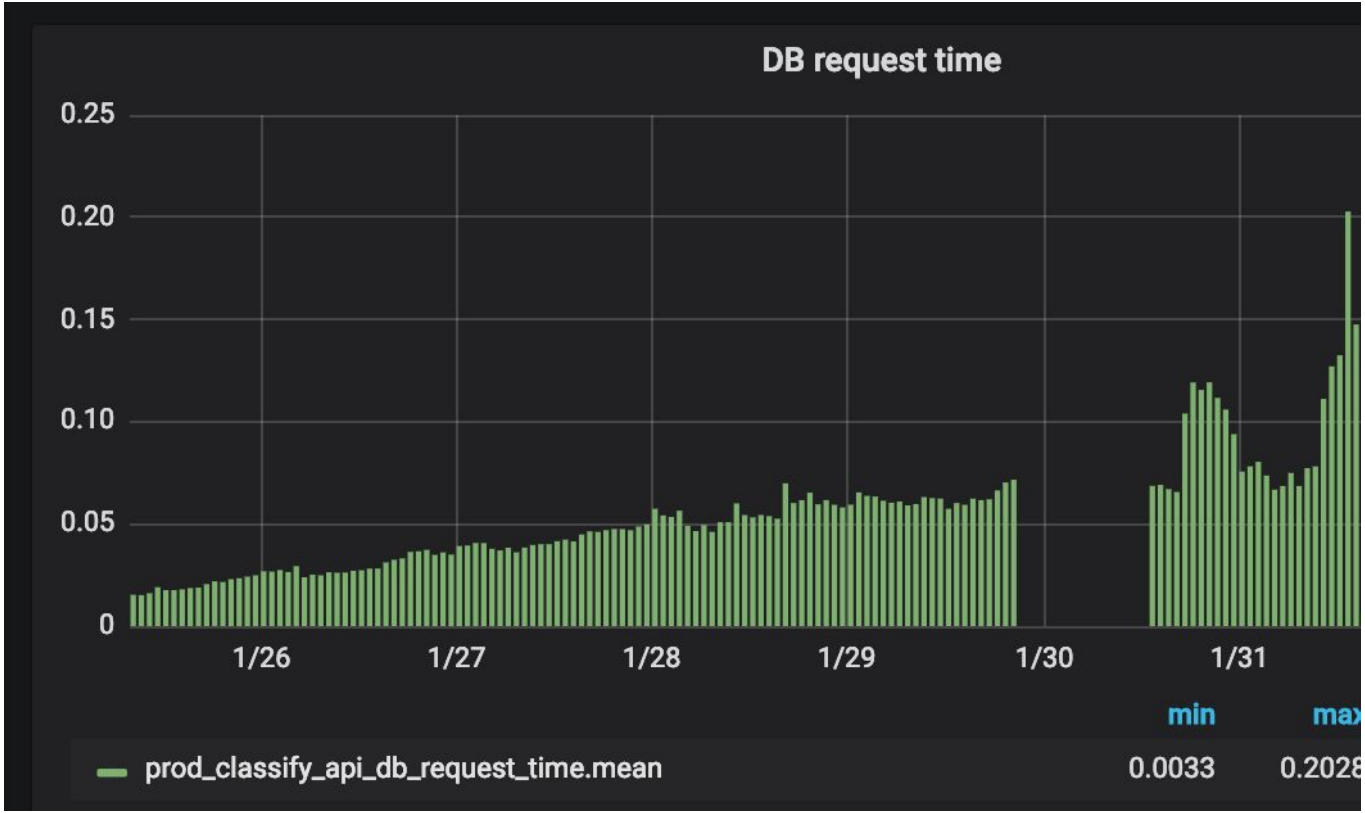
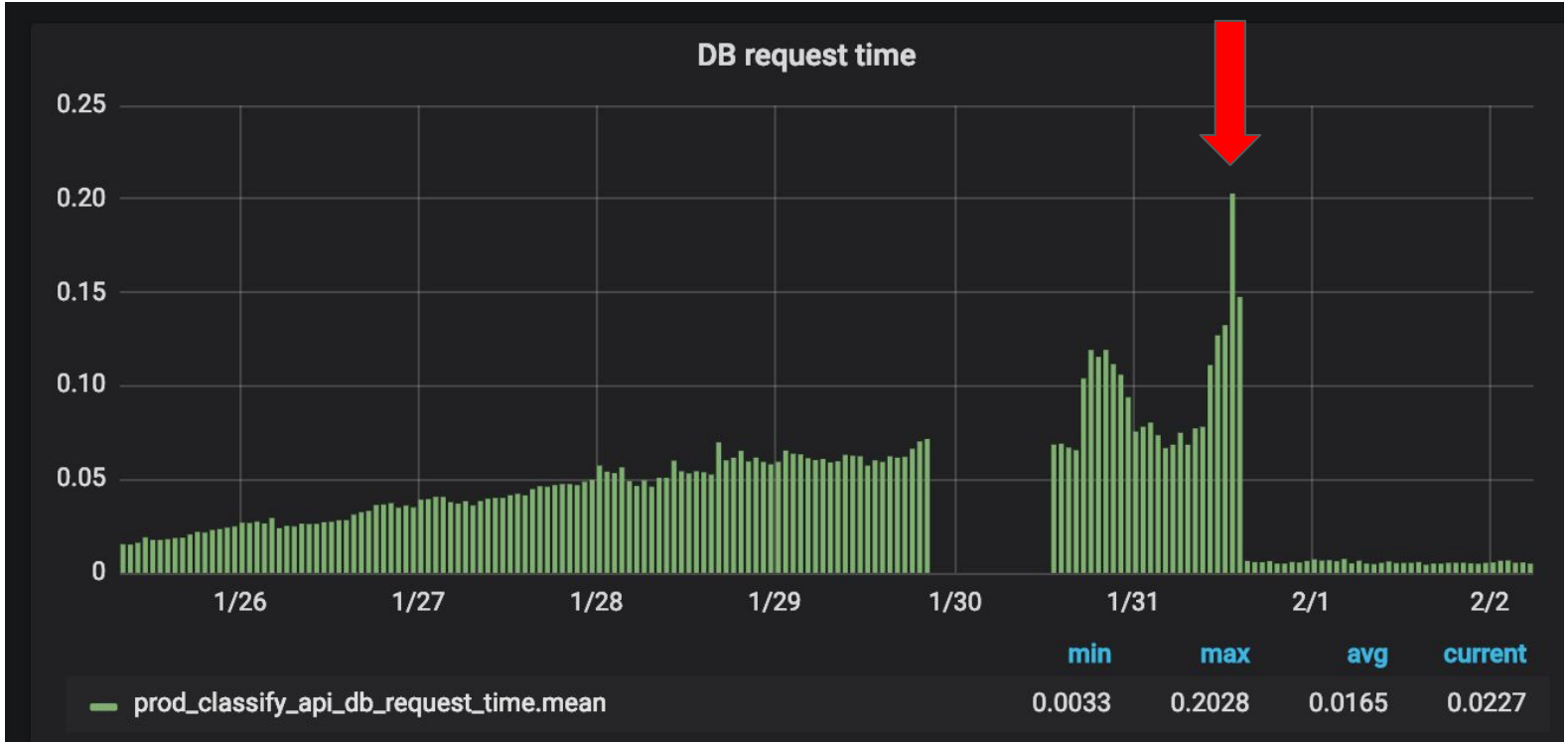


3 seconds per request

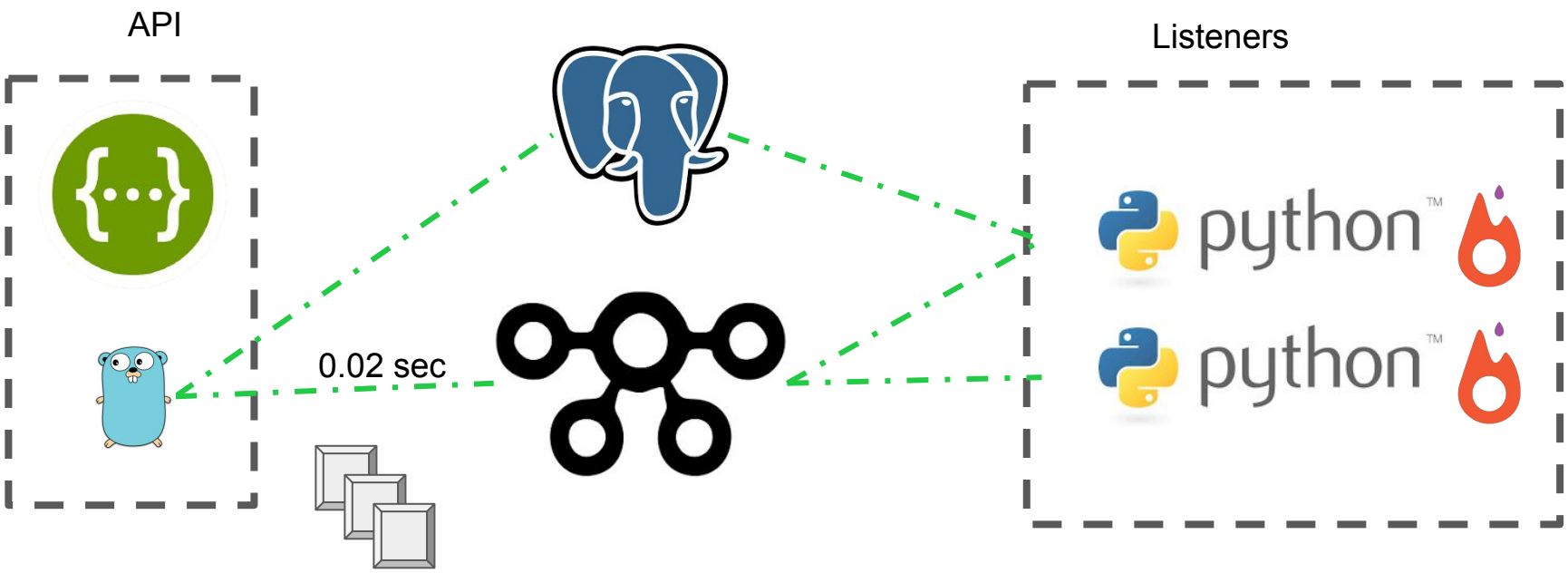
lalafo



2 seconds per request

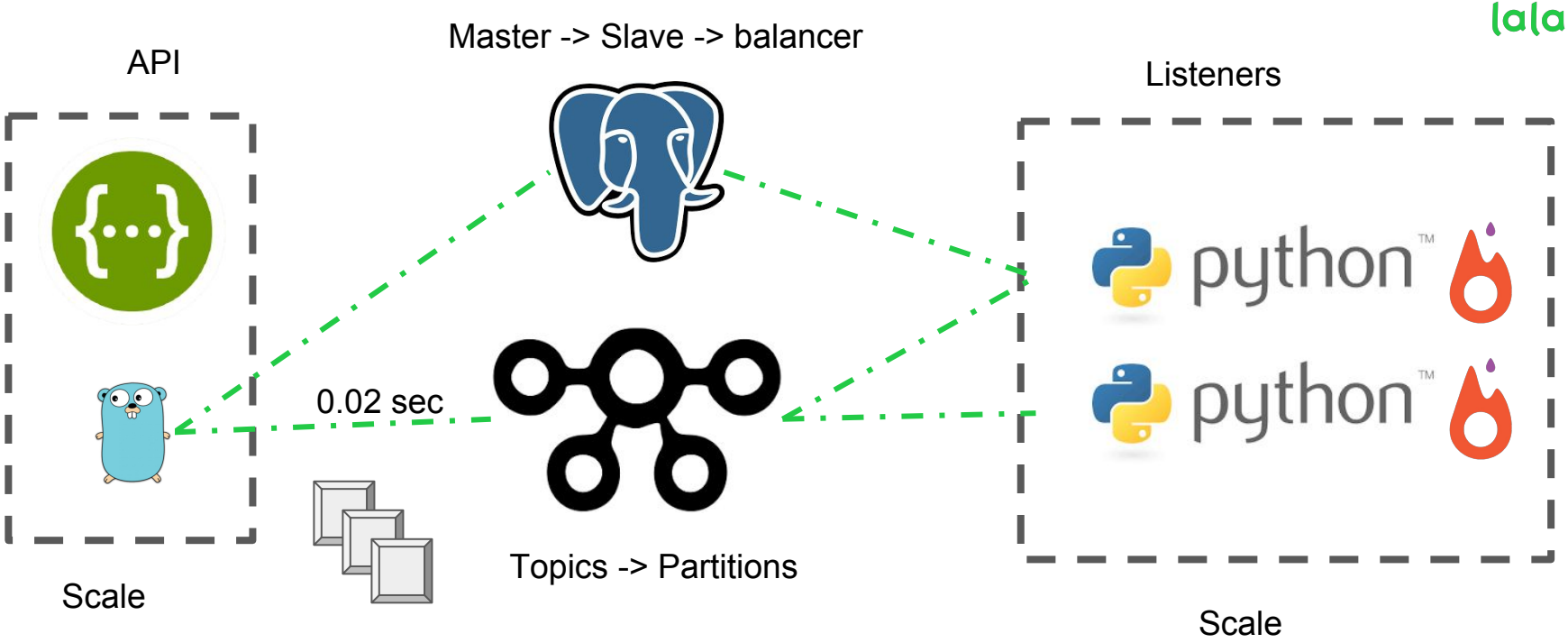
lalafo

¯_(ツ)_/¯



2 seconds per request

200 RPM -> 1200 RPM



2 seconds per request

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Success?
Not yet

< 1 second per request

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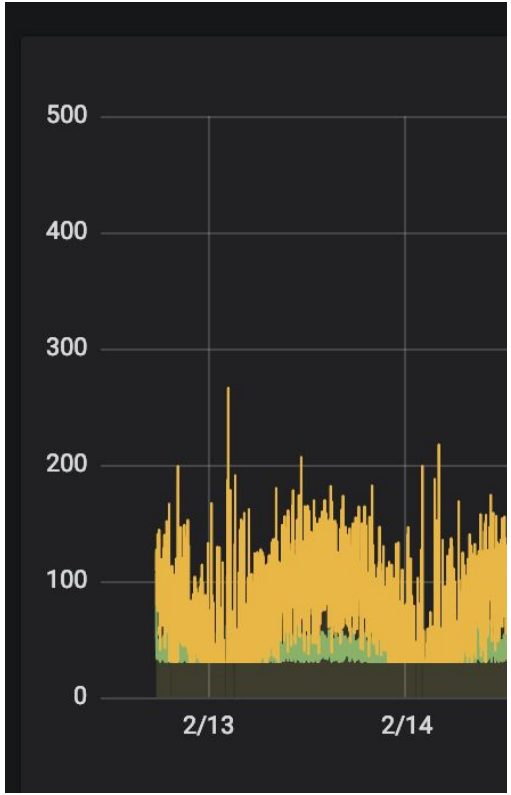


```
| Processes:                                                       GPU Memory |
|  GPU       PID   Type   Process name                             Usage      |
|=============================================================================|
|    0     46897      C   /bin/python                             7652MiB    |
```

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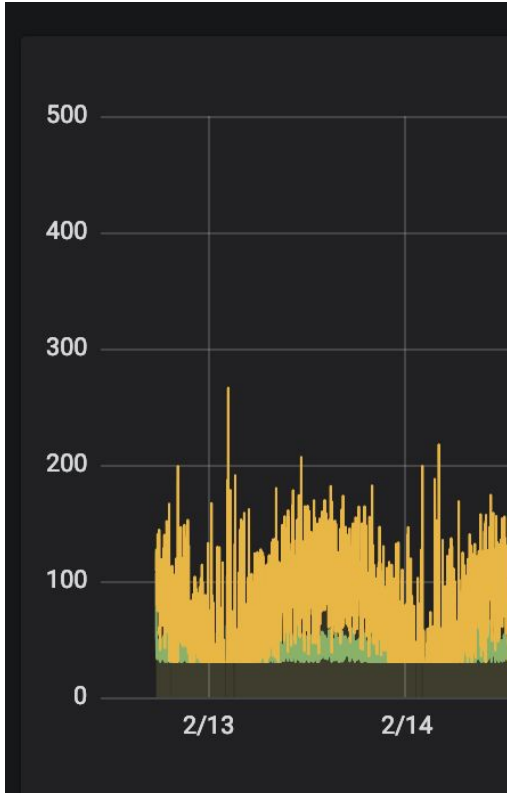

python™

Out of 8Gb

```
| Processes:                                                       GPU Memory |
|  GPU       PID   Type   Process name                             Usage      |
|=============================================================================|
|    0     46897      C   /bin/python                             7652MiB    |
```

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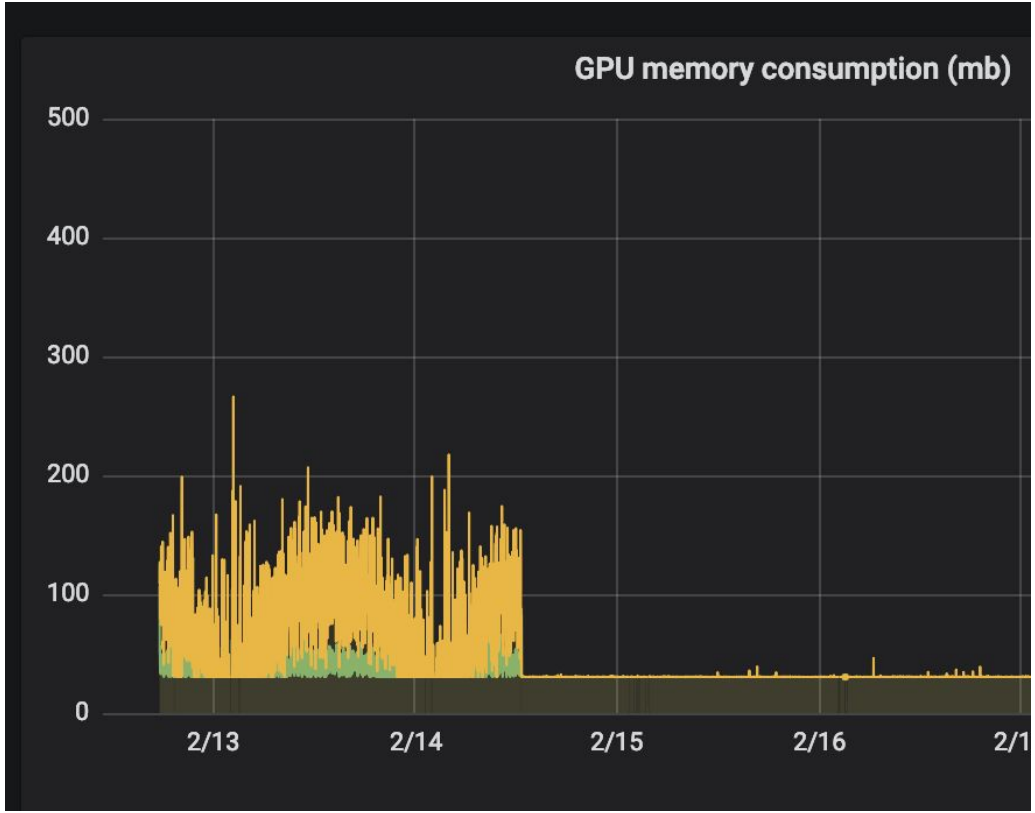

How to PyTorch in production

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```
Sat Mar  9 11:43:08 2019
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 418.39       Driver Version: 418.39       CUDA Version: 10.1     |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|===============================+======================+======================|
|   0  GeForce GTX 1080    Off  | 00000000:01:00.0 Off |                  N/A |
| 46%   57C    P2    40W / 180W |   1294MiB /  8119MiB |      0%      Default |
+-------------------------------+----------------------+----------------------+

+-----------------------------------------------------------------------------+
| Processes:                                                       GPU Memory |
|  GPU       PID   Type   Process name                             Usage      |
|=============================================================================|
|    0     15795      C   ...it- classify -p 6066 /app/classify-data   689MiB |
|    0   1546563      C   python3                                      595MiB |
+-----------------------------------------------------------------------------+
```

7.6 Gb -> 600 Mb

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Success?
Not yet

1 second per request

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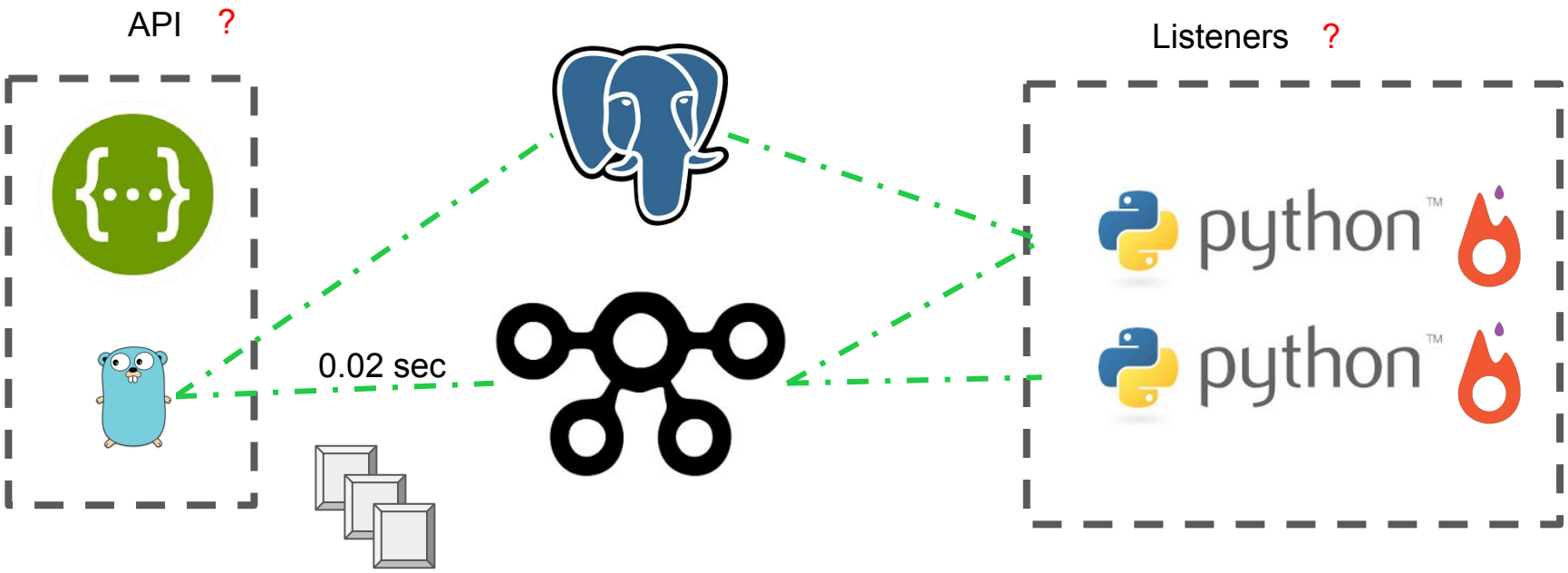
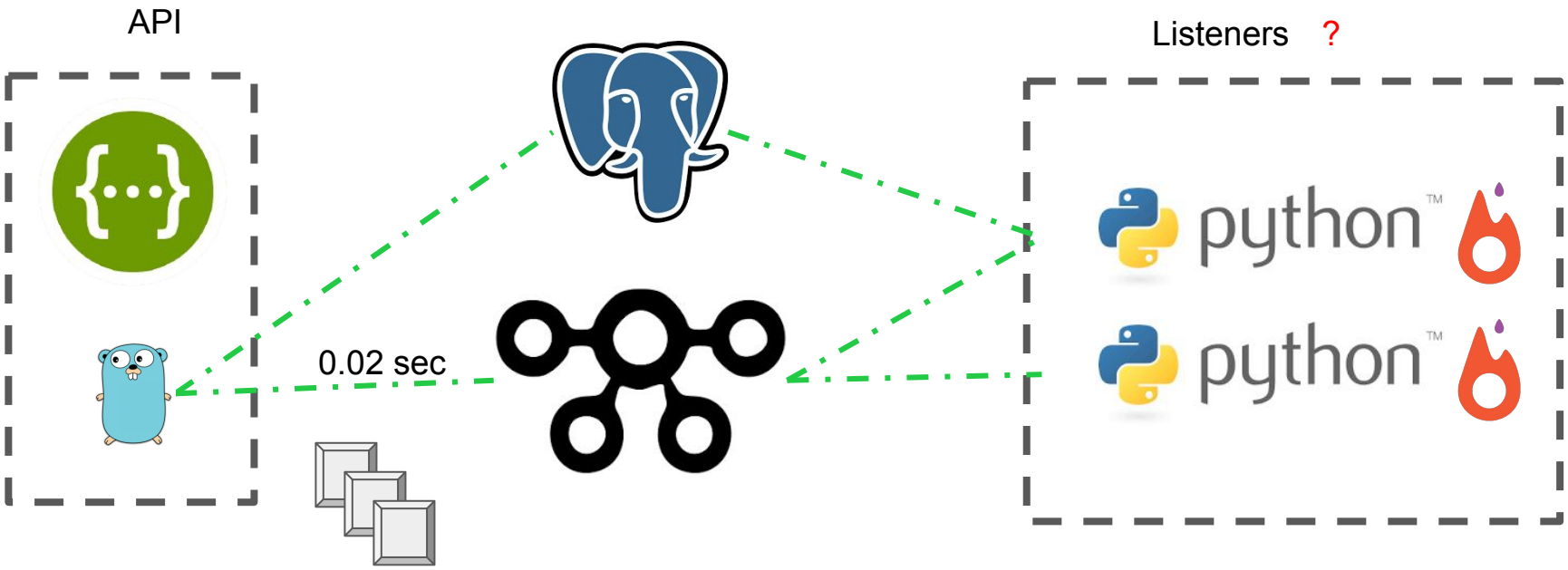
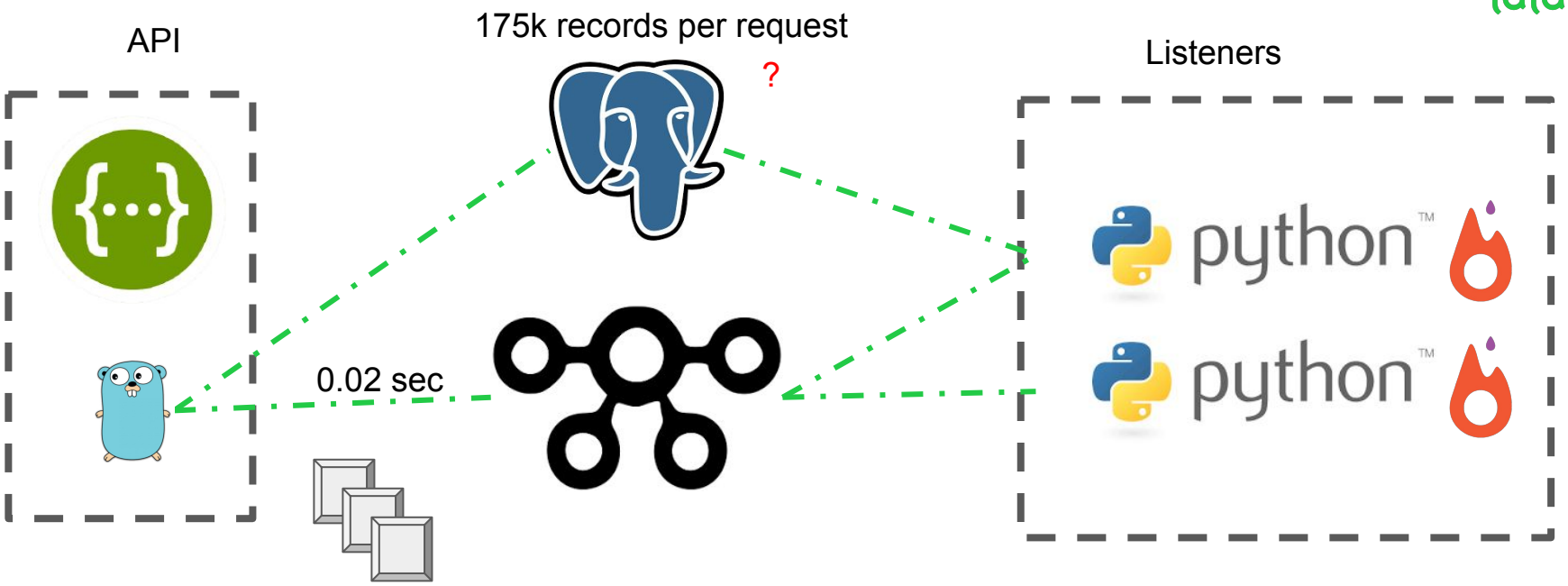
Back to 2, 5, 10 seconds per request



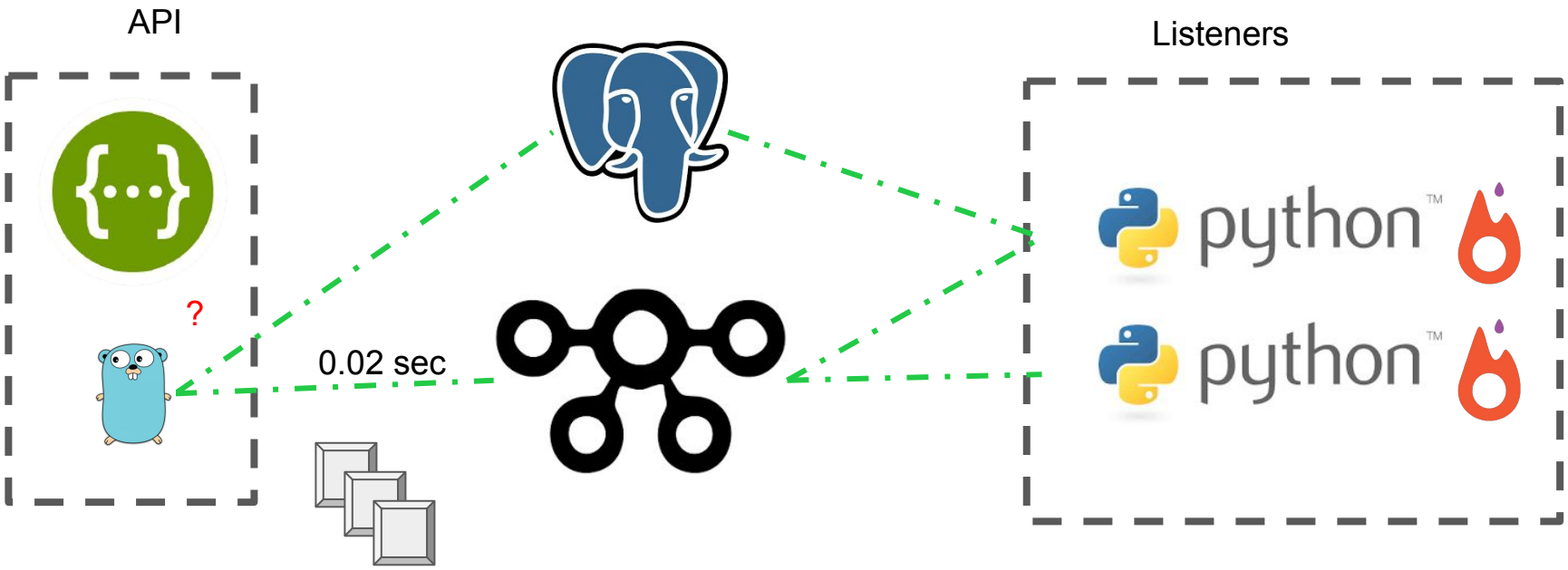
Troubleshooting



Troubleshooting



Troubleshooting



Troubleshooting

API

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```
-       err := db.FirstOrCreate(&ad, Ad{CatalogAdID: ad.CatalogAdID, CatalogName: ad.CatalogName}).Error
+       ad = Ad{CatalogAdID: ad.CatalogAdID, CatalogName: ad.CatalogName}
+       err := db.Create(&ad).Error
        influxTags := map[string]string{"action": "/v4/classify/add_images", "catalog": ad.CatalogName}
        iw.WritePoint(dbRequestTime, influxTags, time.Since(funcStart).Seconds())

        if err != nil {
-               log.Errorf("couldn't save ad to the DB: %v\n  Ad: %v\n", err, ad)
+               if pqErr, _ := err.(*pq.Error); pqErr.Code == "23505" { // Retry once for integrity errors
+                       err = db.First(&ad).Error
+               }
+               log.Errorf("couldn't save ad to the DB: %v\n Ad: %v \n", err, ad)
                c.JSON(http.StatusInternalServerError, LegacyApiError{Status: "Error", Message: "Could not
```

Troubleshooting

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```
-       err := db.FirstOrCreate(&ad, Ad{CatalogAdID: ad.CatalogAdID, CatalogName: ad.CatalogName}).Error
+       ad = Ad{CatalogAdID: ad.CatalogAdID, CatalogName: ad.CatalogName}
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+               }
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                c.JSON(http.StatusInternalServerError, LegacyApiError{Status: "Error", Message: "Could not
```
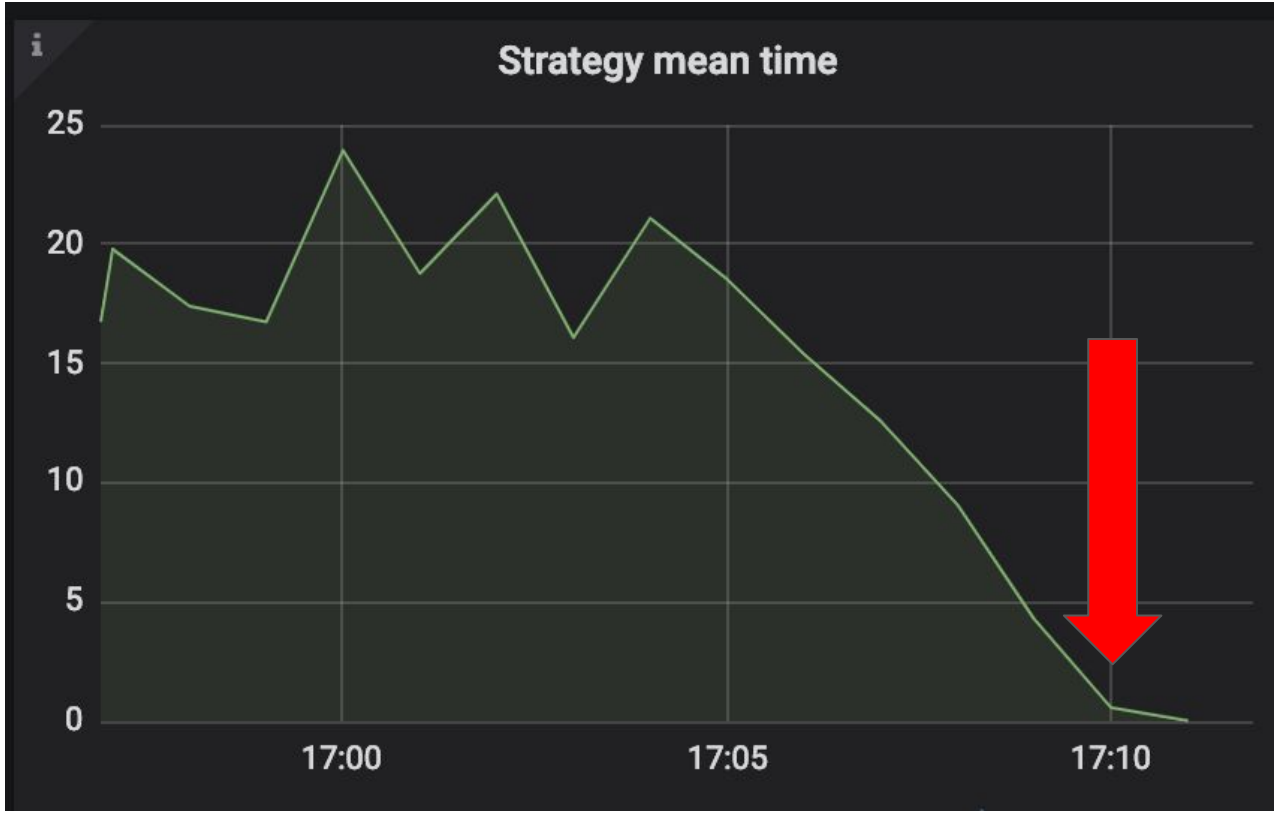

```
\"uix_catalog_name_ad_id\"" {
-                       err = db.First(&ad).Error
+                       err = db.First(&ad, &Ad{CatalogName: ad.CatalogName, CatalogAdID:
ad.CatalogAdID}).Error
```

SELECT * FROM ads LIMIT 1



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25 seconds -> 0.02 seconds

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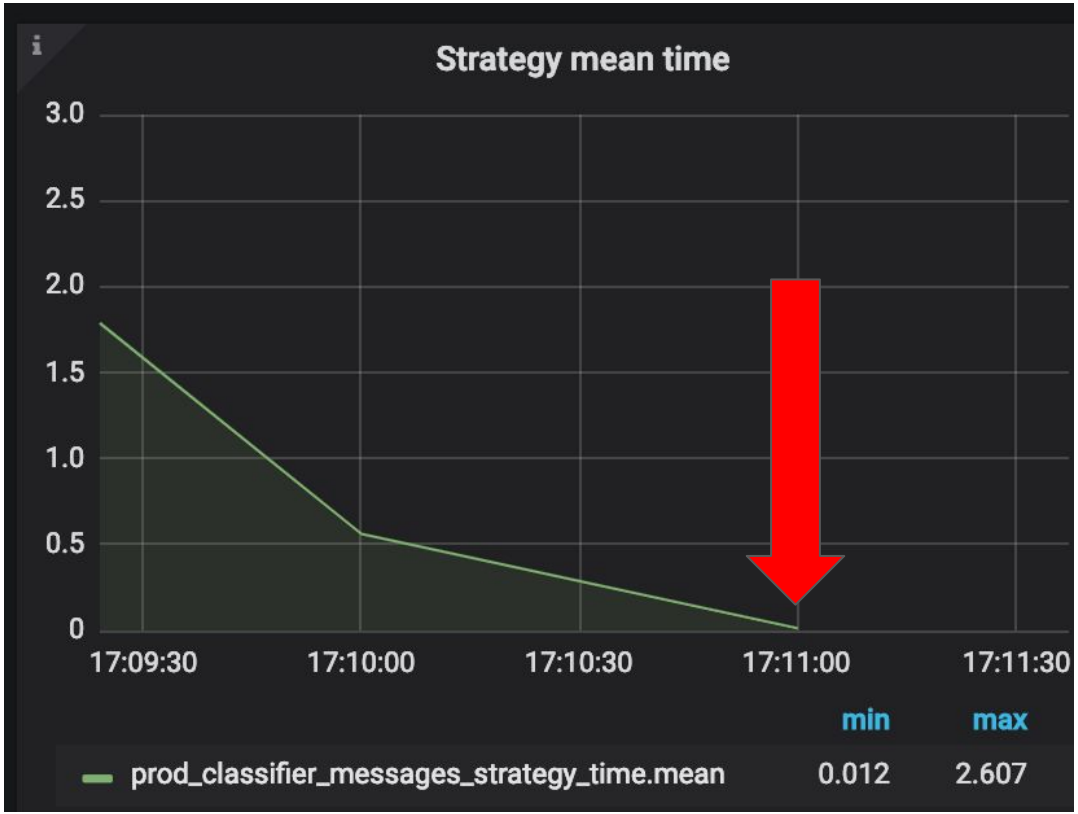

0.02 seconds -> 0.002 second

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Success?
Not yet

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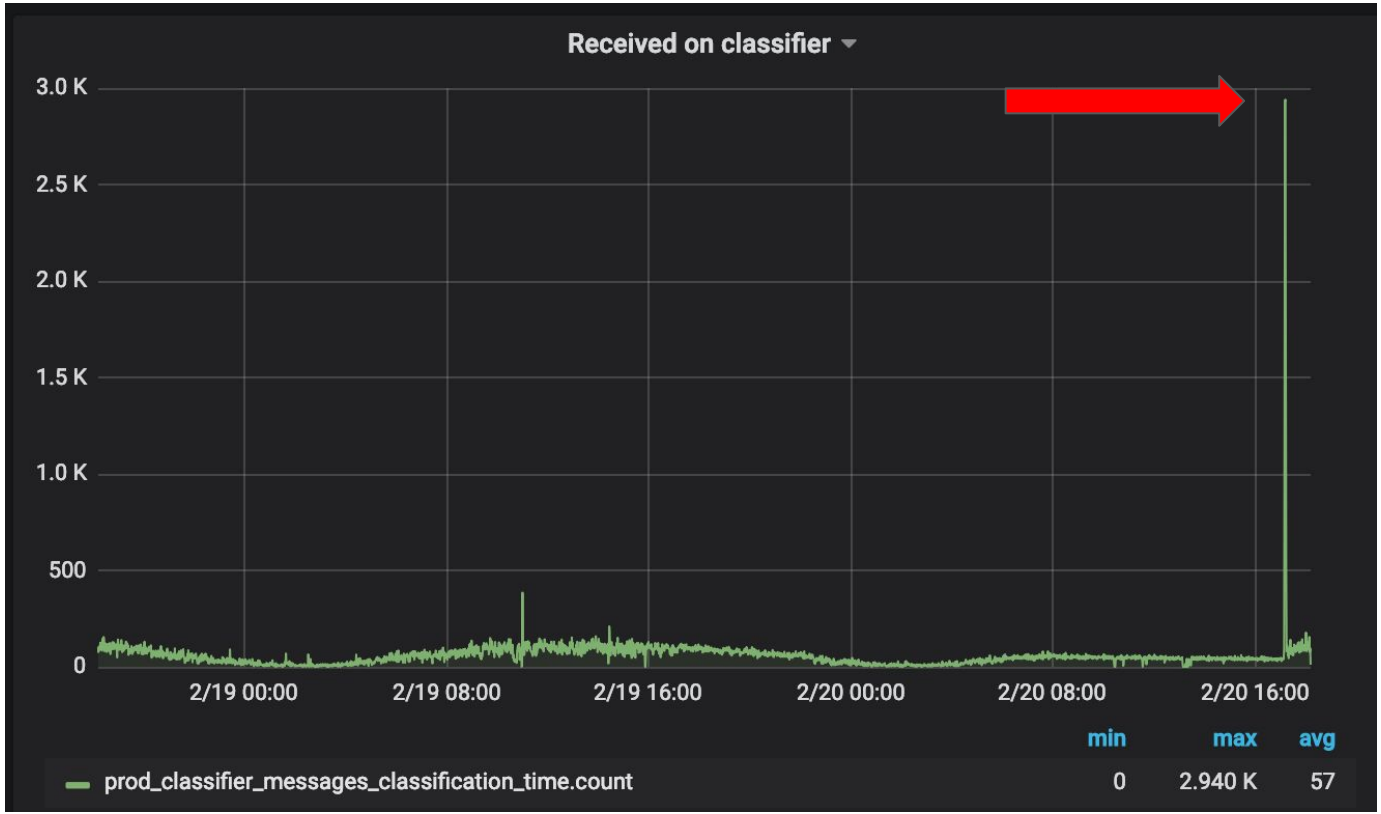
https://github.com/robinhood/faust

Faust 1.4.6: No latest offset



3K images per minute 0_o

lalafo

Success?
Not yet

lalafo

Issues to solve

1. Occasional spikes in performance (GC, network latency)
2. Message broker (Kafka rebalancing, offset etc)
3. How to handle DB migrations
4. Something we are not aware of yet

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Lessons learnt

1. CPU bound tasks != IO bound (¯_(ツ)_/¯)
2. High coupling - low cohesion
3. You need to know how to cook MongoDB
4. Go is not that obvious and library reach as Python
5. Simple != Easier
6. Concurrency != Parallelism (obviously)

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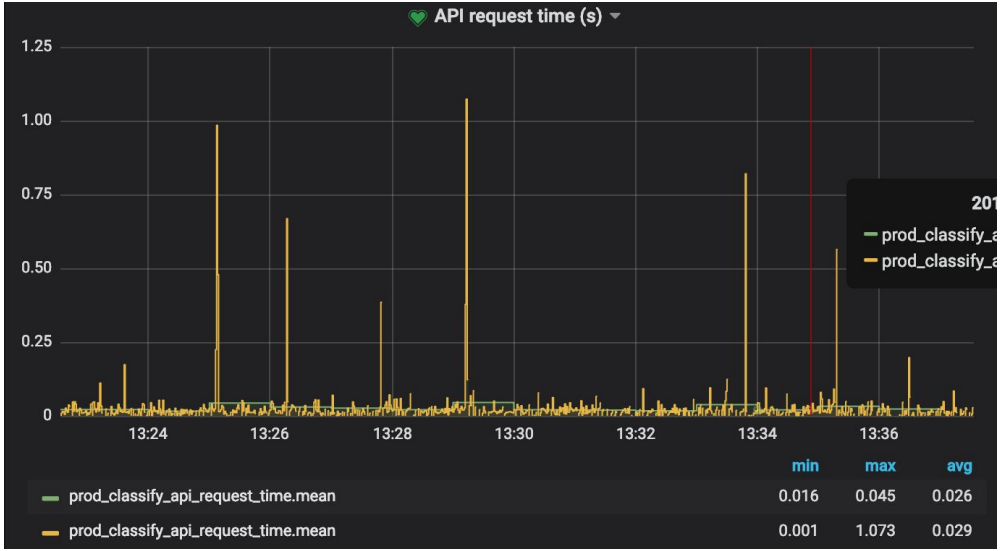
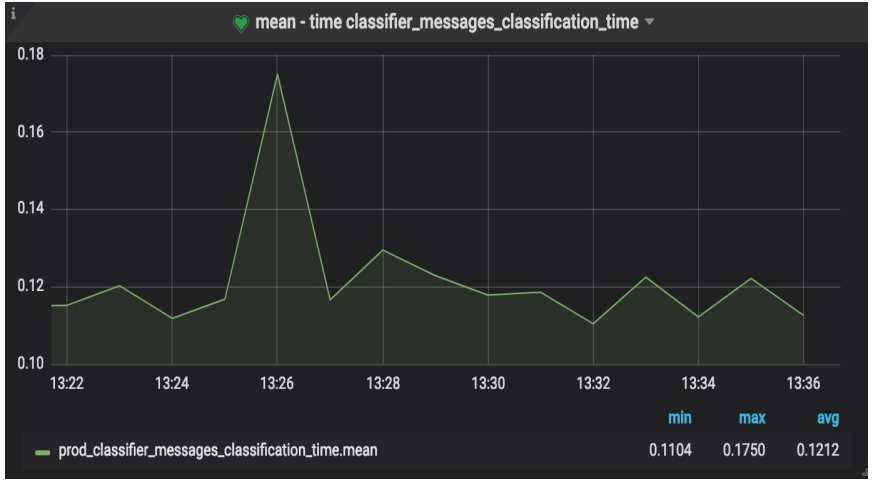
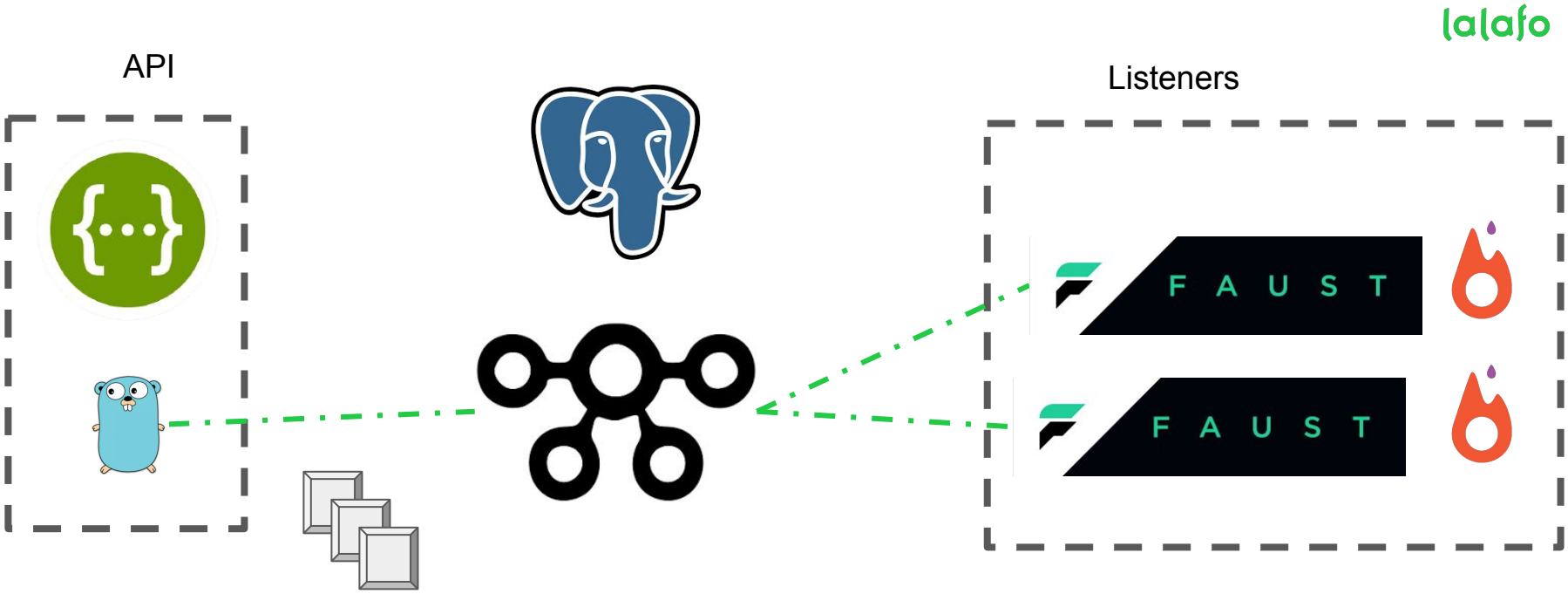




min	max	avg
0.015	0.045	0.027
0.001	1.073	0.029

min	max	avg
0.1025	0.1750	0.1208

< 1 second per request



+ Live statistics from PostgreSQL

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Success?

Thank you everyone