OBSERVABLE MICROSERVICES

Maria Gomez

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O'REILLY

Building Microservices

DESIGNING FINE-GRAINED SYSTEMS

Sam Newman

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Building Microservices

DESIGNING FINE-GRAINED SYSTEMS

Sam Newman

PRINCIPLES OF MICROSERVICES

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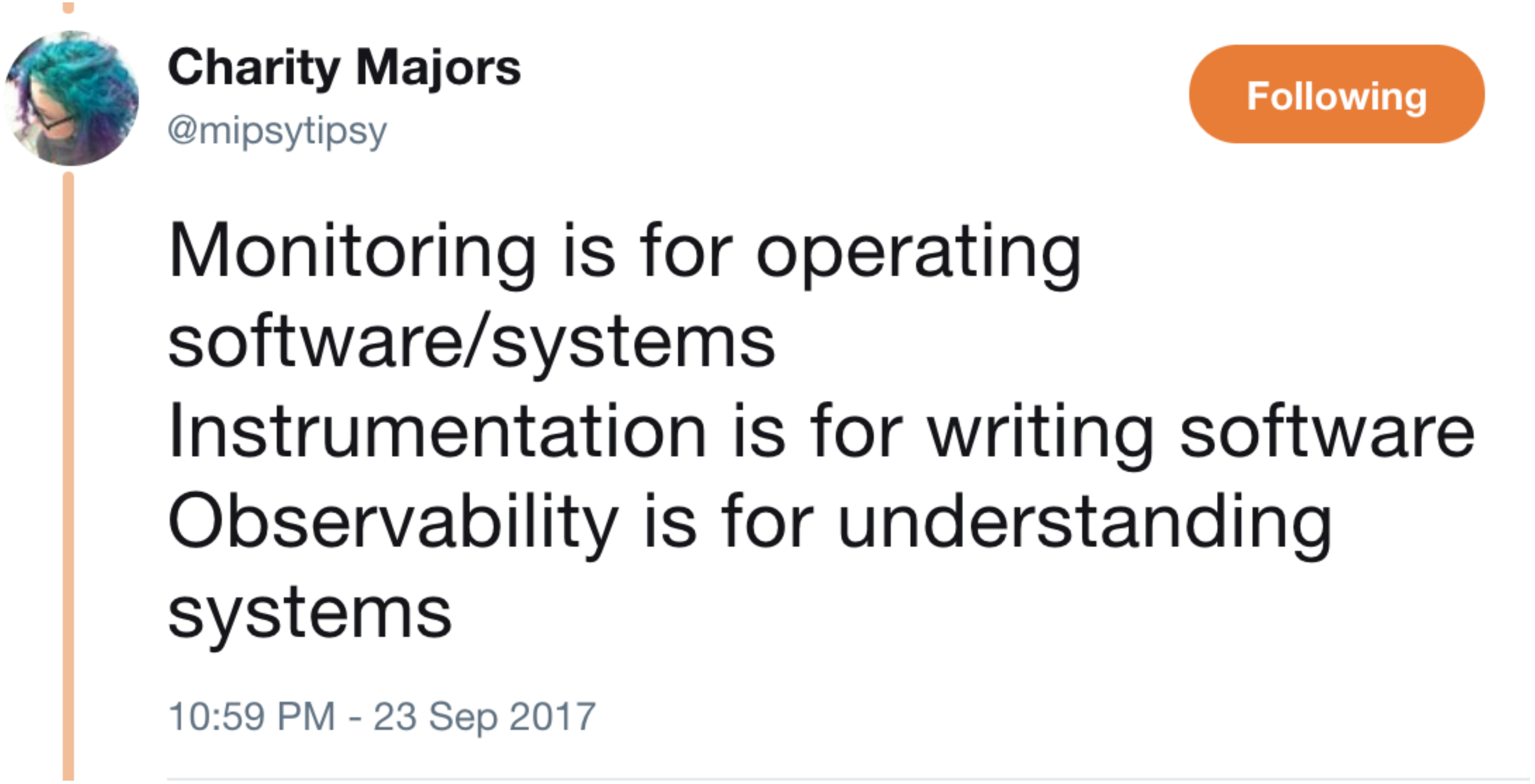
- Modeled around business concepts
- Culture of automation
- Hide internal implementation details
- Decentralize all the things
- Deploy independently
- Isolate Failure
- Highly observable

WHAT IS OBSERVABILITY?

*“**Observability** is the ability to interrogate your system and get accurate answers that improve your understanding of it”*



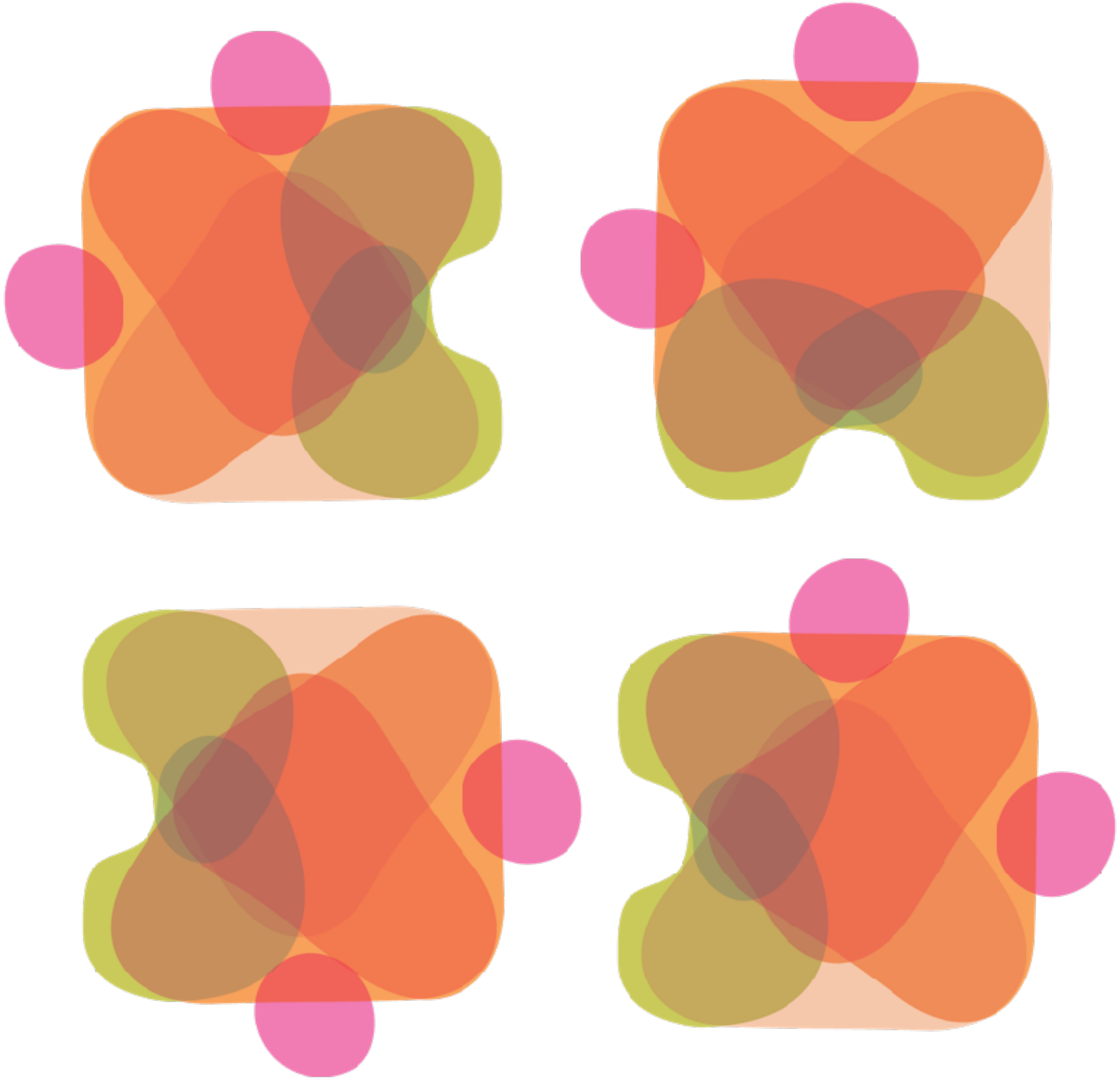
Charity Majors
@mipsytipsy

Monitoring is for operating software/systems
Instrumentation is for writing software
Observability is for understanding systems

10:59 PM - 23 Sep 2017

Logging

Monitoring



Tracing

Visualization & Alerting

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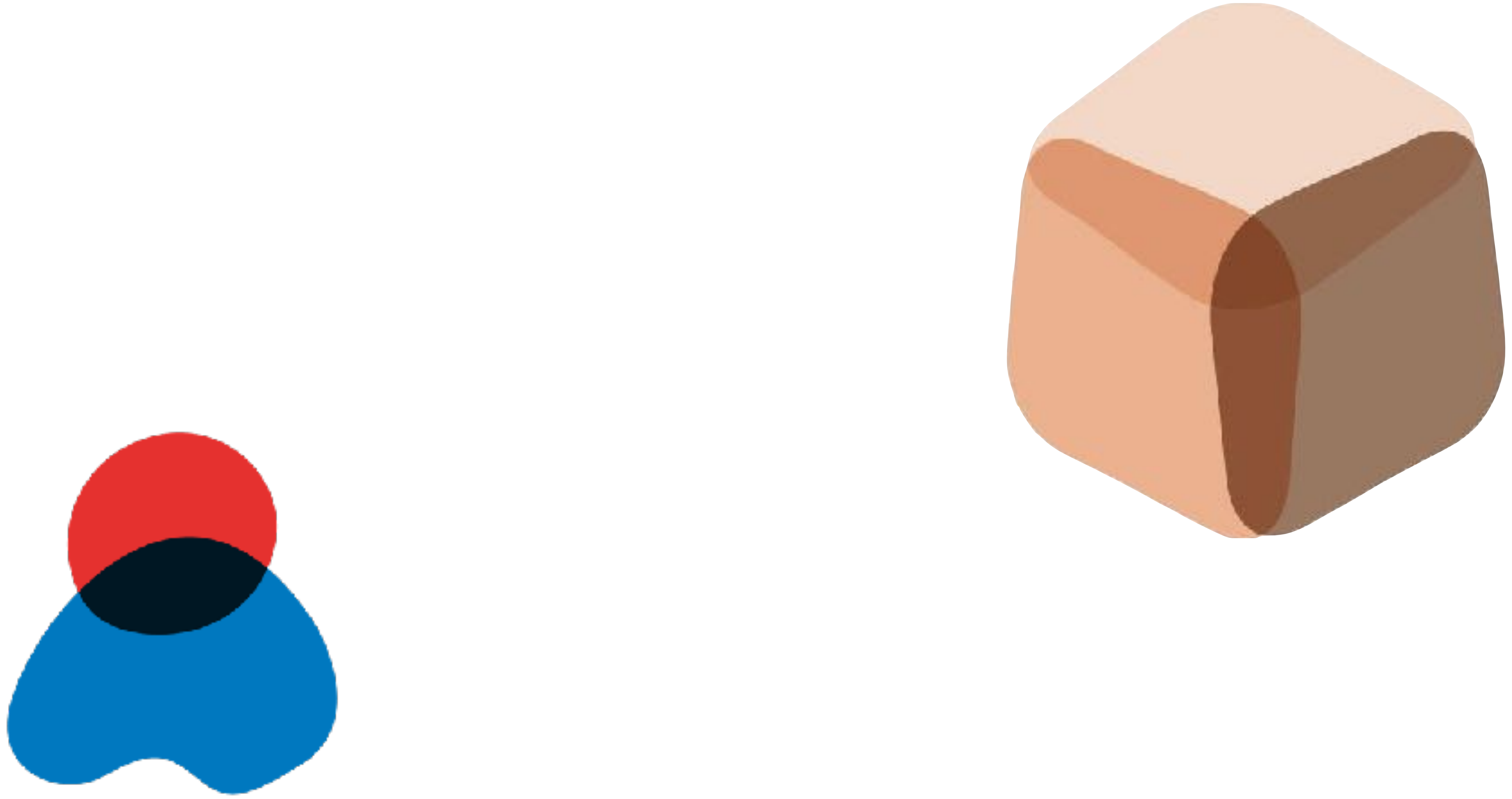
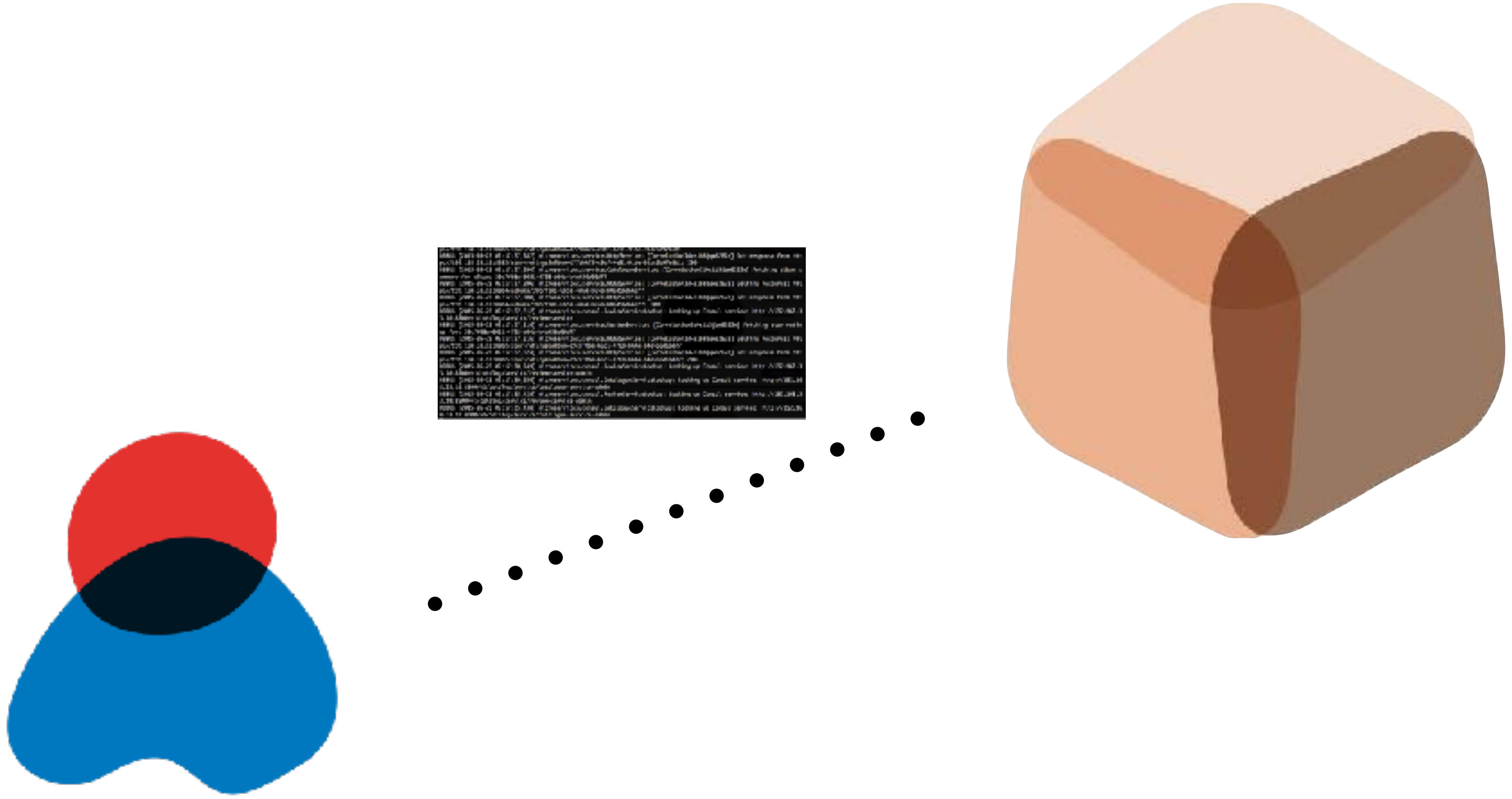
LOGGING

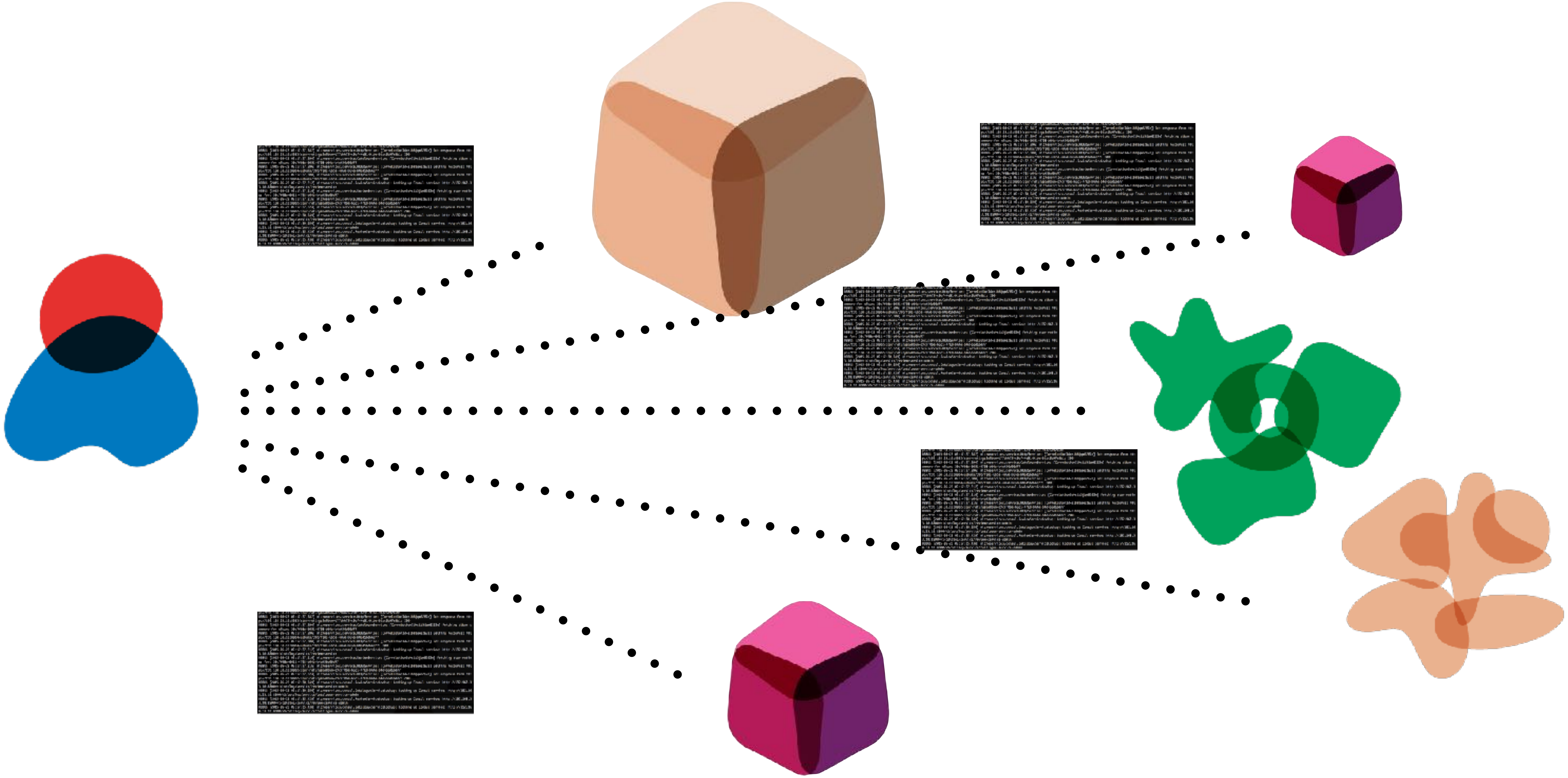
LOGS



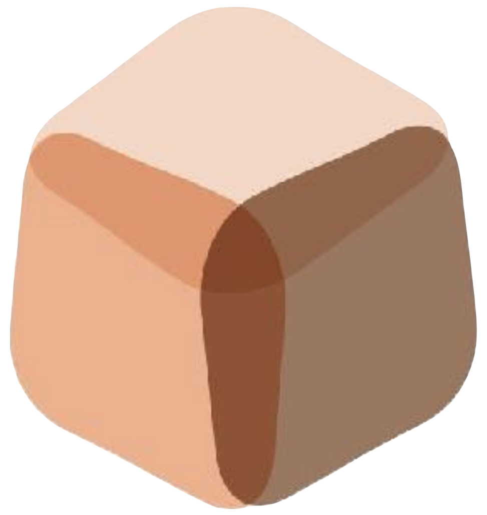
LOGS

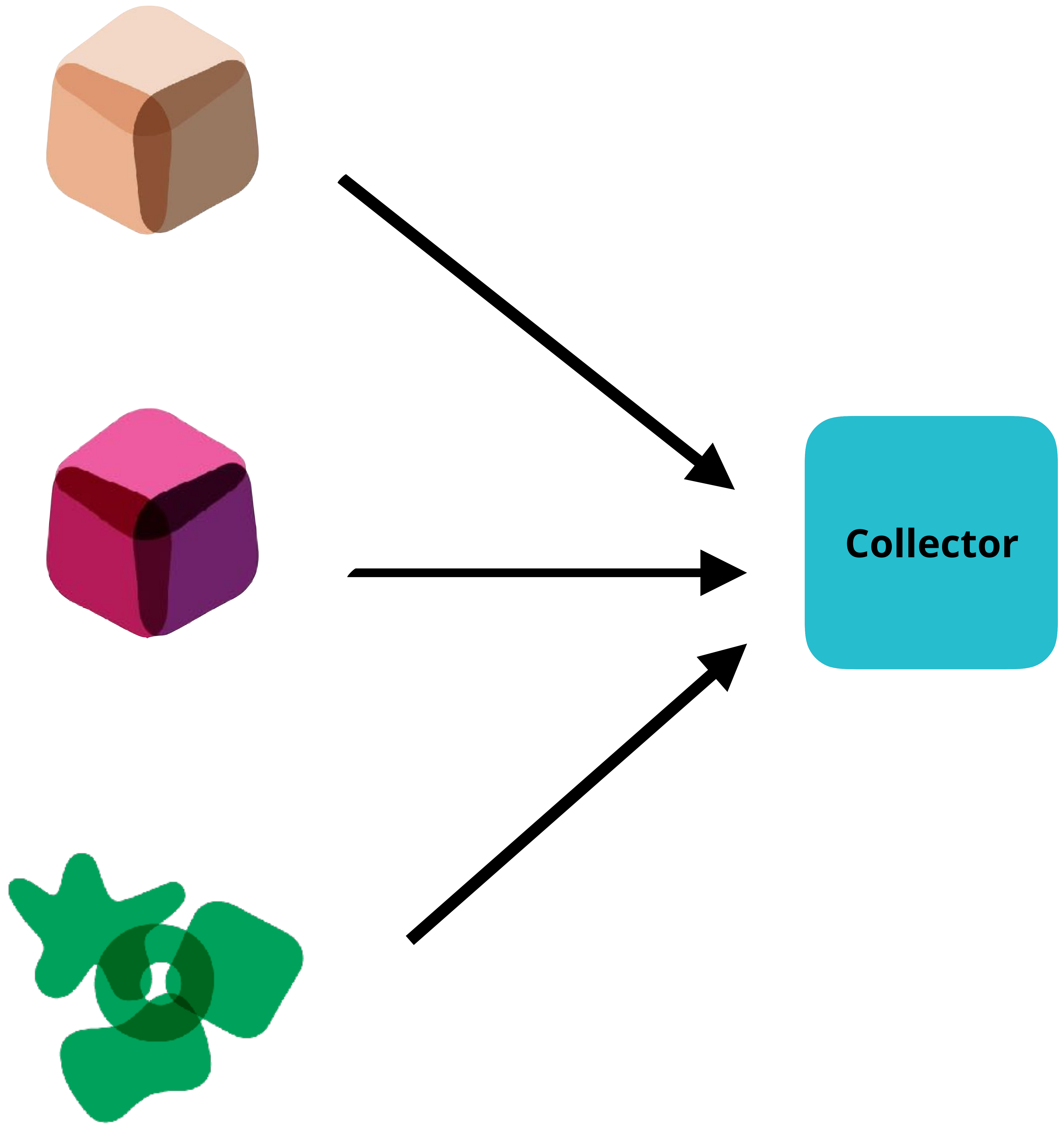


LOGS

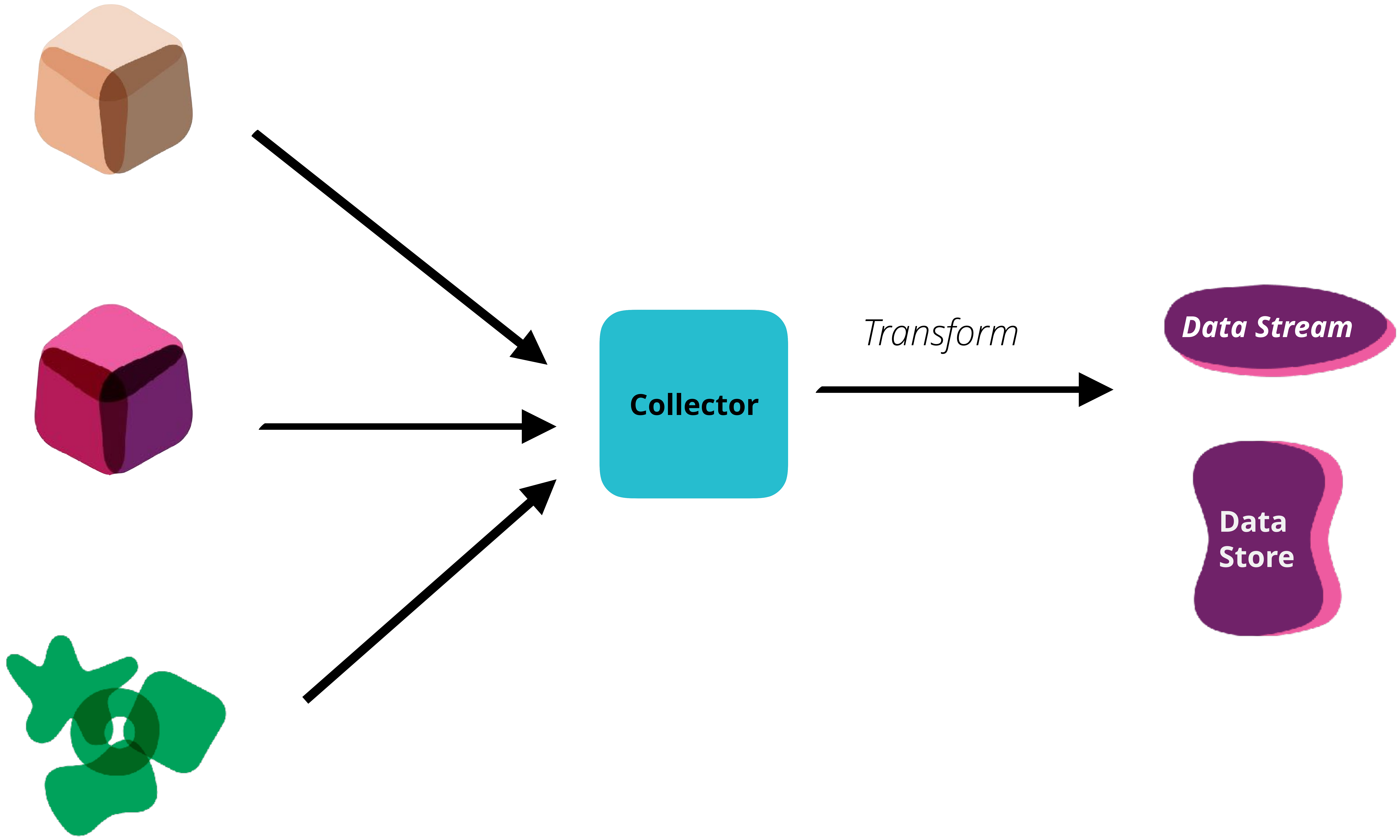


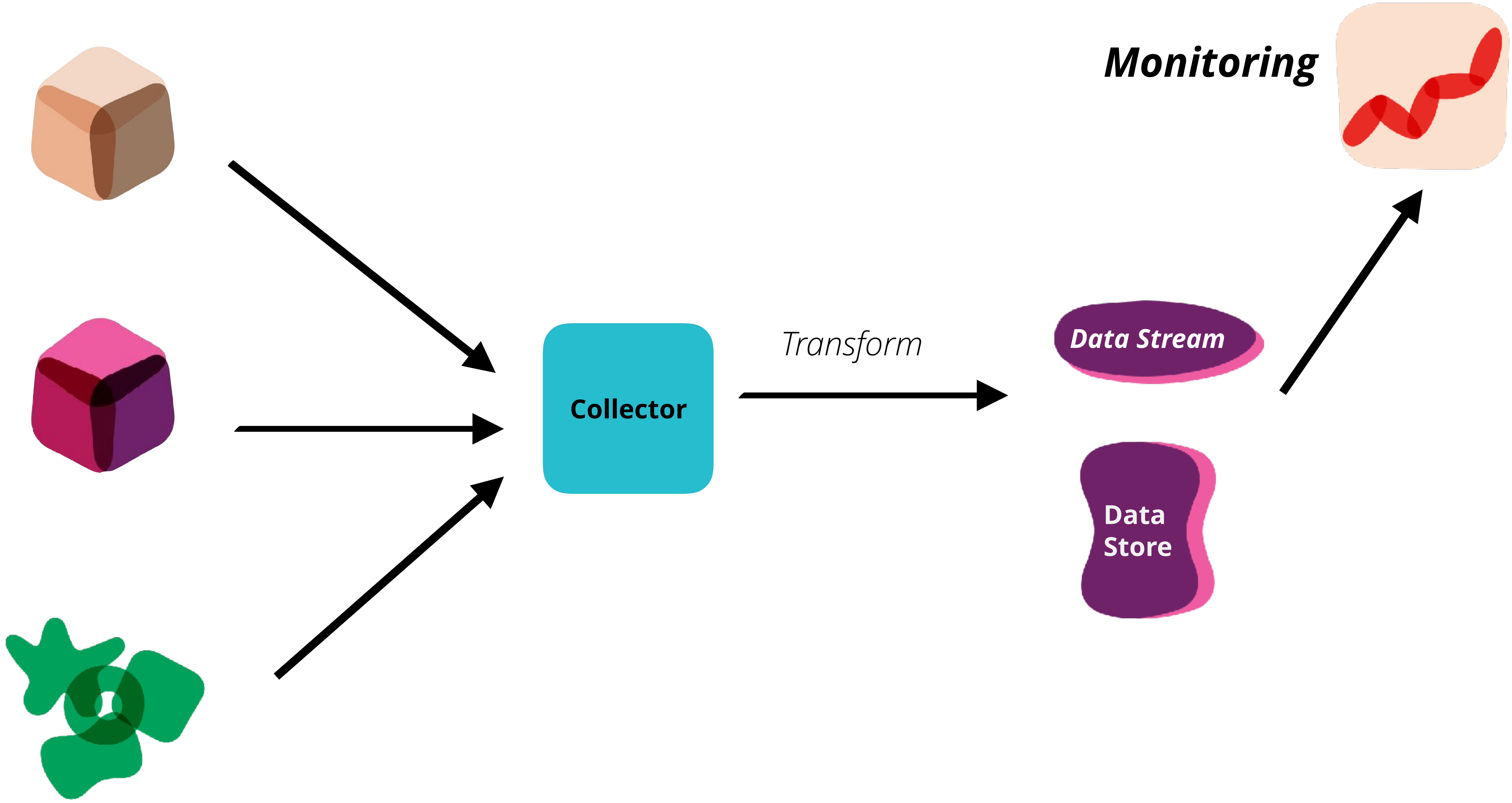
Some suggestions

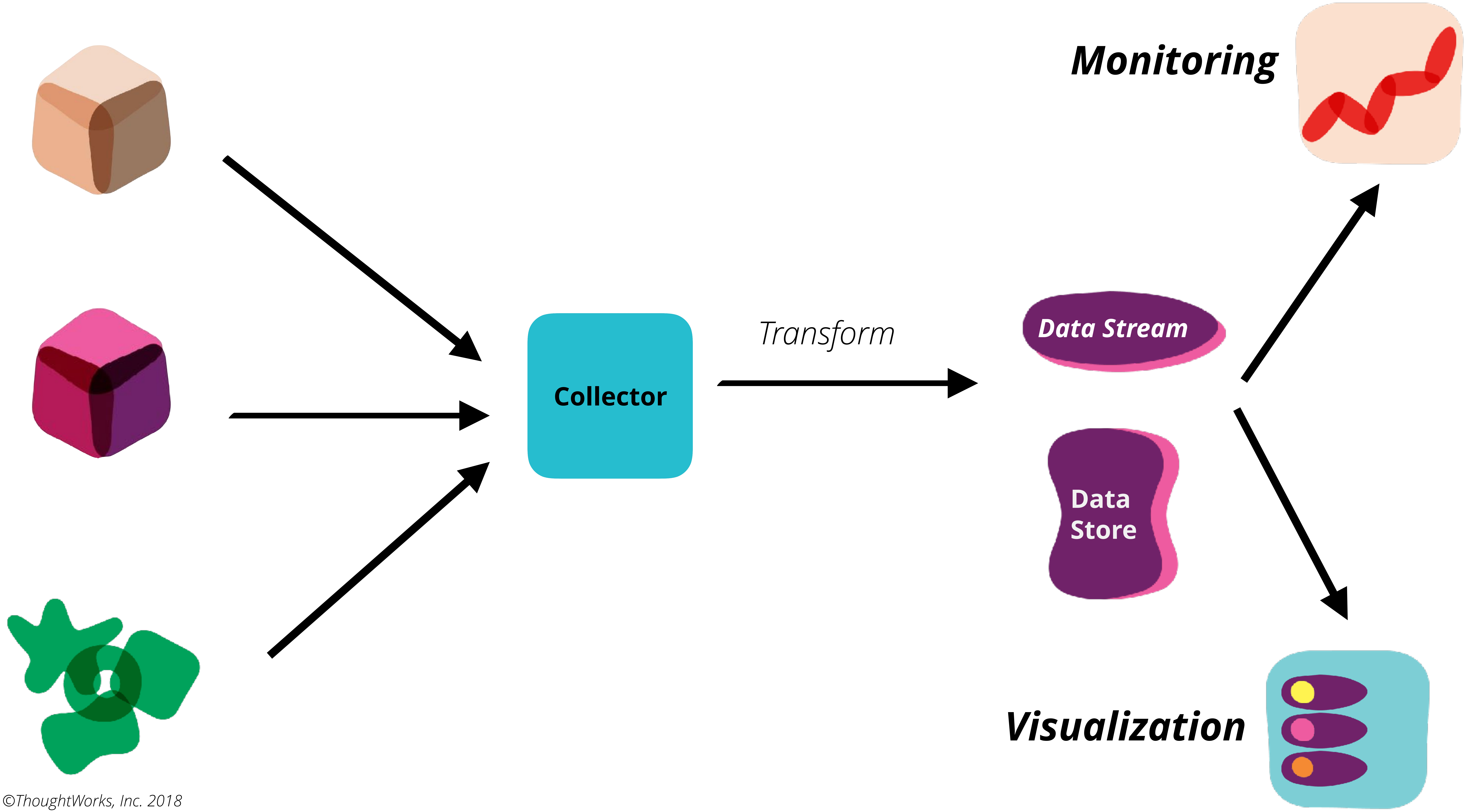




Collector


Collector
Transform
Data Stream
Data
Store


Monitoring
Collector
Transform
Data Stream
Data Store


Monitoring
Collector
Transform
Data Stream
Data Store
Visualization

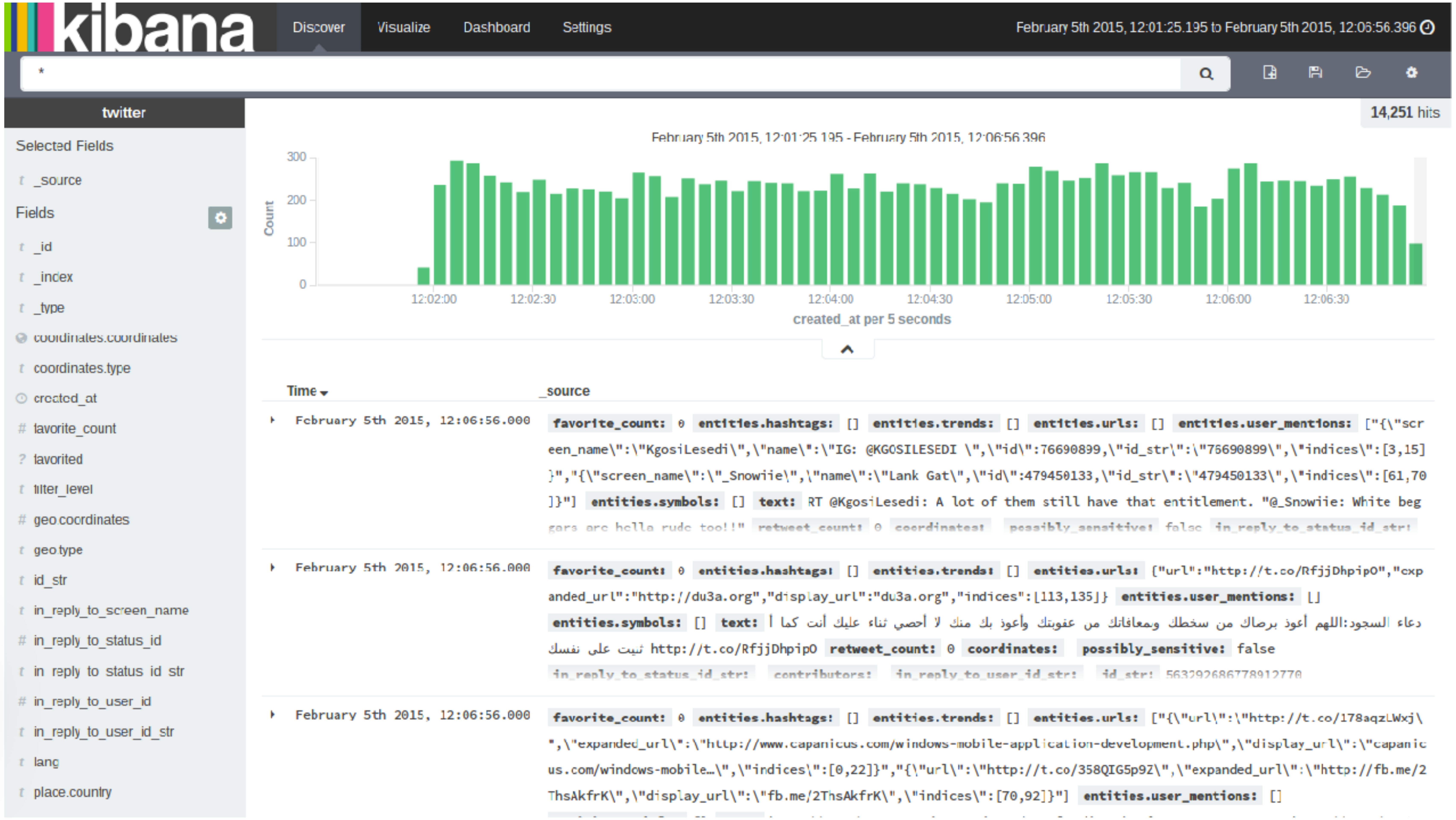
LOG AGGREGATION

elastic

logstash

kibana

splunk>



```
February 5th 2015, 12:06:56.000  favorite_count: 0 entities.hashtags: [] entities.trends: [] entities.urls: [] entities.user_mentions: ["{\"screen_name\":\"KgosiLesedi\",\"name\":\"IG: @KGOSILESEDI \",\"id\":76690899,\"id_str\":\"76690899\",\"indices\":[3,15]}","{\"screen_name\":\"_Snowiie\",\"name\":\"Lank Gat\",\"id\":479450133,\"id_str\":\"479450133\",\"indices\":[61,70]}"] entities.symbols: [] text: RT @KgosiLesedi: A lot of them still have that entitlement. "@_Snowiie: White beggars are hella rude too!!" retweet_count: 0 coordinates: possibly_sensitive: false in_reply_to_status_id_str:

February 5th 2015, 12:06:56.000  favorite_count: 0 entities.hashtags: [] entities.trends: [] entities.urls: ["url":"http://t.co/RfjjDhpipO","expanded_url":"http://du3a.org","display_url":"du3a.org","indices":[113,135]} entities.user_mentions: []
entities.symbols: [] text: دعاء السجود:اللهم أعوذ برضاك من سخطك ومعافاتك من عقوبتك وأعوذ بك منك لا أحصي ثناء عليك أنت كما أ
ثنيت على نفسك http://t.co/RfjjDhpipO retweet_count: 0 coordinates: possibly_sensitive: false
in_reply_to_status_id_str: contributors: in_reply_to_user_id_str: id_str: 563292686778912770

February 5th 2015, 12:06:56.000  favorite_count: 0 entities.hashtags: [] entities.trends: [] entities.urls: ["{\"url\":\"http://t.co/178aqzLWxj\",\"expanded_url\":\"http://www.capanicus.com/windows-mobile-application-development.php\",\"display_url\":\"capanicus.com/windows-mobile…\",\"indices\":[0,22]}","{\"url\":\"http://t.co/358QIG5p9Z\",\"expanded_url\":\"http://fb.me/2ThsAkfrK\",\"display_url\":\"fb.me/2ThsAkfrK\",\"indices\":[70,92]}"] entities.user_mentions: []
```

LOG STRUCTURED DATA

```
{
  CreationTime: “2017-02-24T17:49:15”,
   Id: “9fe0650565-3dac-425a-c83e38499c”,
   Host: “WEBSRVR06”,
   ServiceId: “MyShoppingCartService”,
   ComponentId: “DynamoDBWriter”,
   Message: “Body size exceeded 400kb limit”
   ….
   ….
}
```

TRACK BUSINESS AND SYSTEM EVENTS

```
{
  CreationTime: “2017-02-24T17:49:15”,
   Id: “9fe0650565-3dac-425a-c83e38499c”,
   Host: “WEBSRVR06”,
   ServiceId: “MyShoppingCartService”,
   Type: “BusinessEvent”,
   Event: “ItemAddedToShoppingCart”,
   ItemDetail: {…}
   ….
   ….
```

STANDARDIZE

- Standardize certain keys across services
- Bake logging into into your service template
- Build a common log aggregation infrastructure

MONITOR

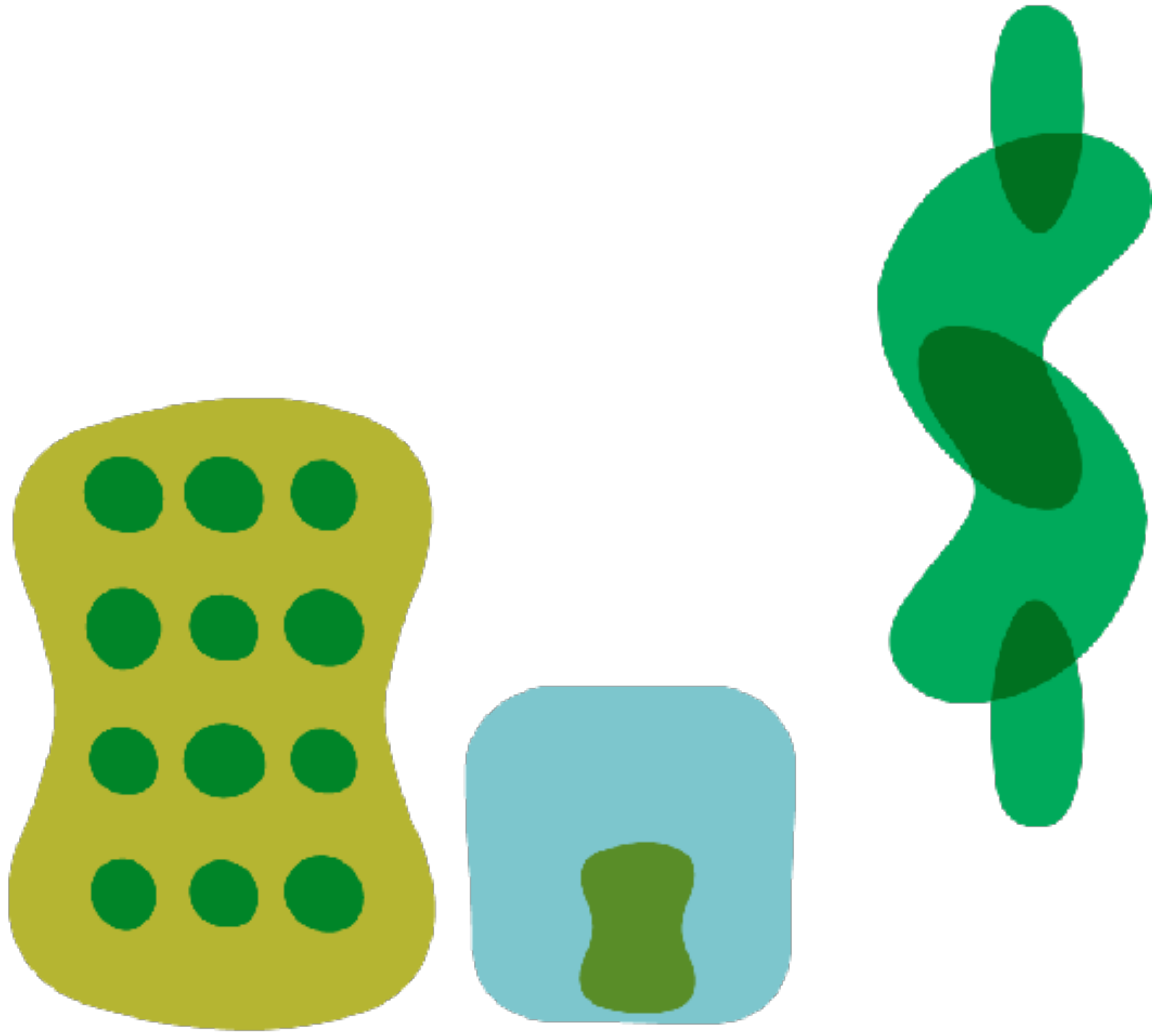
Have enough information to help you make decisions

Evolves with your system

EXAMPLE

EXAMPLE

Online marketplace



3M+ articles
10M+ users per month

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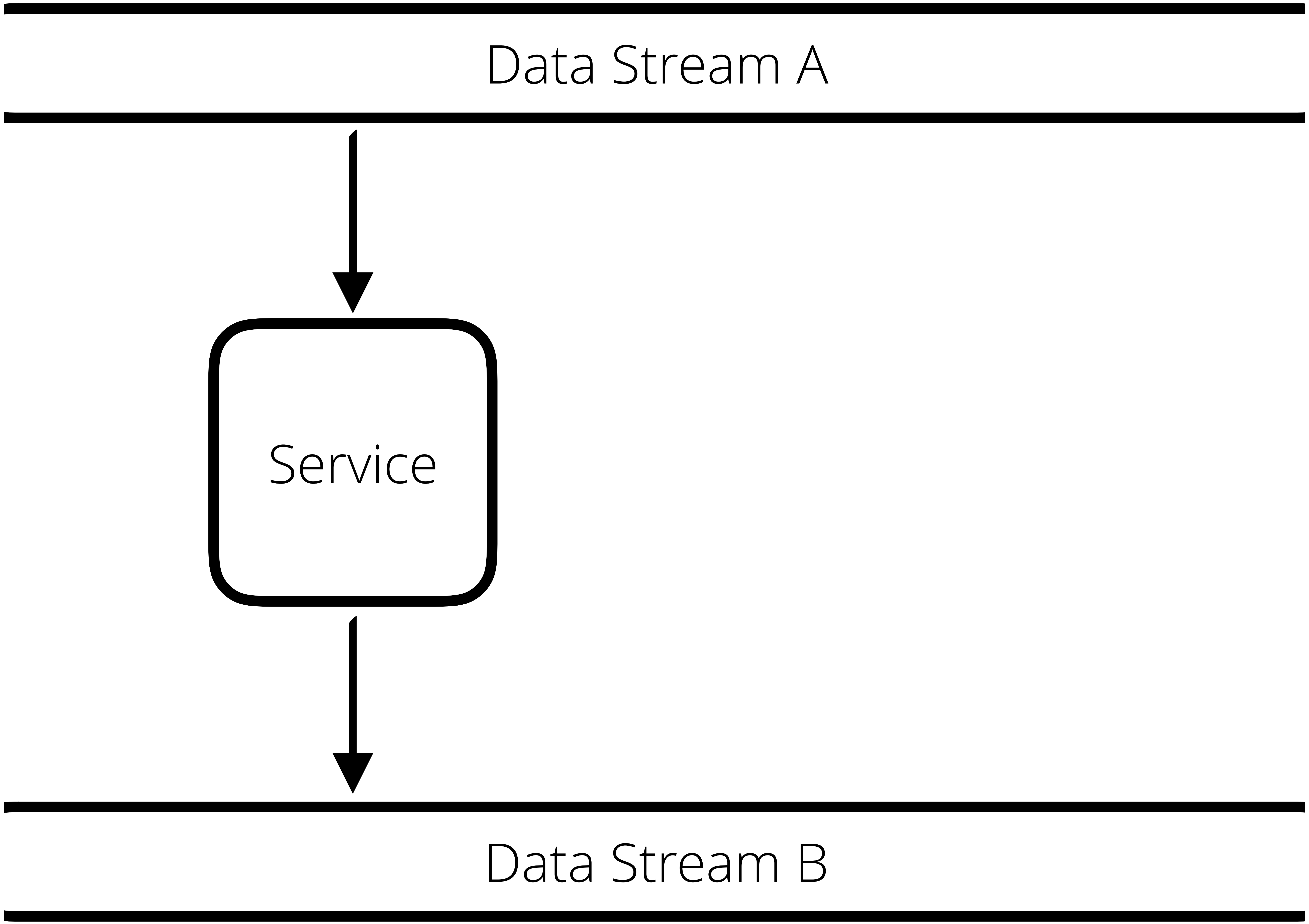
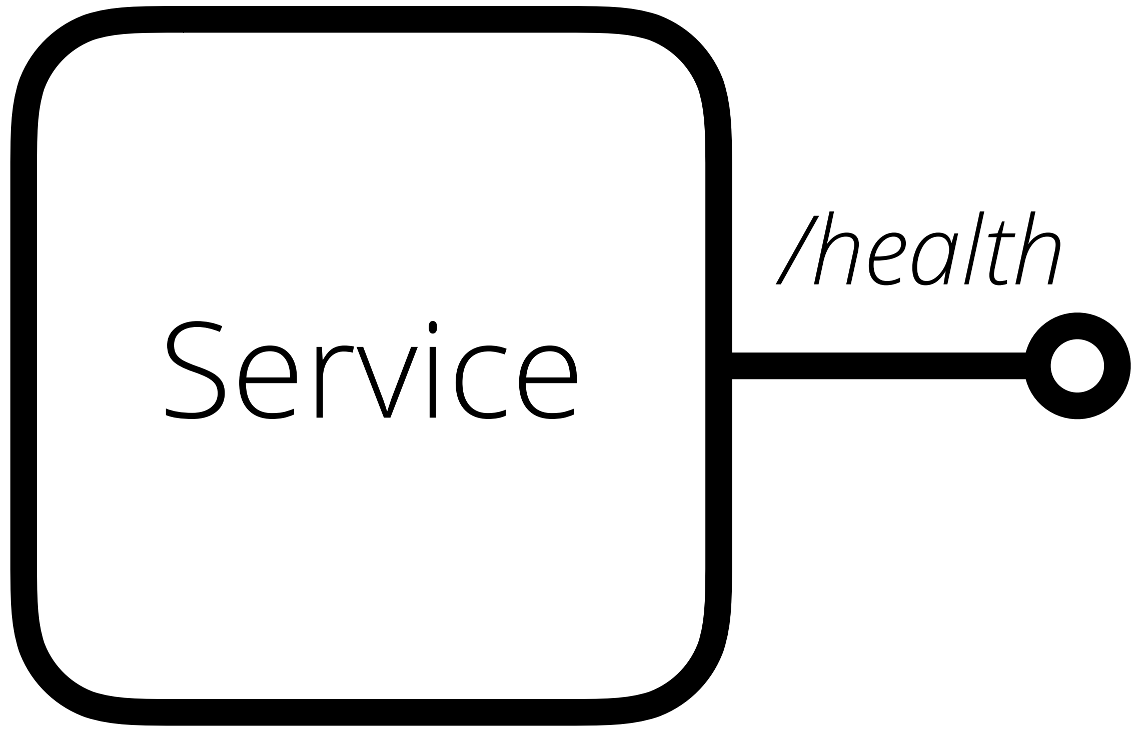
EXAMPLE

Service

EXAMPLE

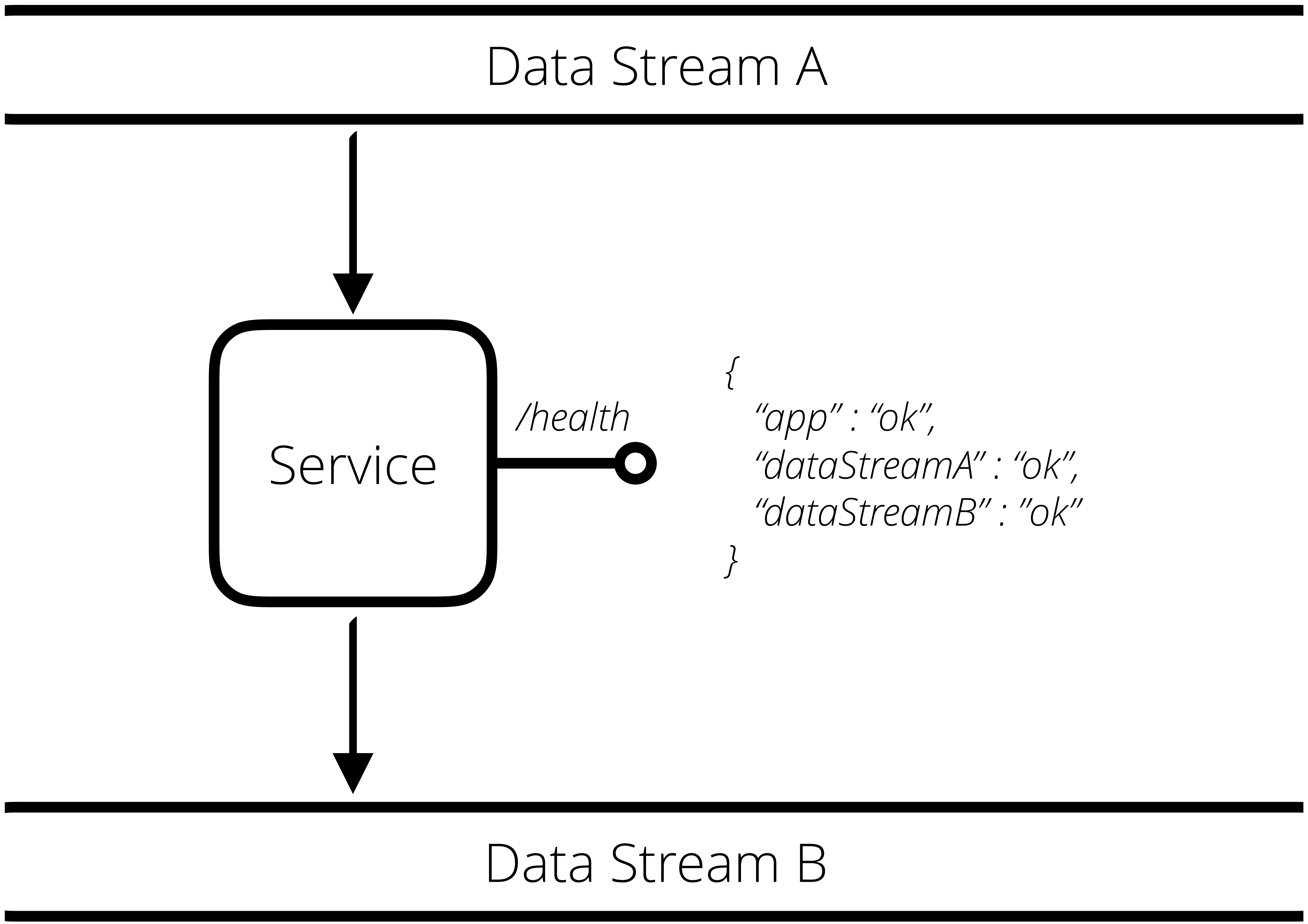


EXAMPLE



```
{
   "app" : "ok"
}
```

EXAMPLE



Data Stream A

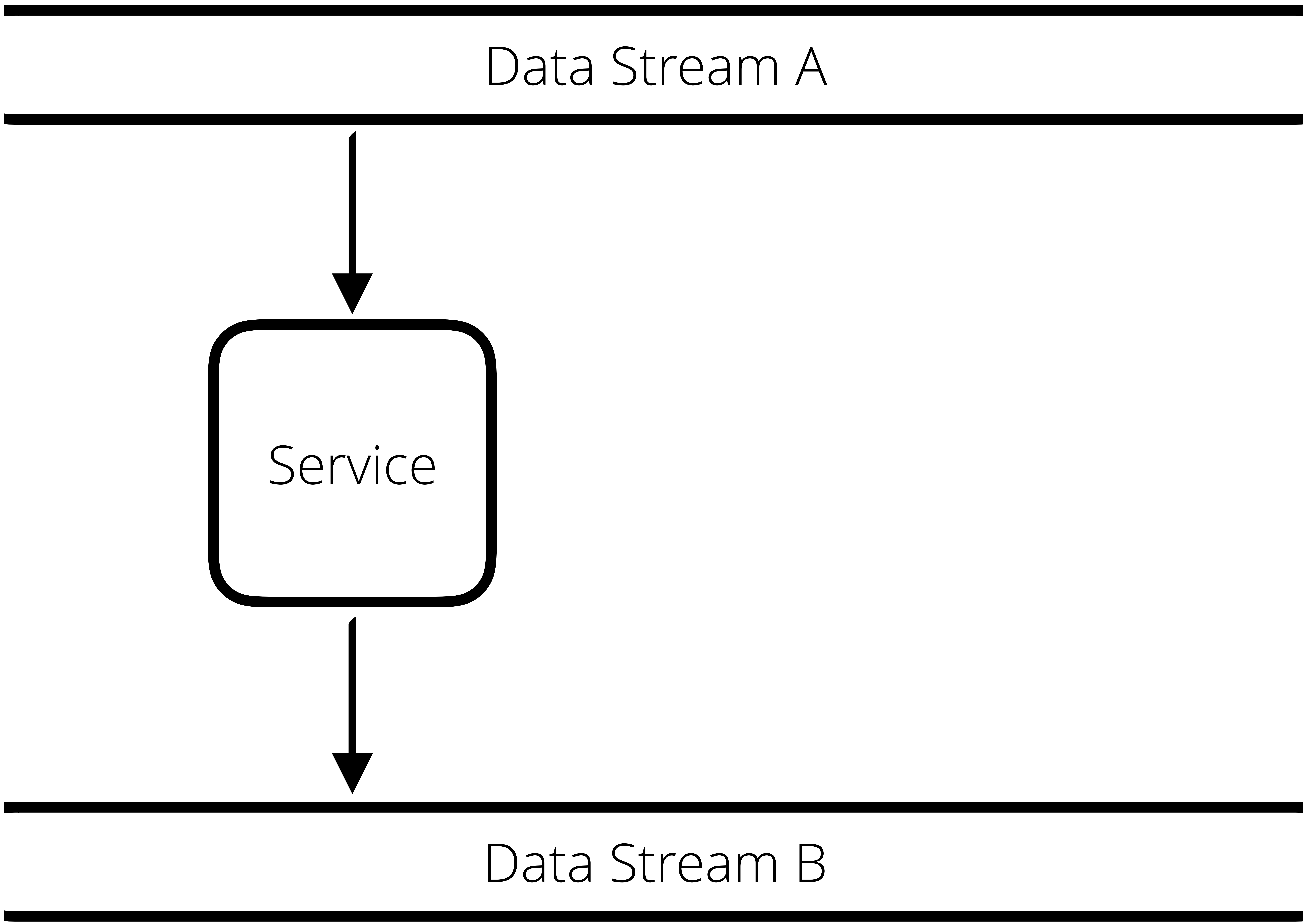
Service

/health

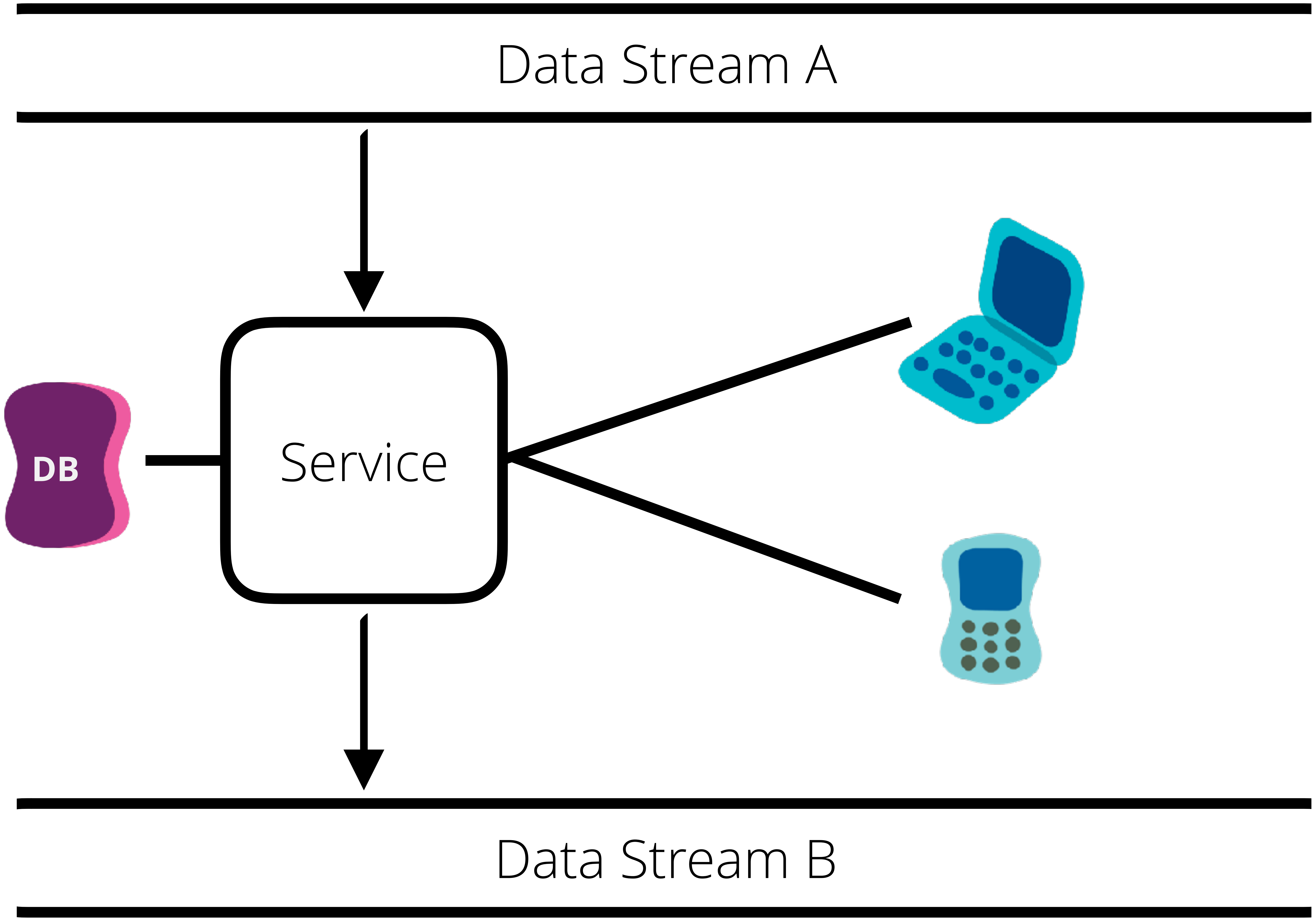
```
{
   “app” : “ok”,
   “dataStreamA” : “ok”,
   “dataStreamB” : ”ok”
}
```

Data Stream B

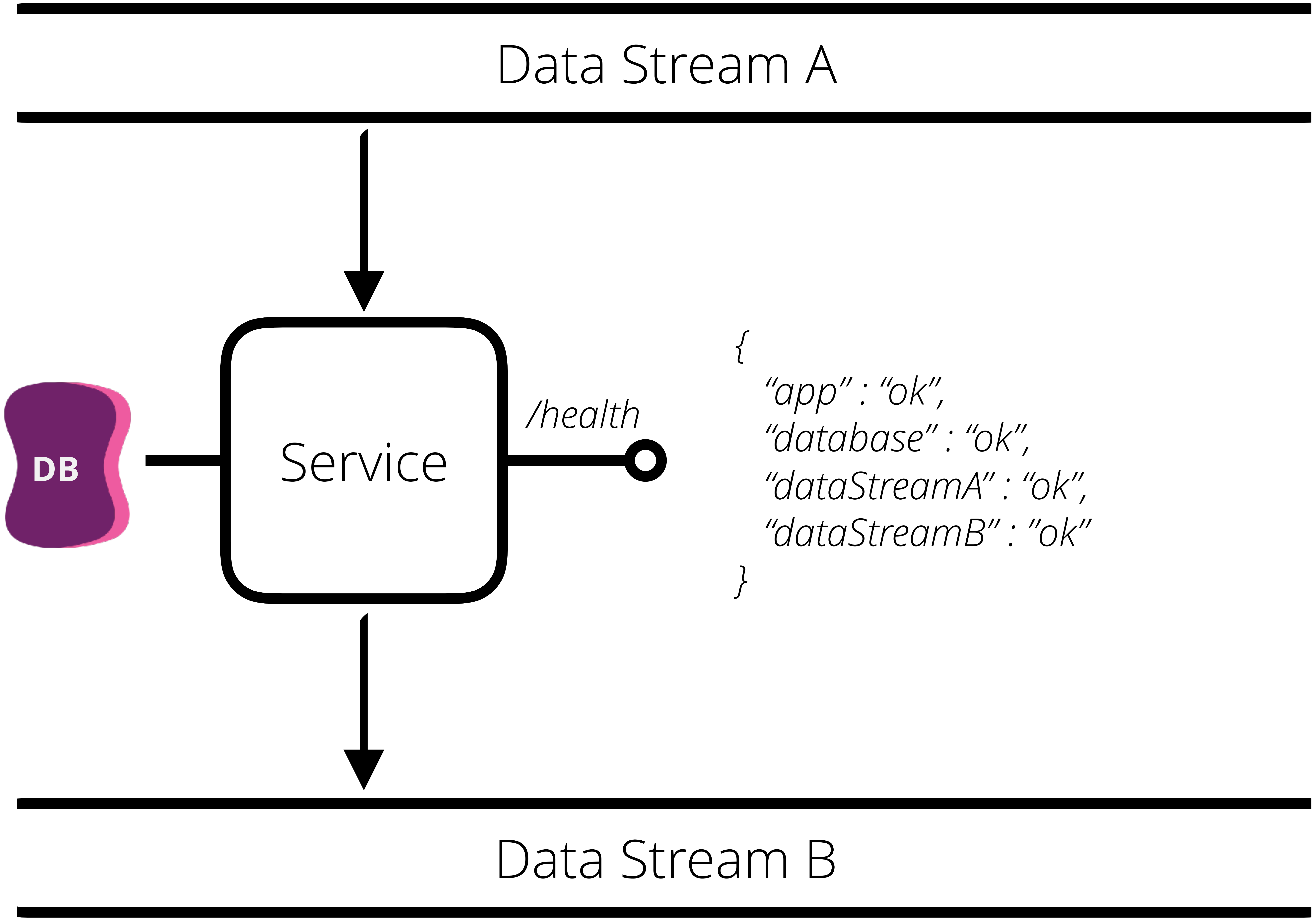
EXAMPLE



EXAMPLE



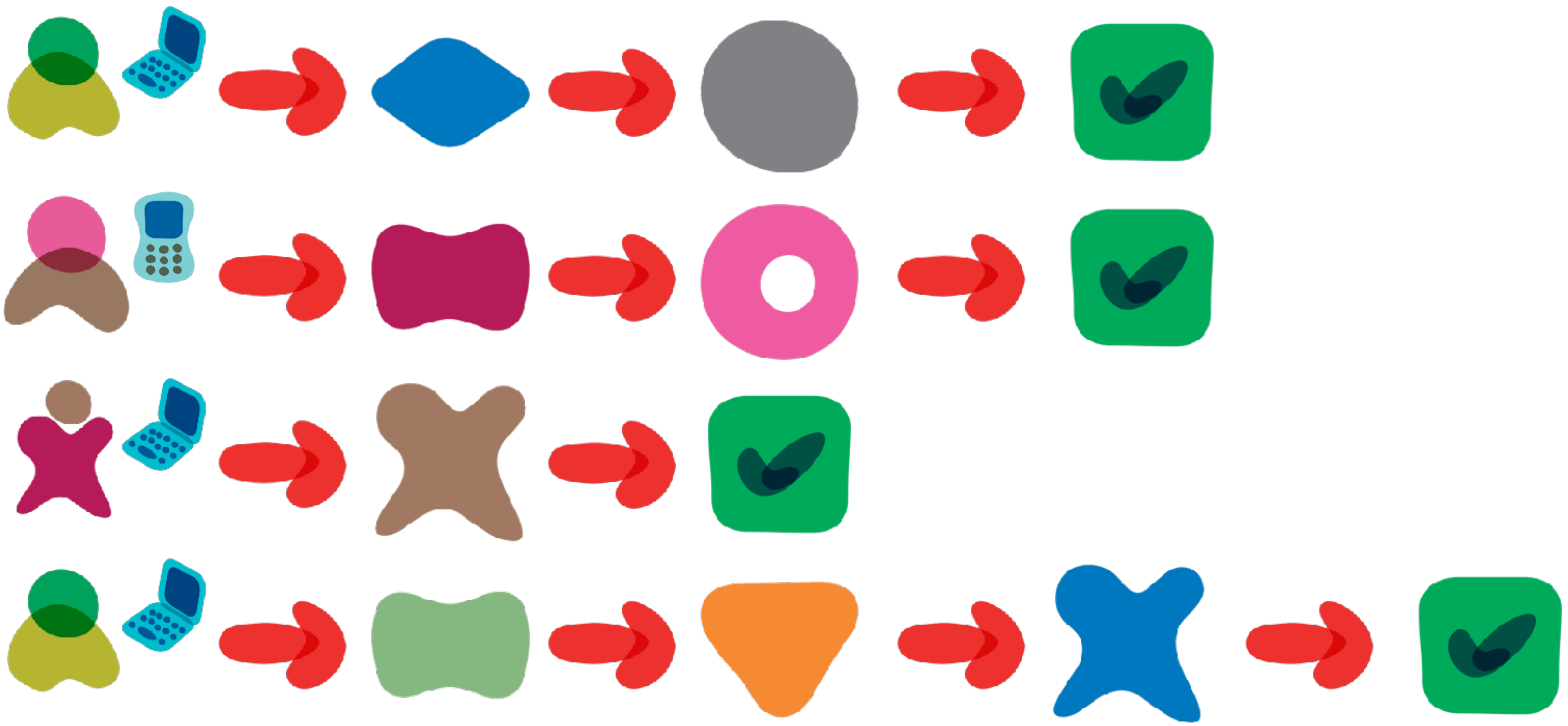
EXAMPLE



```
{
   "app" : "ok",
   "database" : "ok",
   "dataStreamA" : "ok",
   "dataStreamB" : "ok"
}
```

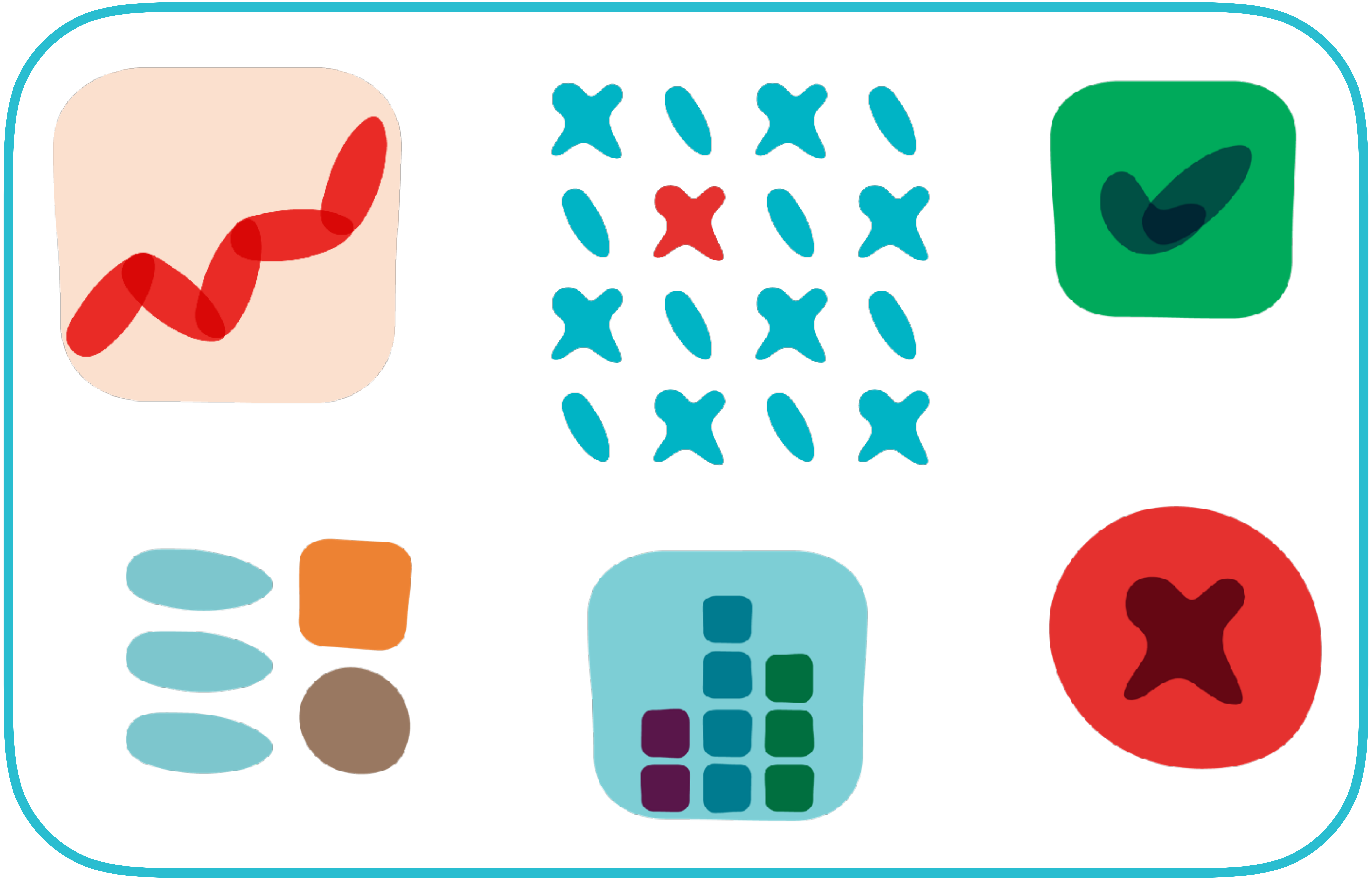
Business monitoring

SEMANTIC MONITORING



https://martinfowler.com/bliki/SyntheticMonitoring.html

It is accessible by everyone in the team



Monitoring overload

TOOLS

An open-source service monitoring system and time series database.

Push notifications: Alerts

ALERTS SHOULD BE ACTIONABLE

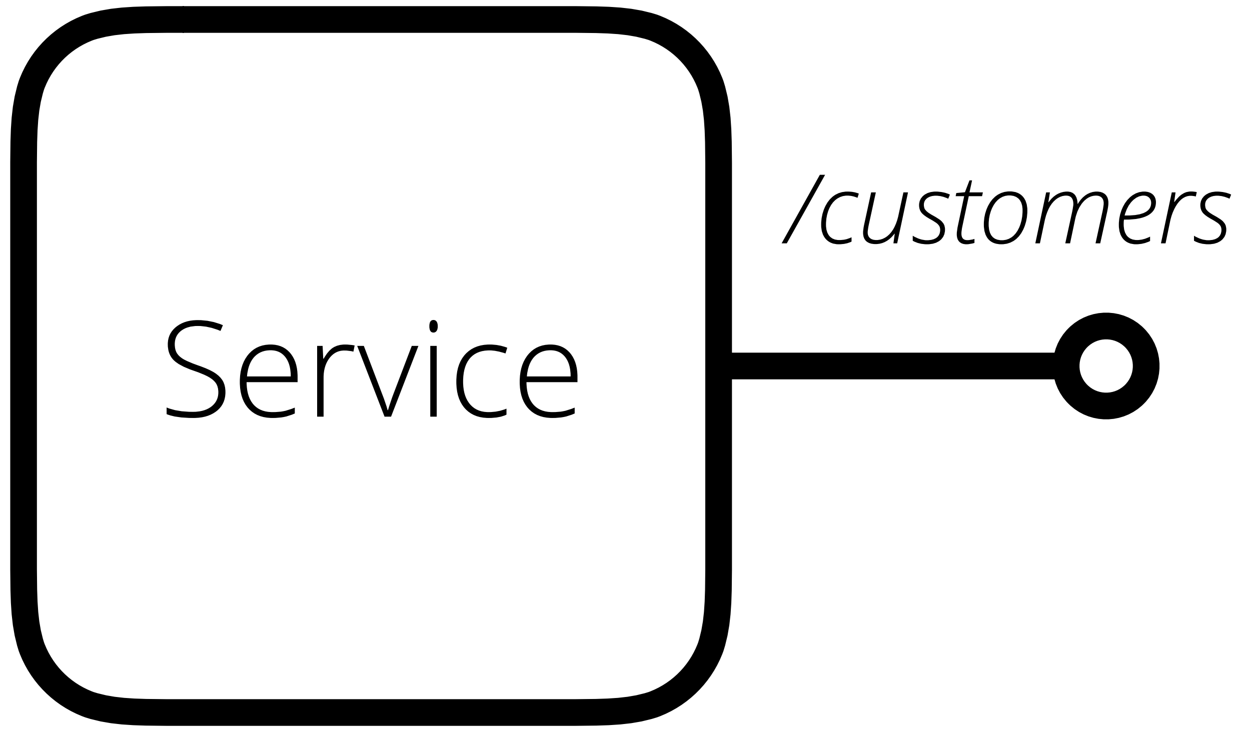
Title: ConnectionTimeOutException

Description: Connection to service A has timed out

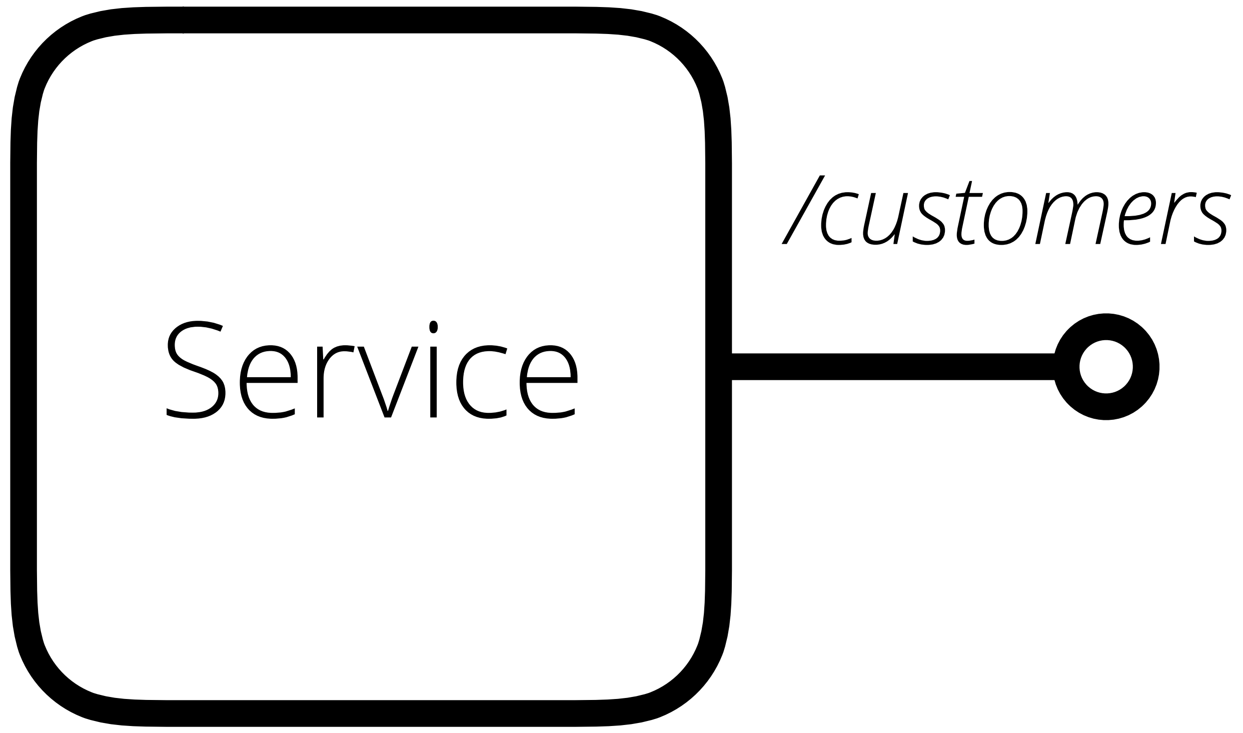
More info: <link to visualization tool>

How to act: <link to run book>

SMART ALERTS

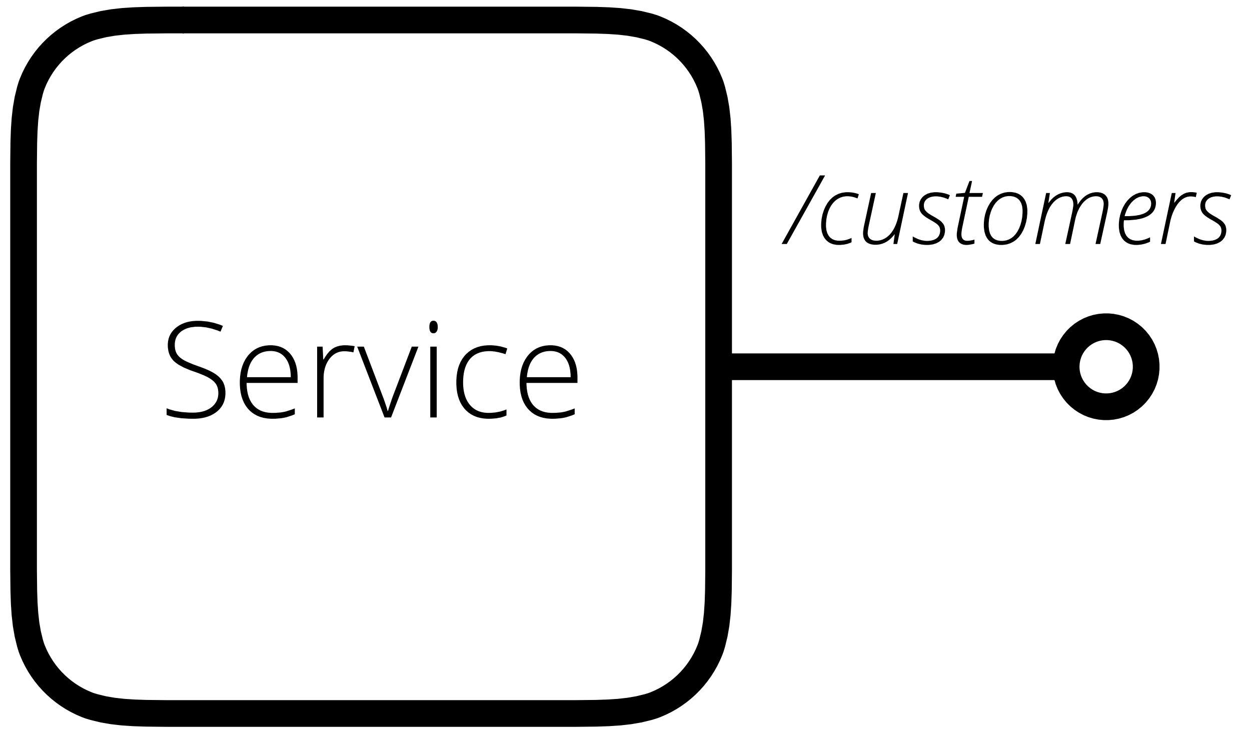


SMART ALERTS



Send an email to owner for every 5xx error

SMART ALERTS

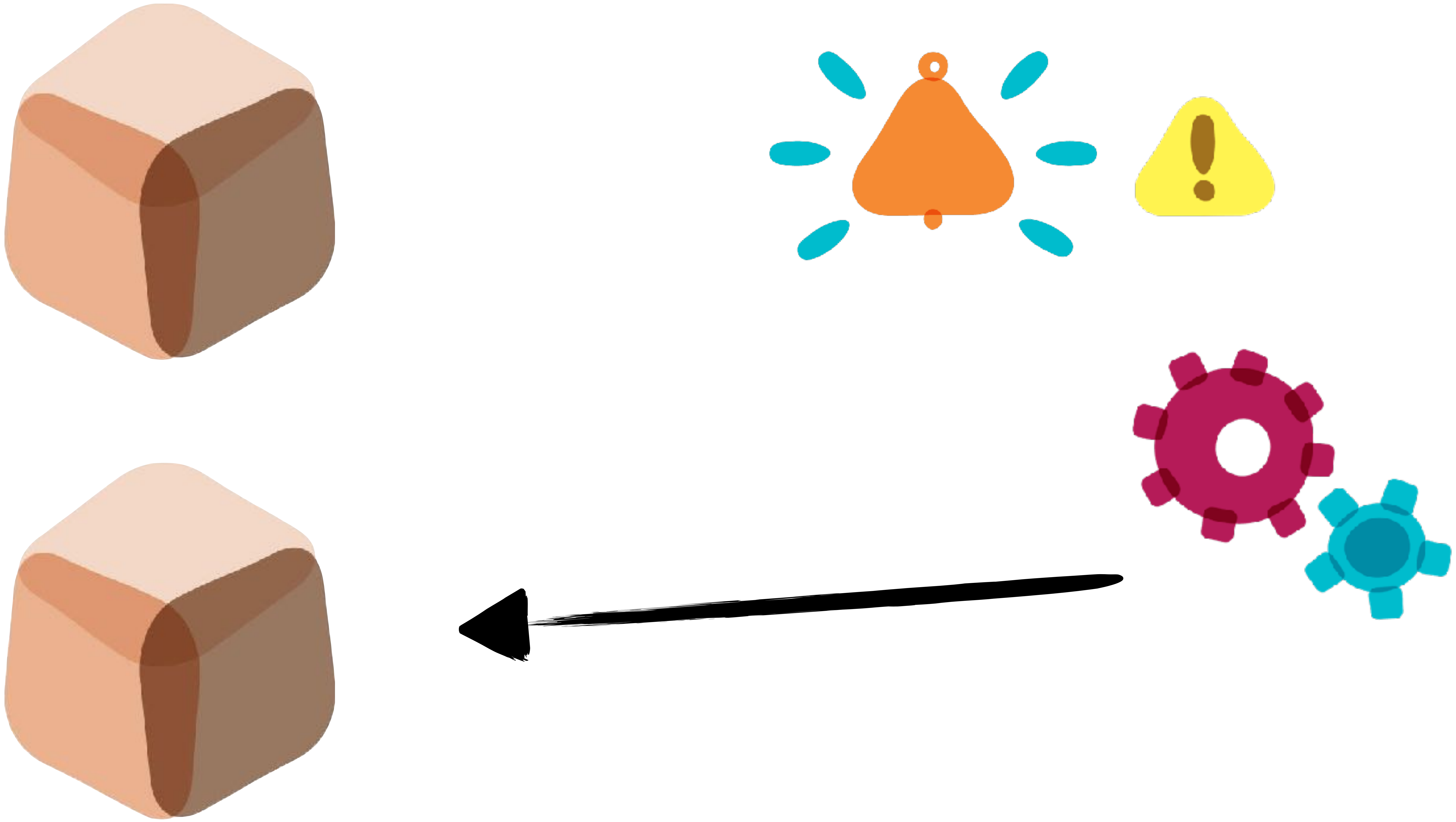


Send an email to owner for every 5xx error

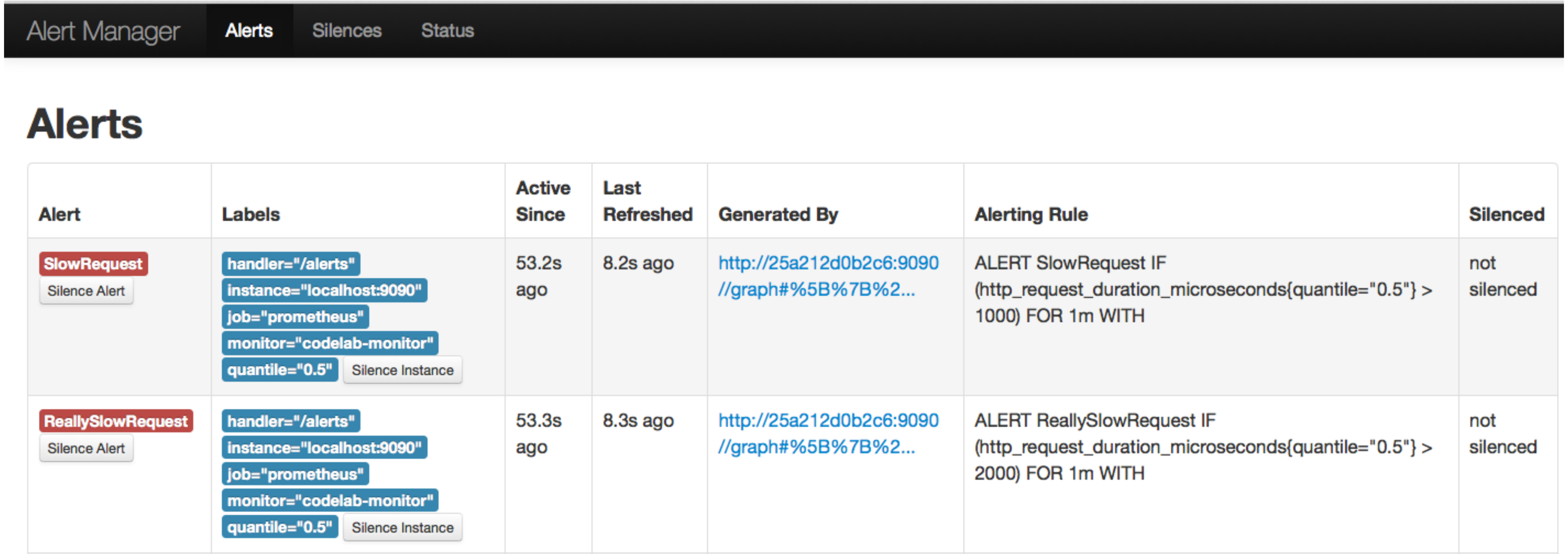
Raise a high priority alarm when >10 5xx errors in 10 minutes

SMART ALERTS

SMART ALERTS



SMART ALERTS



Alerts

Alert	Labels	Active Since	Last Refreshed	Generated By	Alerting Rule	Silenced
SlowRequest Silence Alert	handler="/alerts" instance="localhost:9090" job="prometheus" monitor="codelab-monitor" quantile="0.5" Silence Instance	53.2s ago	8.2s ago	http://25a212d0b2c6:9090//graph#%5B%7B%2...	ALERT SlowRequest IF (http_request_duration_microseconds{quantile="0.5"} > 1000) FOR 1m WITH	not silenced
ReallySlowRequest Silence Alert	handler="/alerts" instance="localhost:9090" job="prometheus" monitor="codelab-monitor" quantile="0.5" Silence Instance	53.3s ago	8.3s ago	http://25a212d0b2c6:9090//graph#%5B%7B%2...	ALERT ReallySlowRequest IF (http_request_duration_microseconds{quantile="0.5"} > 2000) FOR 1m WITH	not silenced

Prometheus

An open-source service monitoring system and time series database.

OpsGenie

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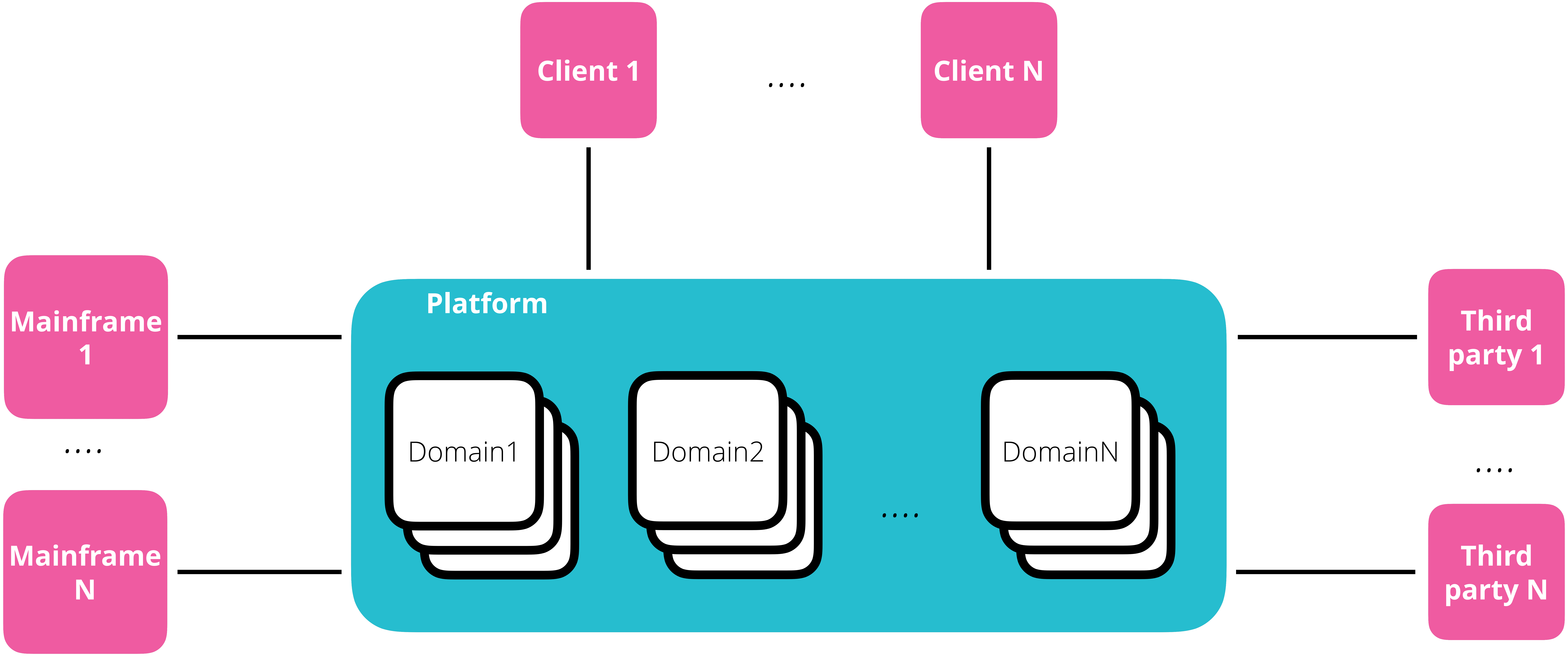
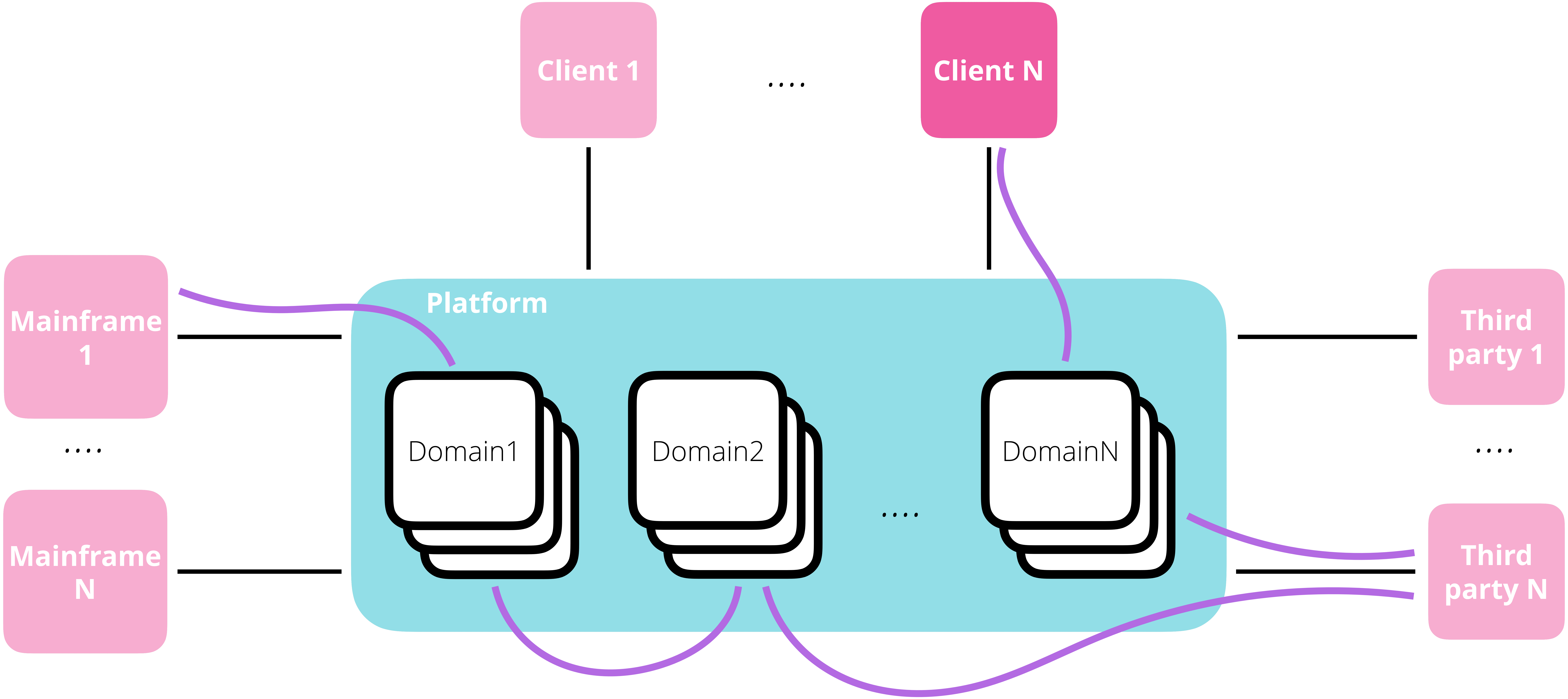
TRACING

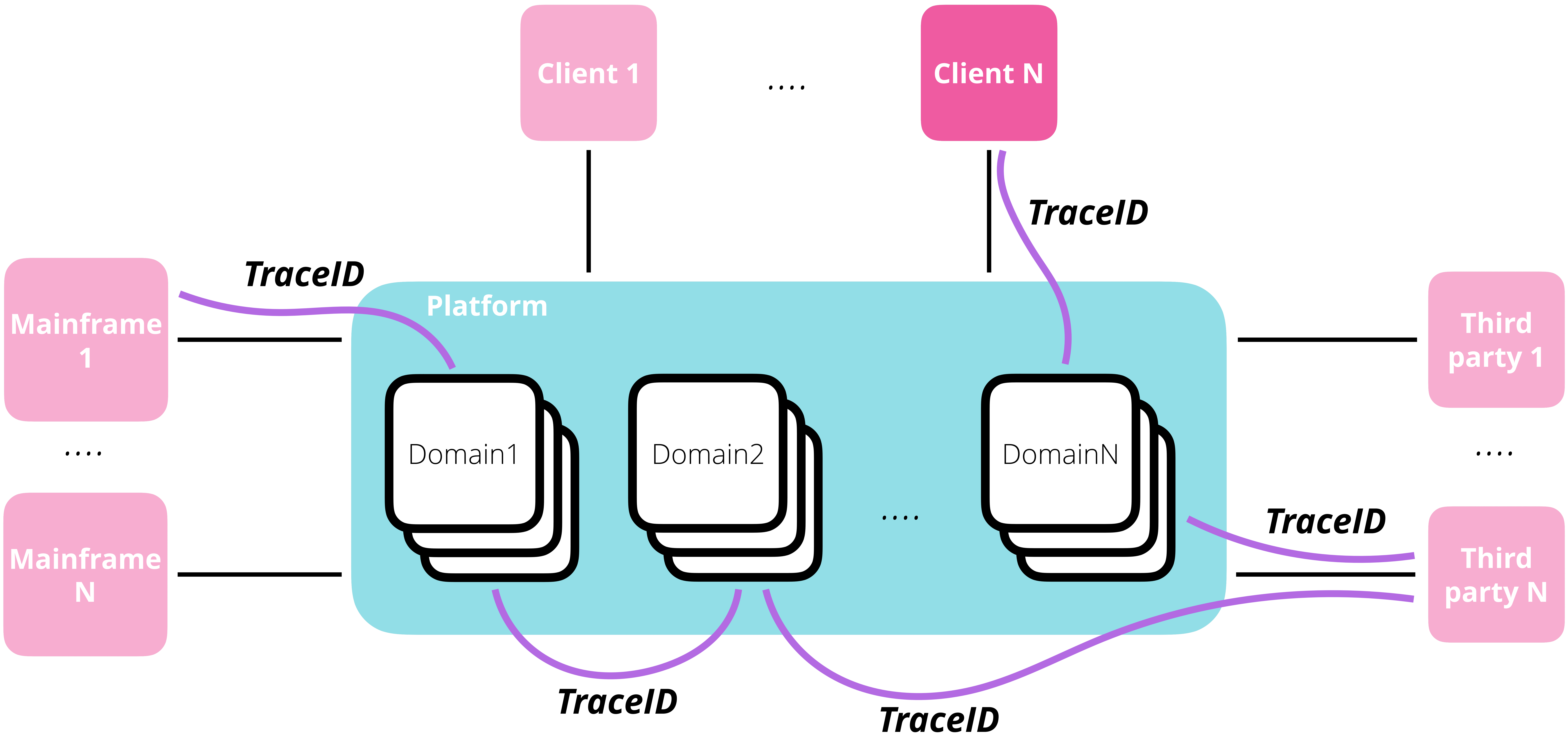
ABILITY TO FIND THE ORIGIN OF A REQUEST



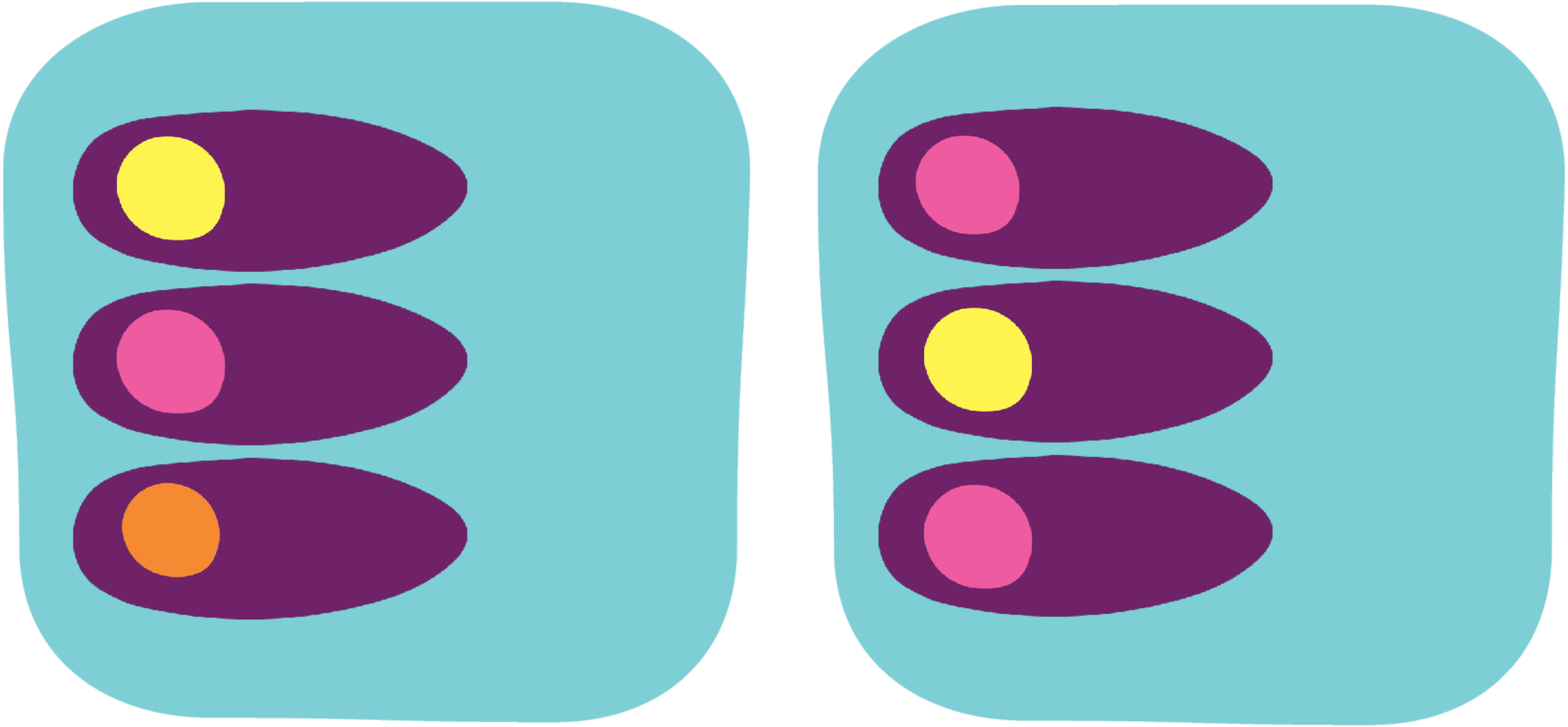
ABILITY TO FIND THE ORIGIN OF A REQUEST



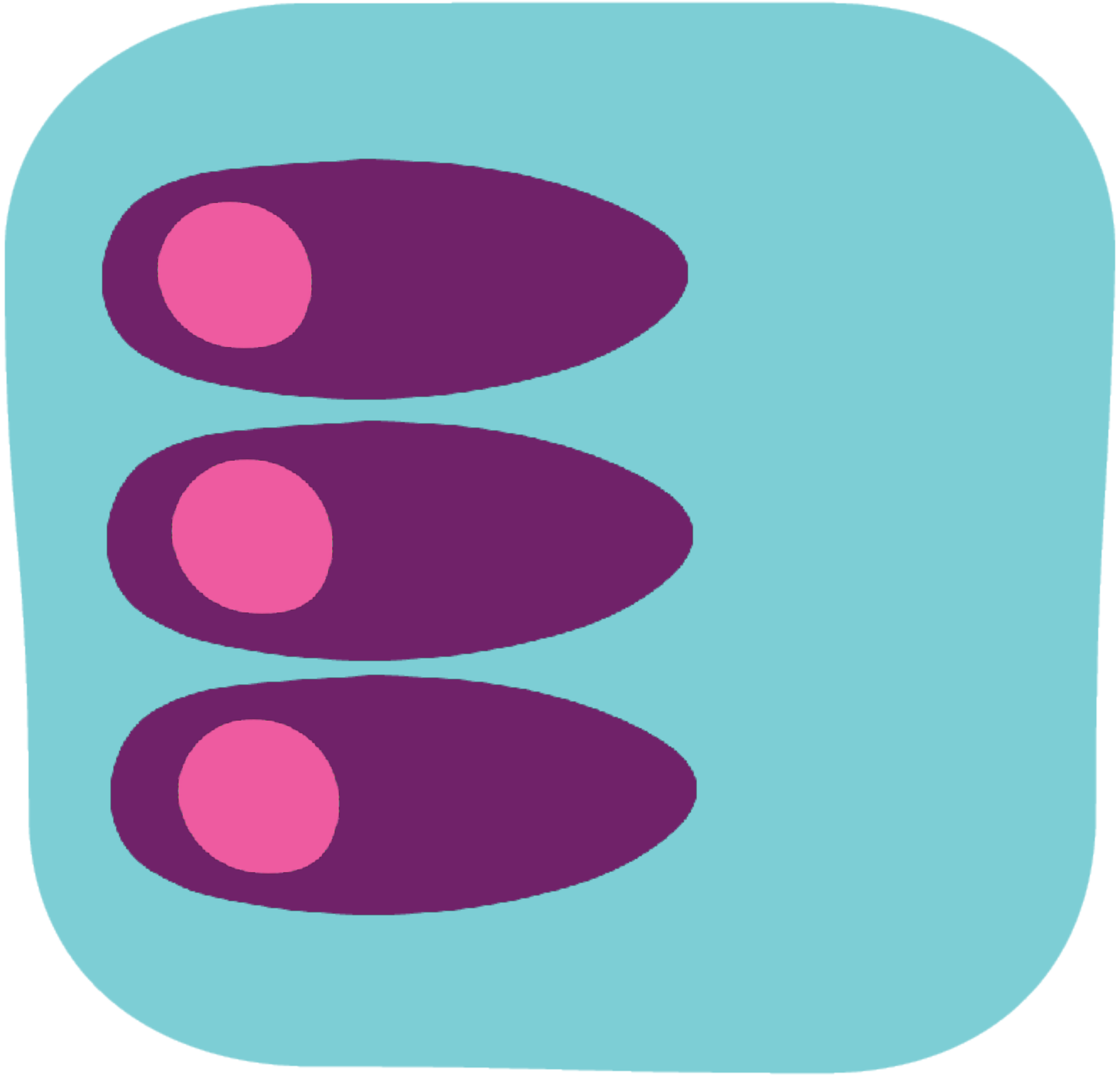
ABILITY TO FIND THE ORIGIN OF A REQUEST



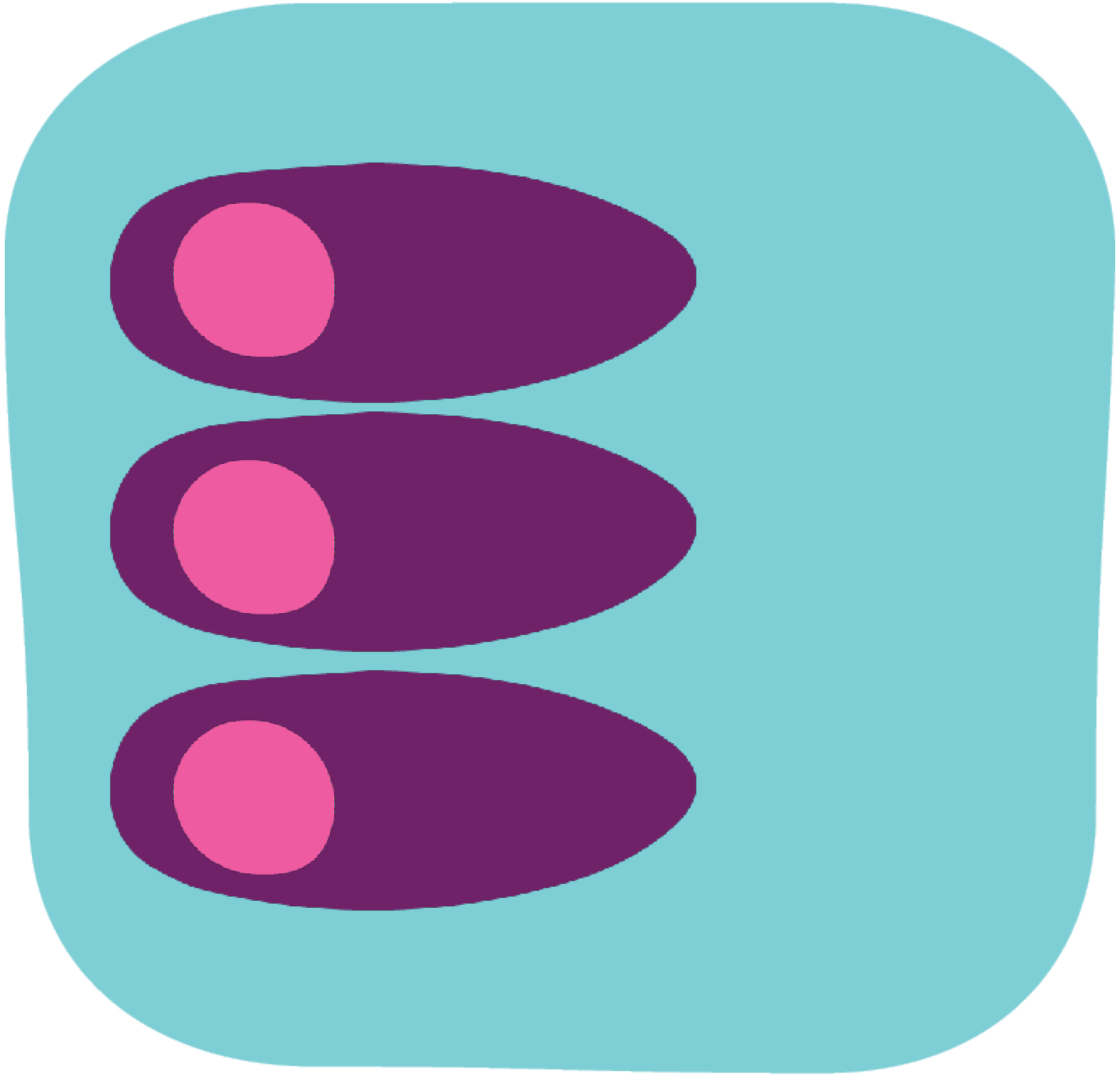
LOG AGGREGATOR



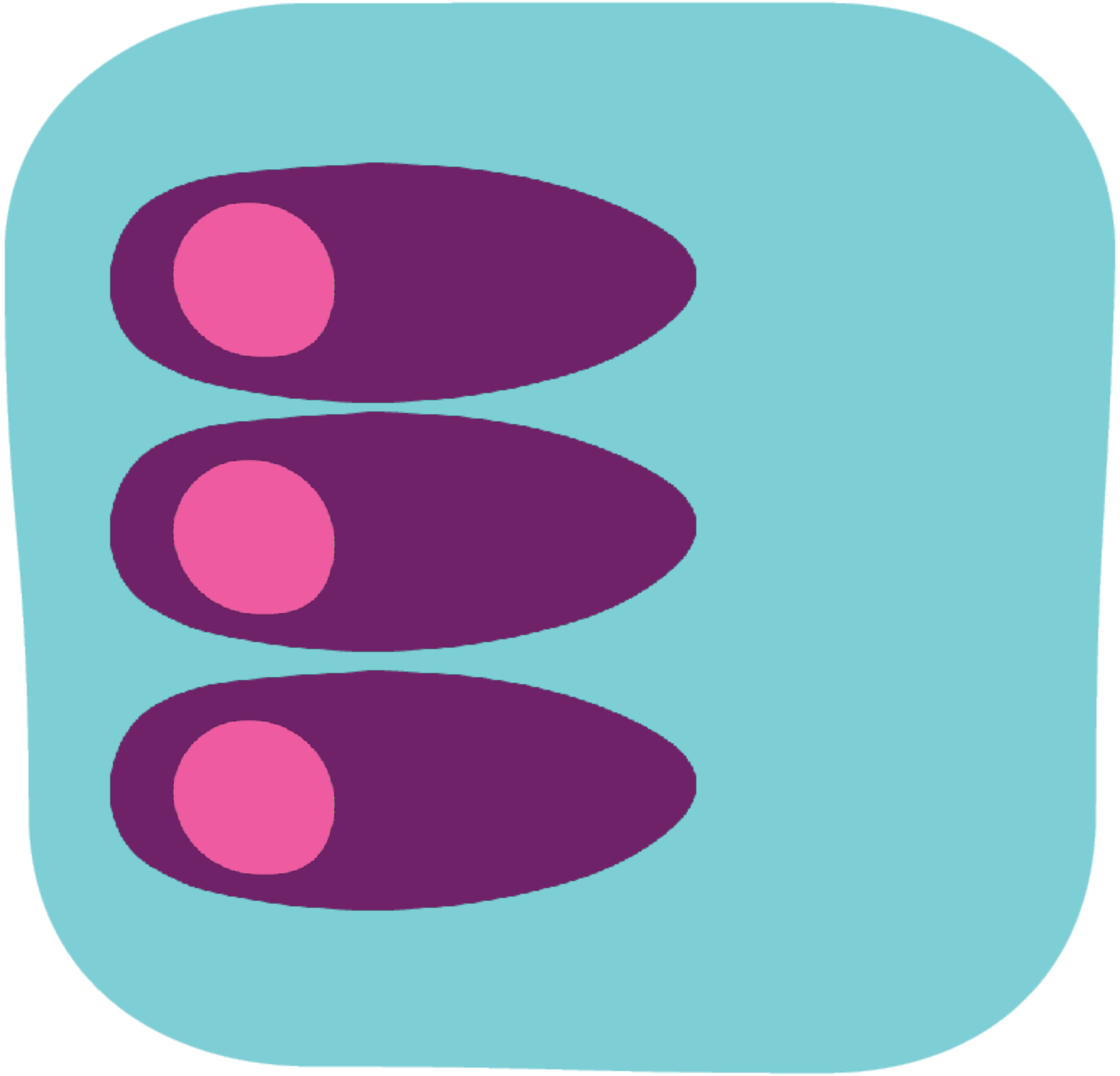
LOG AGGREGATOR

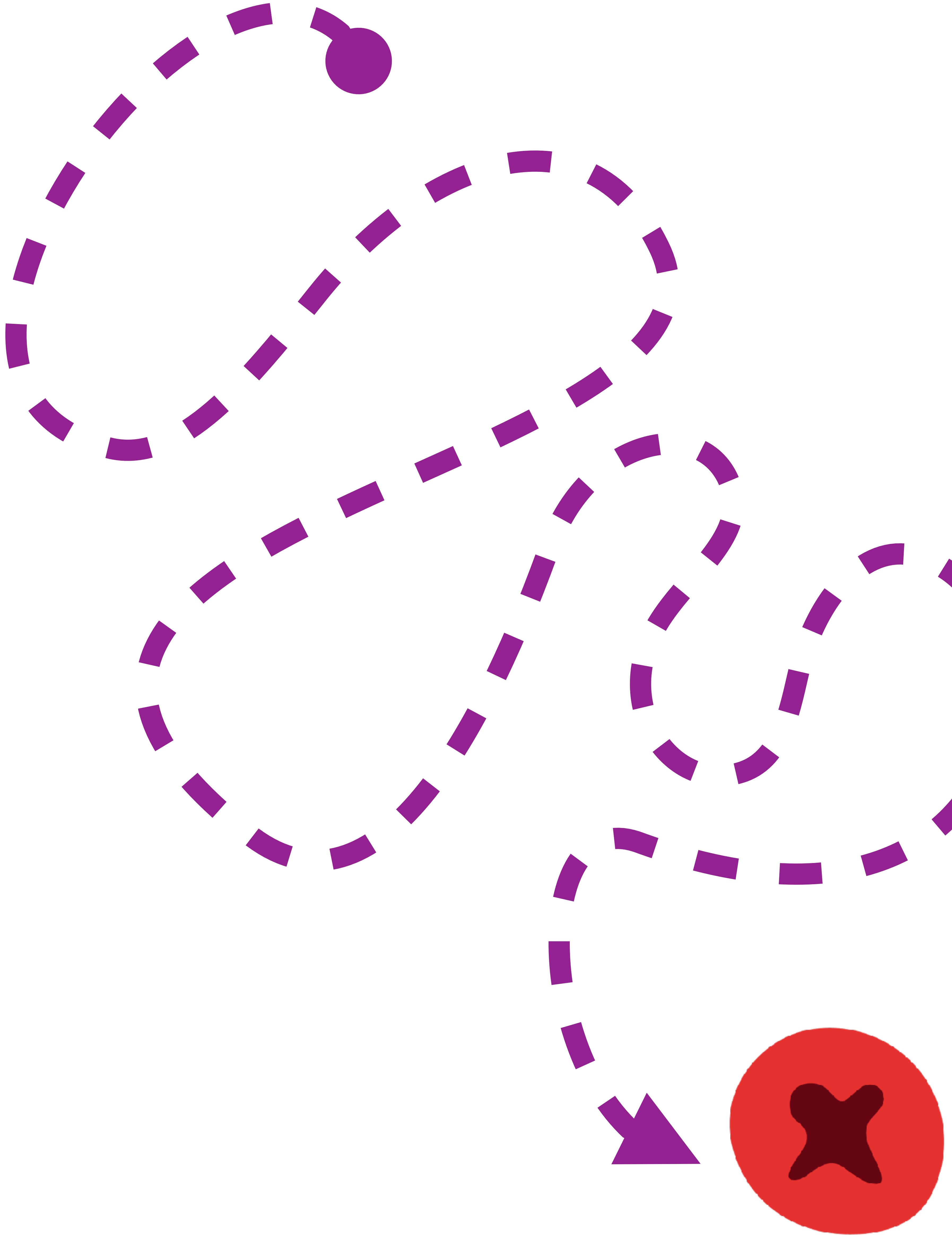


LOG AGGREGATOR

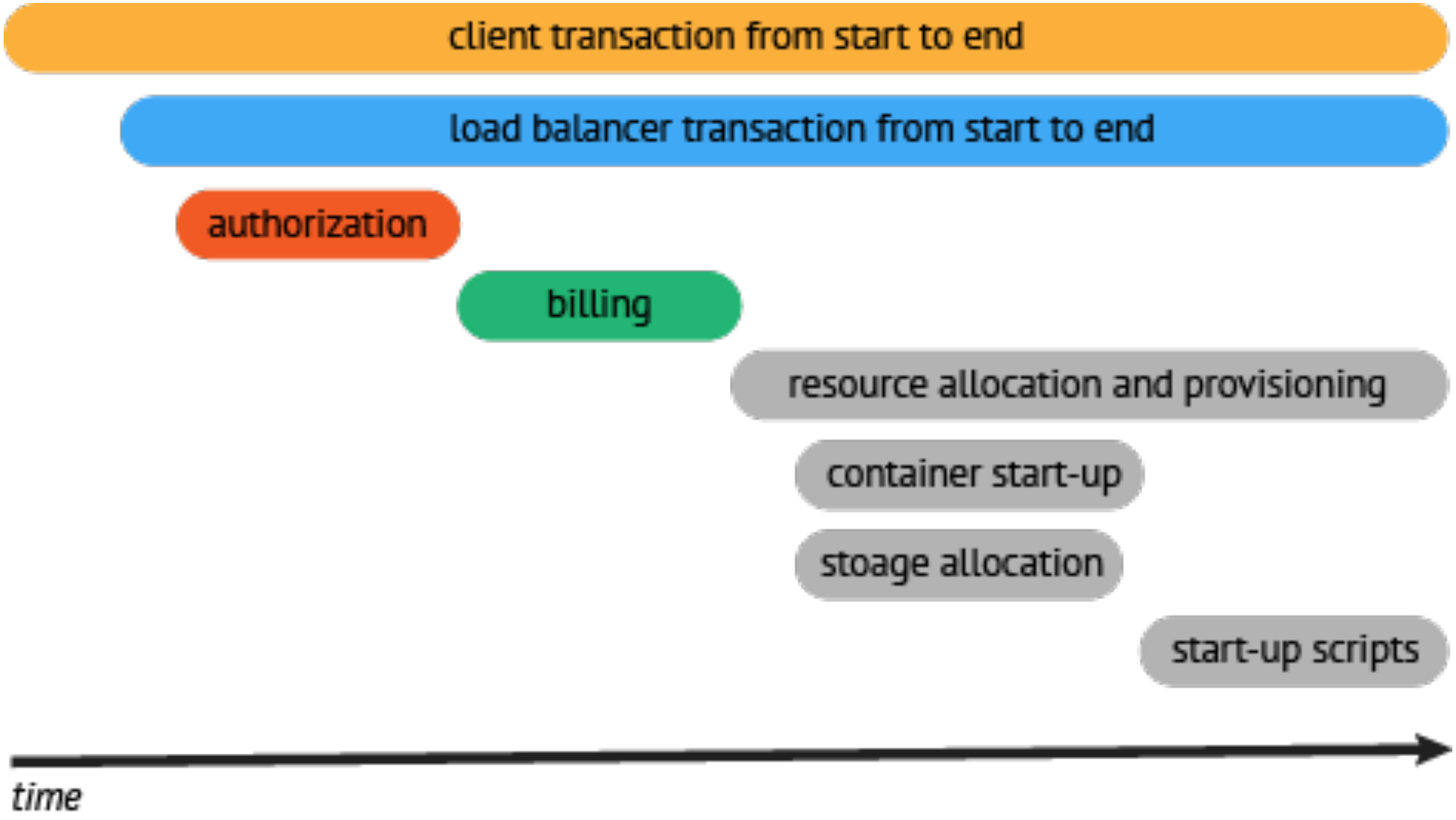


LOG AGGREGATOR

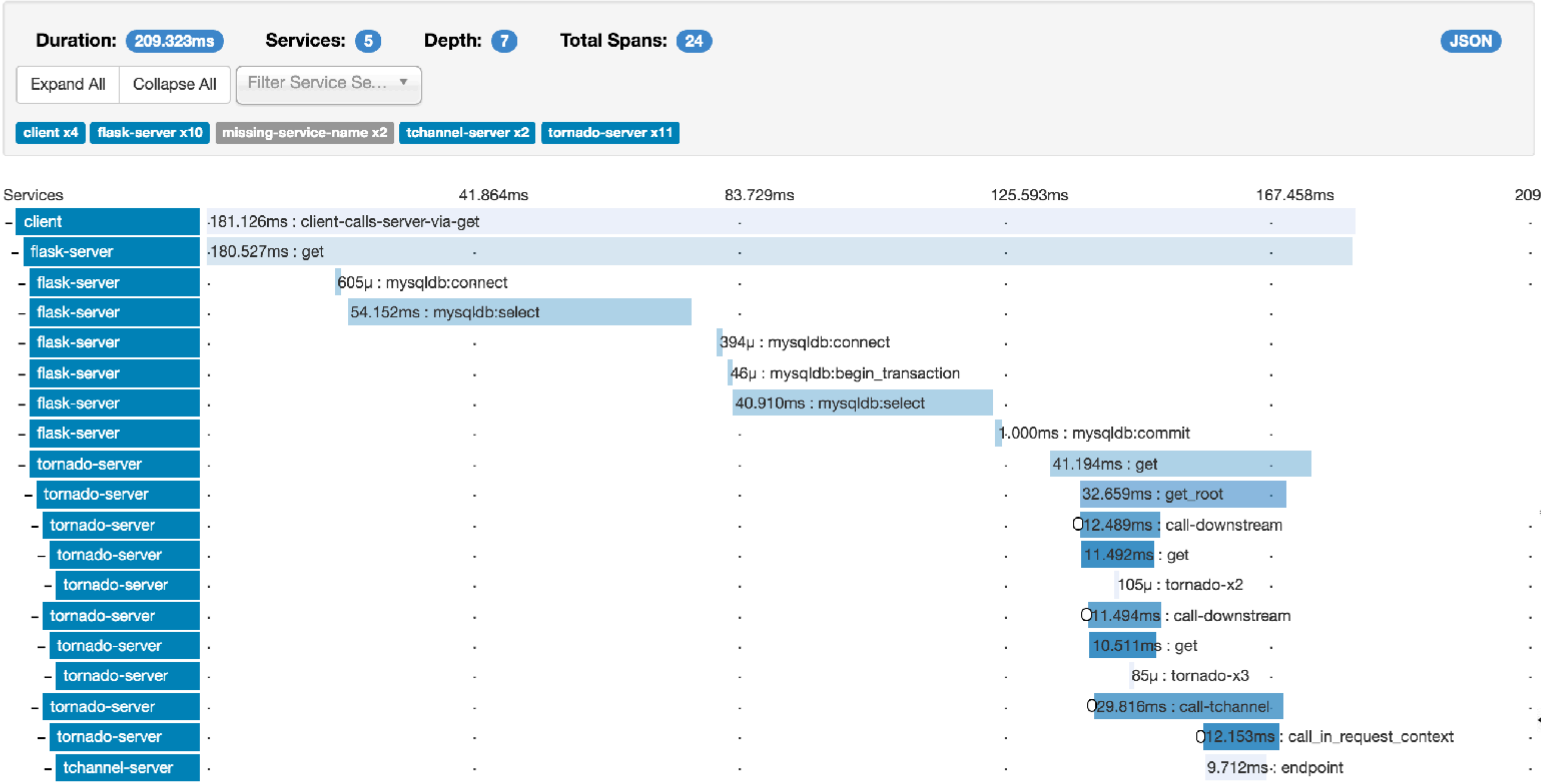




REQUEST GRAPH


client transaction from start to end
load balancer transaction from start to end
authorization
billing
resource allocation and provisioning
container start-up
stoage allocation
start-up scripts
time

DISTRIBUTING TRACING TOOLS



Duration: 209.323ms **Services:** 5 **Depth:** 7 **Total Spans:** 24 JSON

Expand All | Collapse All | Filter Service Se... ▾

client x4 | flask-server x10 | missing-service-name x2 | tchannel-server x2 | tornado-server x11

Services	41.864ms	83.729ms	125.593ms	167.458ms	209.323ms
– client	181.126ms : client-calls-server-via-get				
– flask-server	180.527ms : get				
– flask-server	605μ : mysqldb:connect				
– flask-server	54.152ms : mysqldb:select				
– flask-server		394μ : mysqldb:connect			
– flask-server		46μ : mysqldb:begin_transaction			
– flask-server		40.910ms : mysqldb:select			
– flask-server			1.000ms : mysqldb:commit		
– tornado-server				41.194ms : get	
– tornado-server				32.659ms : get_root	
– tornado-server				012.489ms : call-downstream	
– tornado-server				11.492ms : get	
– tornado-server				105μ : tornado-x2	
– tornado-server				011.494ms : call-downstream	
– tornado-server				10.511ms : get	
– tornado-server				85μ : tornado-x3	
– tornado-server				029.816ms : call-tchannel	
– tornado-server				012.153ms : call_in_request_context	
– tchannel-server				9.712ms : endpoint	

LightStep

Jaegar

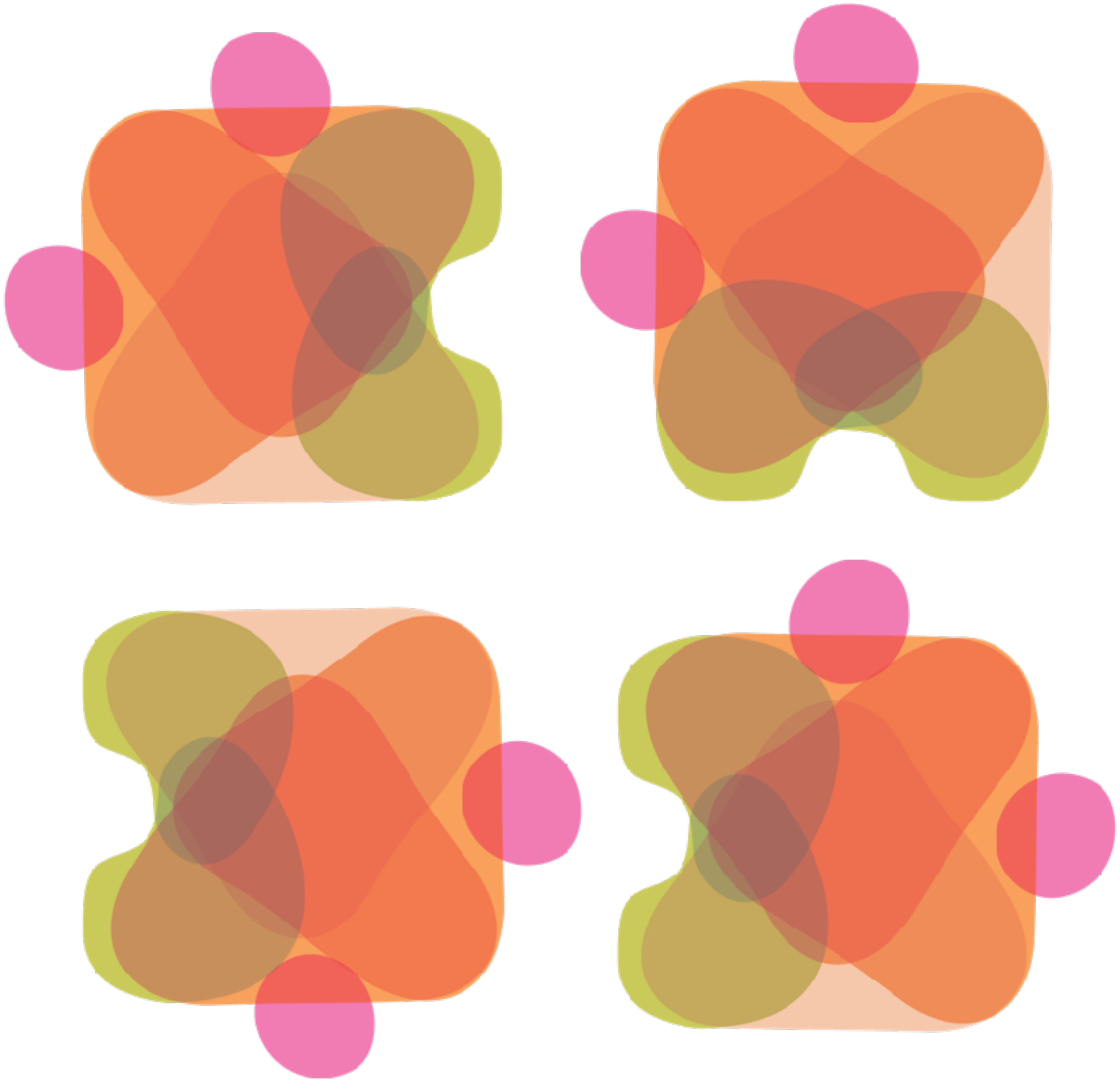
ZIPKIN

STANDARDS

OPENTRACING

ThoughtWorks®

SUMMARY



Logging

Monitoring

Tracing

Visualization
& Alerting

TAKE AWAYS

- Structure your data so it can be consumed by other tools
- Be intentional about things you log, monitor, and alert on
- Proactively iterate and eliminate noise
- Evaluate and use existing tools and libraries
- Service templates to bootstrap microservices over shared libraries

THANK YOU

Maria Gomez

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