AWS re:Invent

SVS209-S

Powering digital billboards with serverless

Taqqui Karim
Tech Lead
Place Exchange

Matthew Williams
Evangelist
Datadog

AWS re:Invent

aws

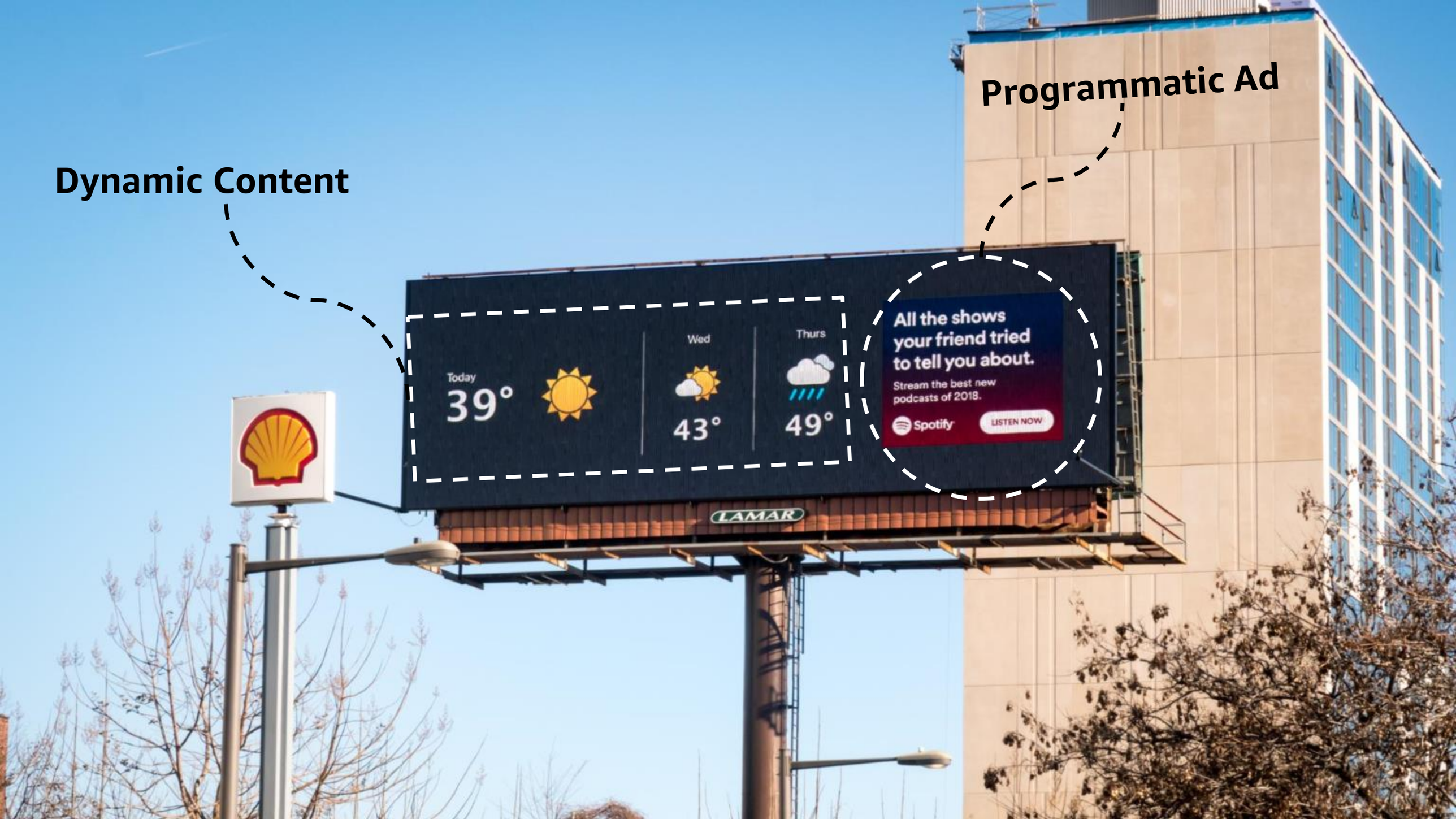
Useful content provided to DOOH screens.

Paid for via programmatic ads.

Drives greater engagement.


Today
39°
Wed
43°
Thurs
49°
All the shows your friend tried to tell you about.
Stream the best new podcasts of 2018.
Spotify
LISTEN NOW
LAMAR


Programmatic Ad
Today
39°
Wed
43°
Thurs
49°
All the shows your friend tried to tell you about.
Stream the best new podcasts of 2018.
Spotify
LISTEN NOW
LAMAR


Dynamic Content
Programmatic Ad
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All the shows your friend tried to tell you about.
Stream the best new podcasts of 2018.
Spotify
LISTEN NOW
LAMAR


Today
39°
Wed
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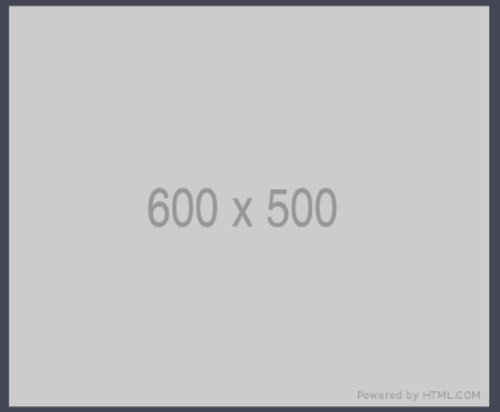
Try Premium free
Spotify
LAMAR


Her ideas unite.
She's committed to her ideas.
And we're committed to her.
Her Ideas
Start Something Priceless


Vengo
Touch Screen Vending Machine
MARVEL STUDIOS
SELECT
PLACE EXCHANGE
COLLECT
Vengo

Wednesday, June 26

HI
89°
LO
70°



Powered by Dark Sky

Wednesday, June 26

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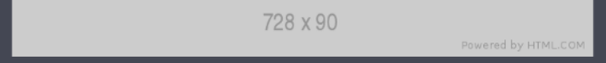

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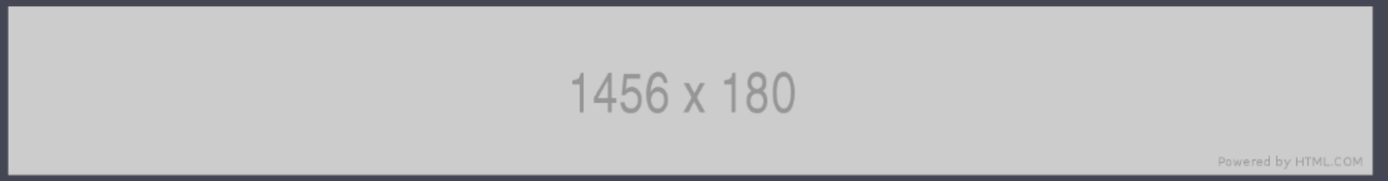

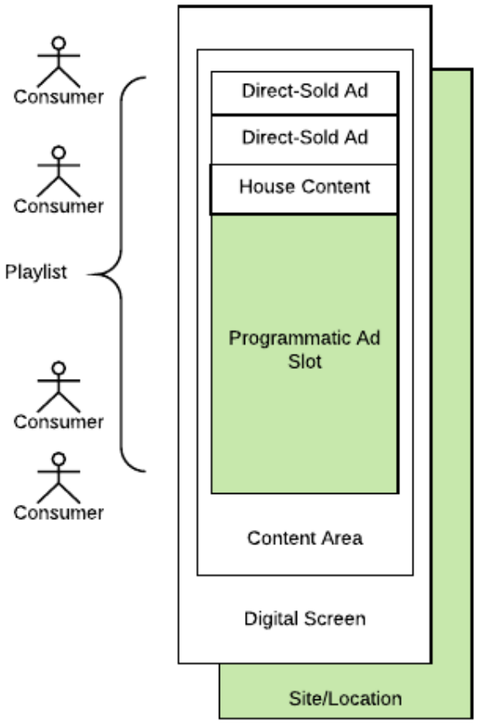
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Playlist
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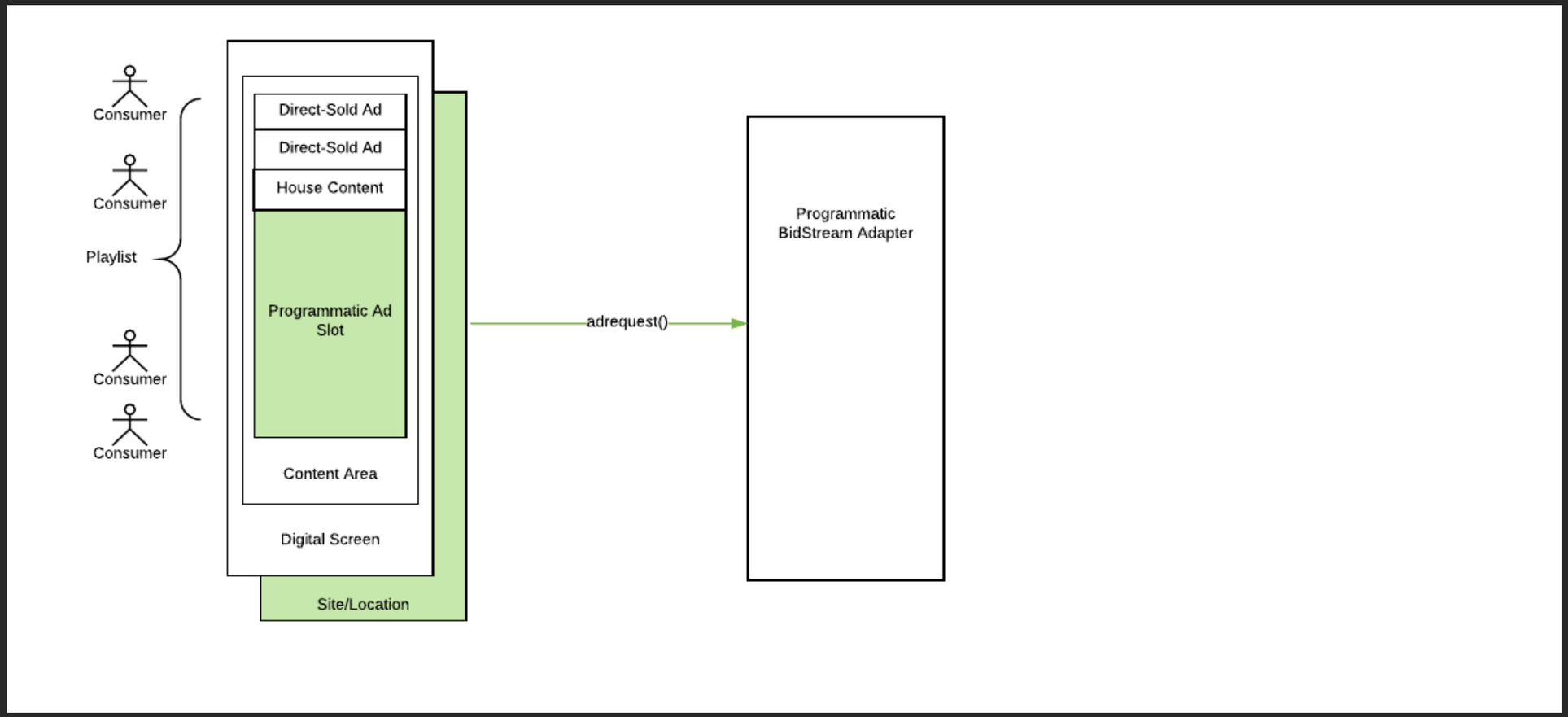
Consumer
Direct-Sold Ad
Direct-Sold Ad
House Content
Programmatic Ad Slot
Content Area
Digital Screen
Site/Location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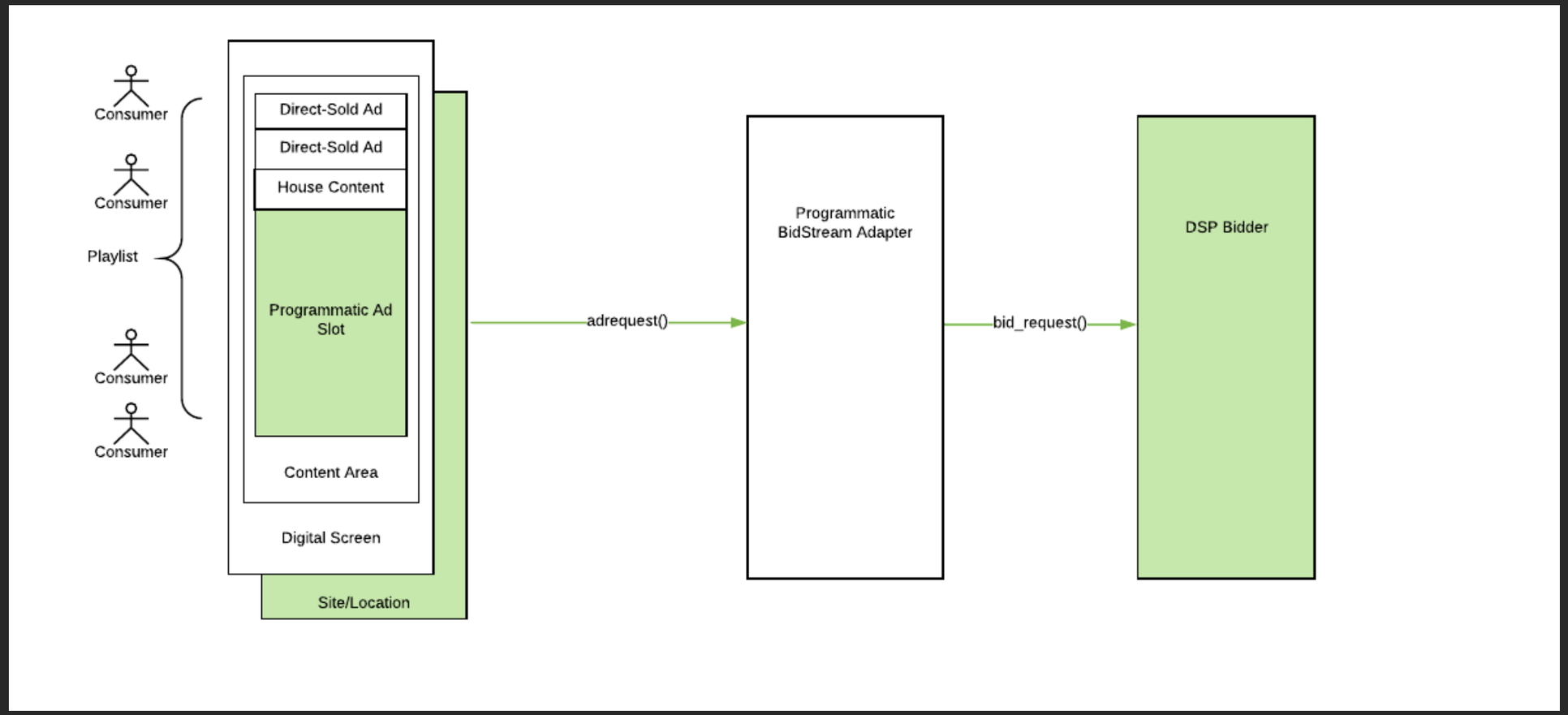
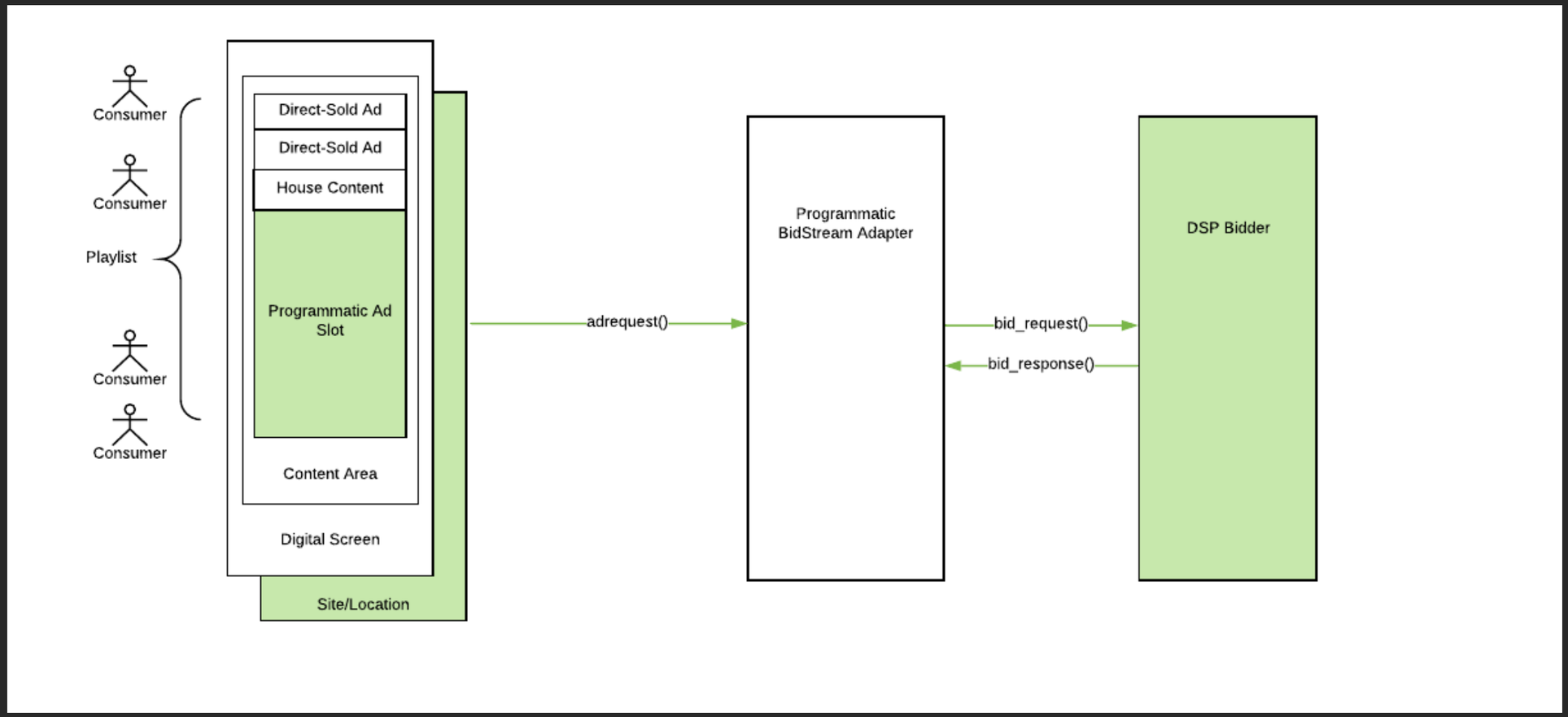
Site/Location
adrequest()
Programmatic BidStream Adapter



DSP: Demand Side Platform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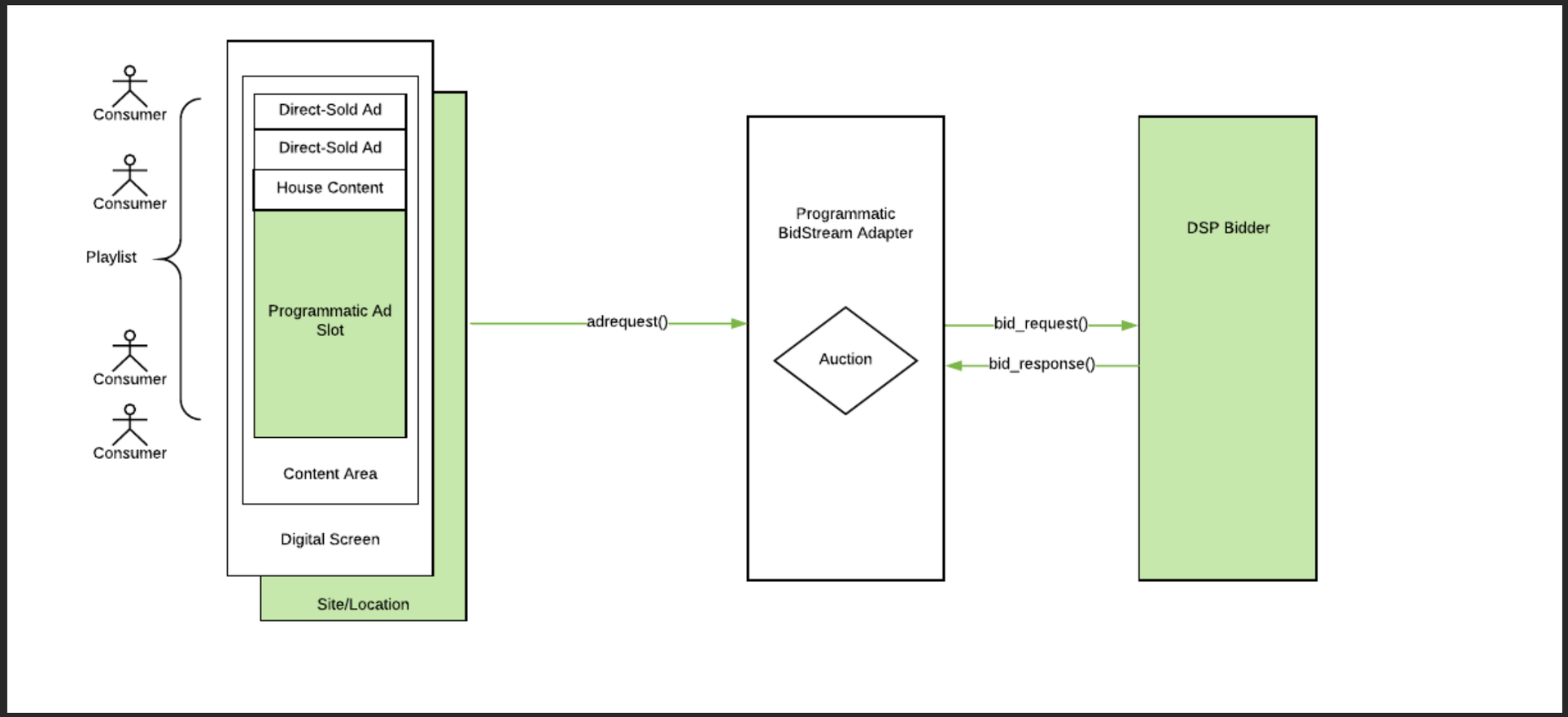
Programmatic BidStream Adapter
bid_request()
bid_response()
DSP Bidder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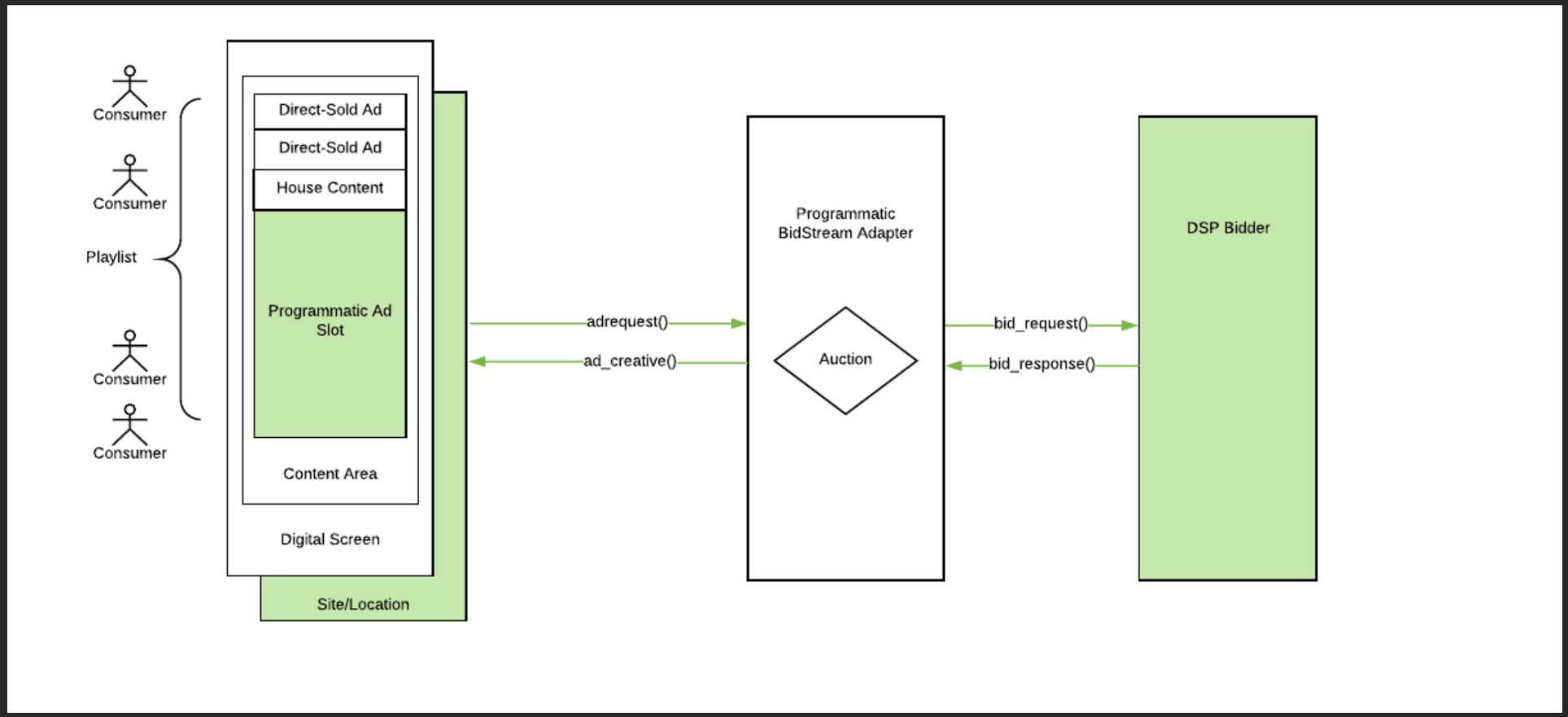
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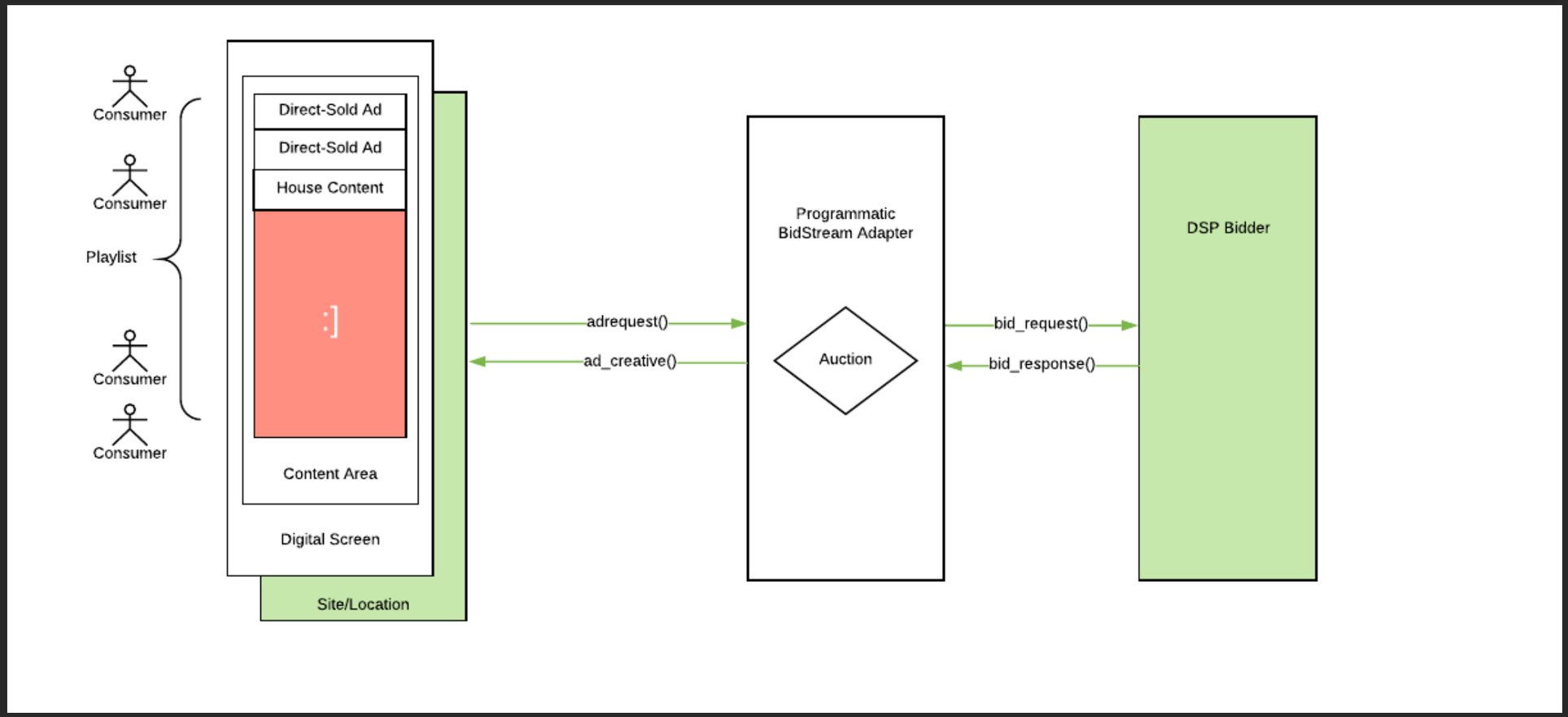
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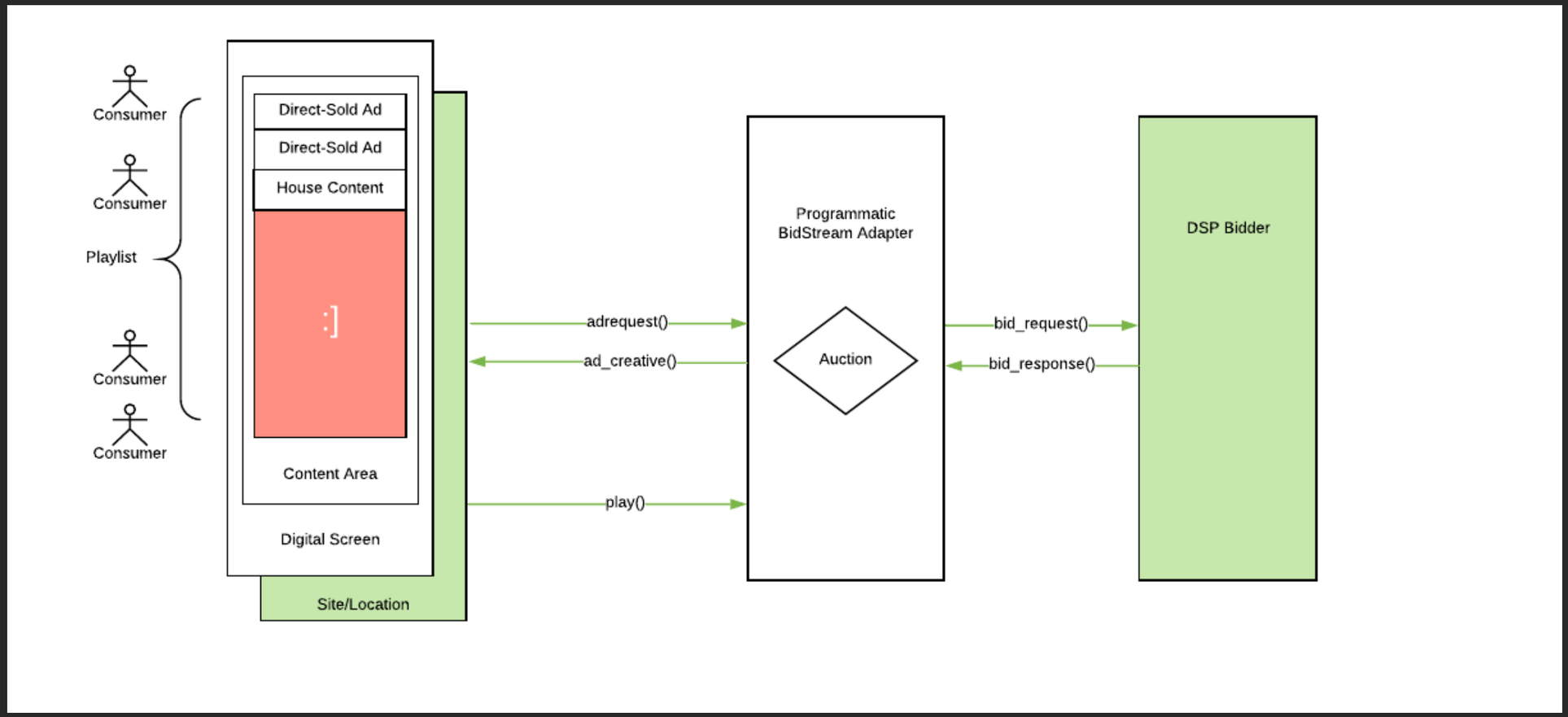
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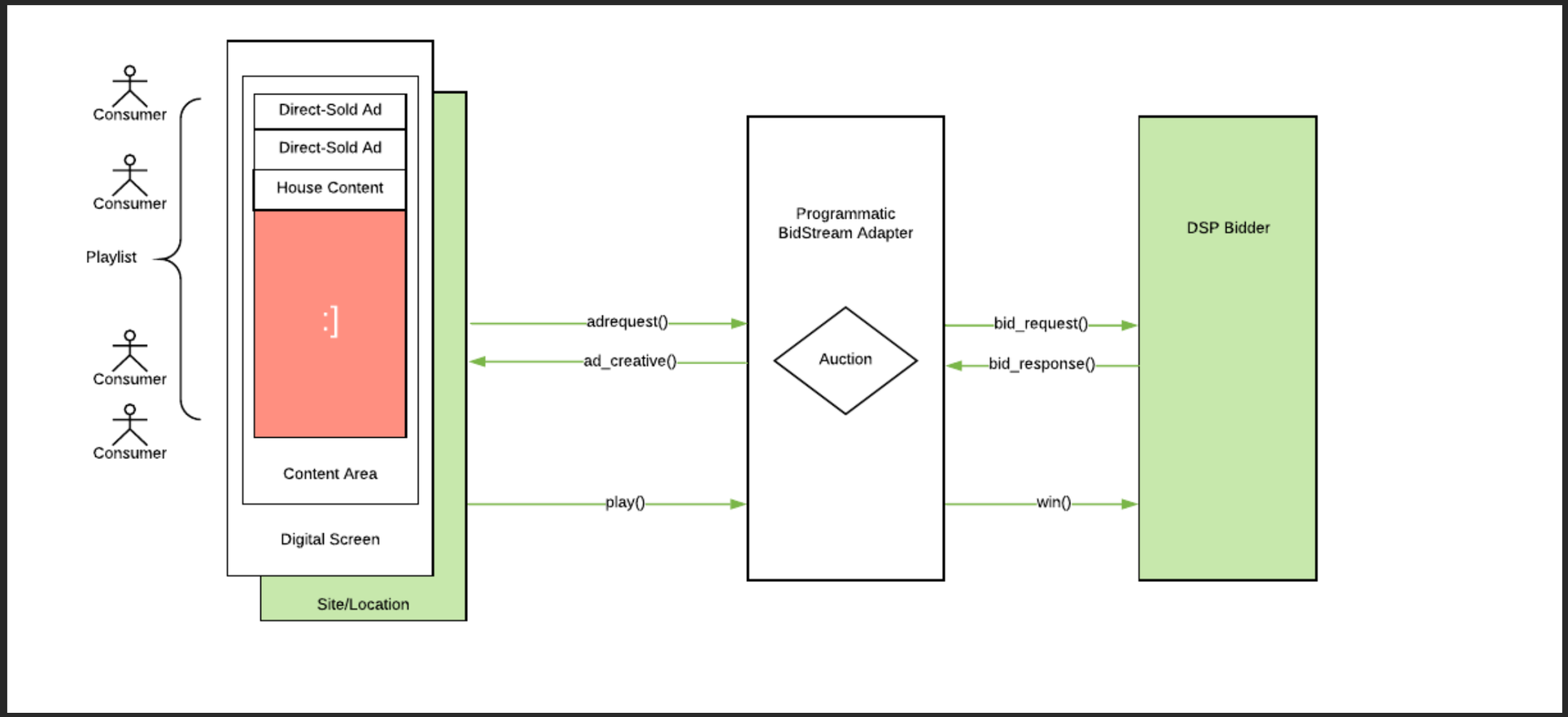
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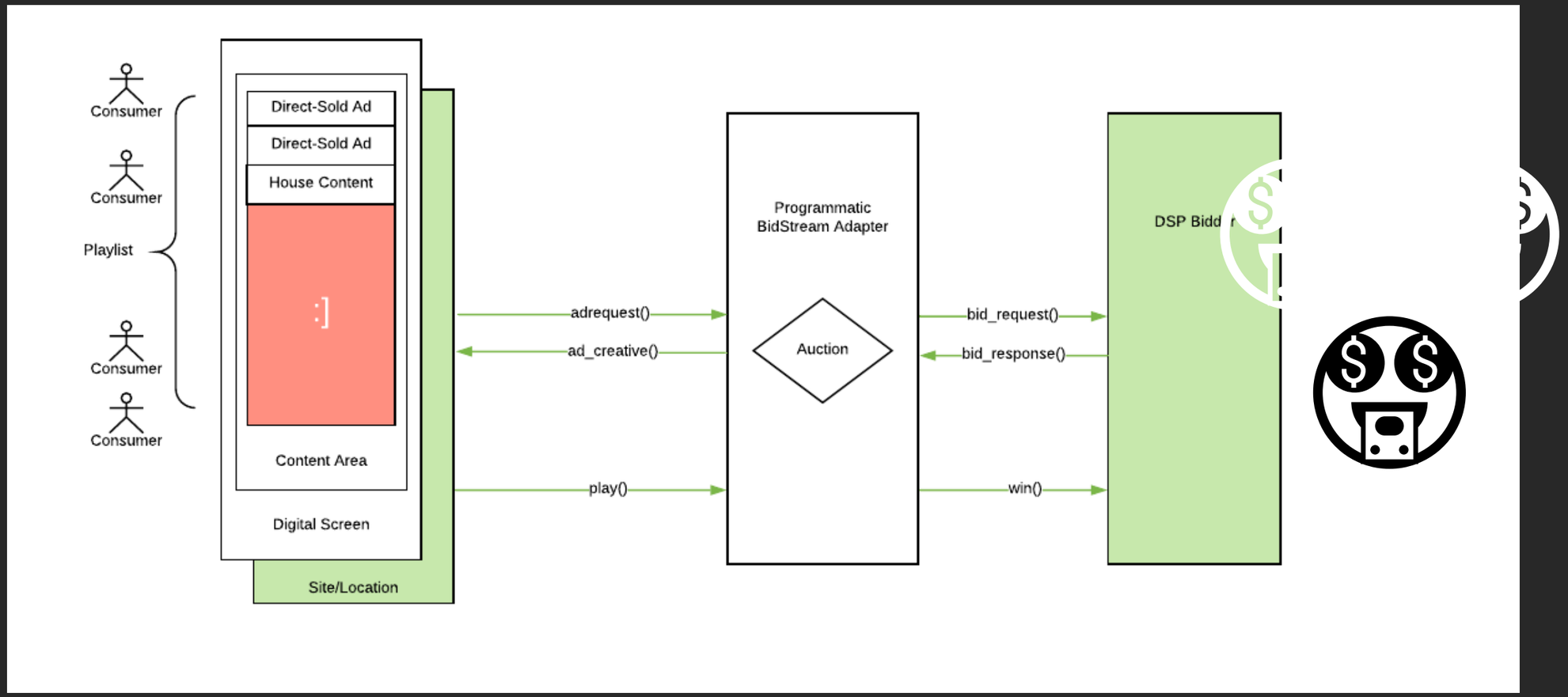
bid_response()
win()
DSP Bidder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Digital Screen
Site/Location
adrequest()
ad_creative()
play()
Programmatic
BidStream Adapter
Auction
bid_request()
bid_response()
win()
DSP Bidd

Initial V1 architecture

- Flask app, deployed to Elastic Load Balancing (ELB)
- Bare-minimum observability and monitoring

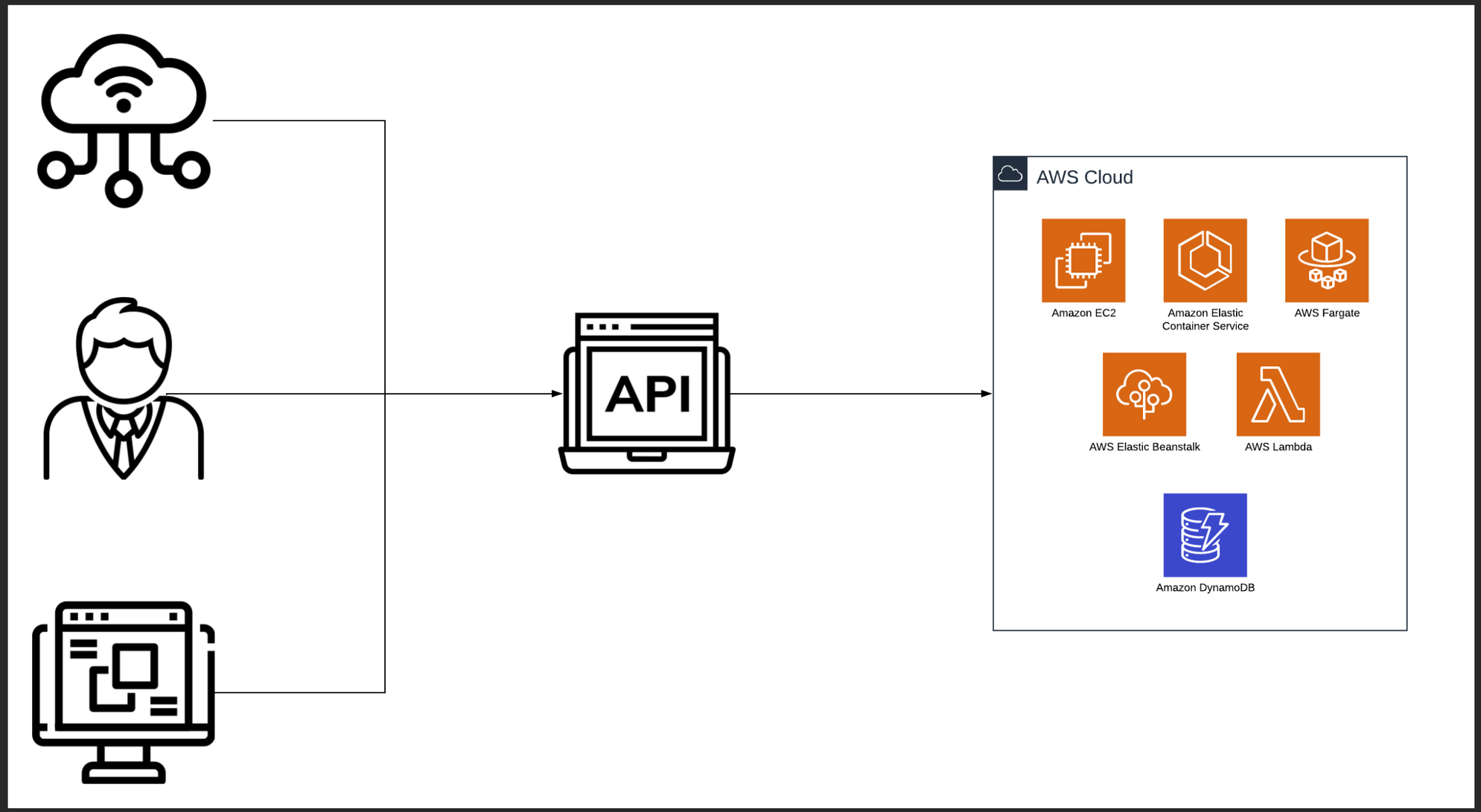
Drawbacks

- “Flying blind,” multiple points of failure
- Managing scaling vs. cost is hard

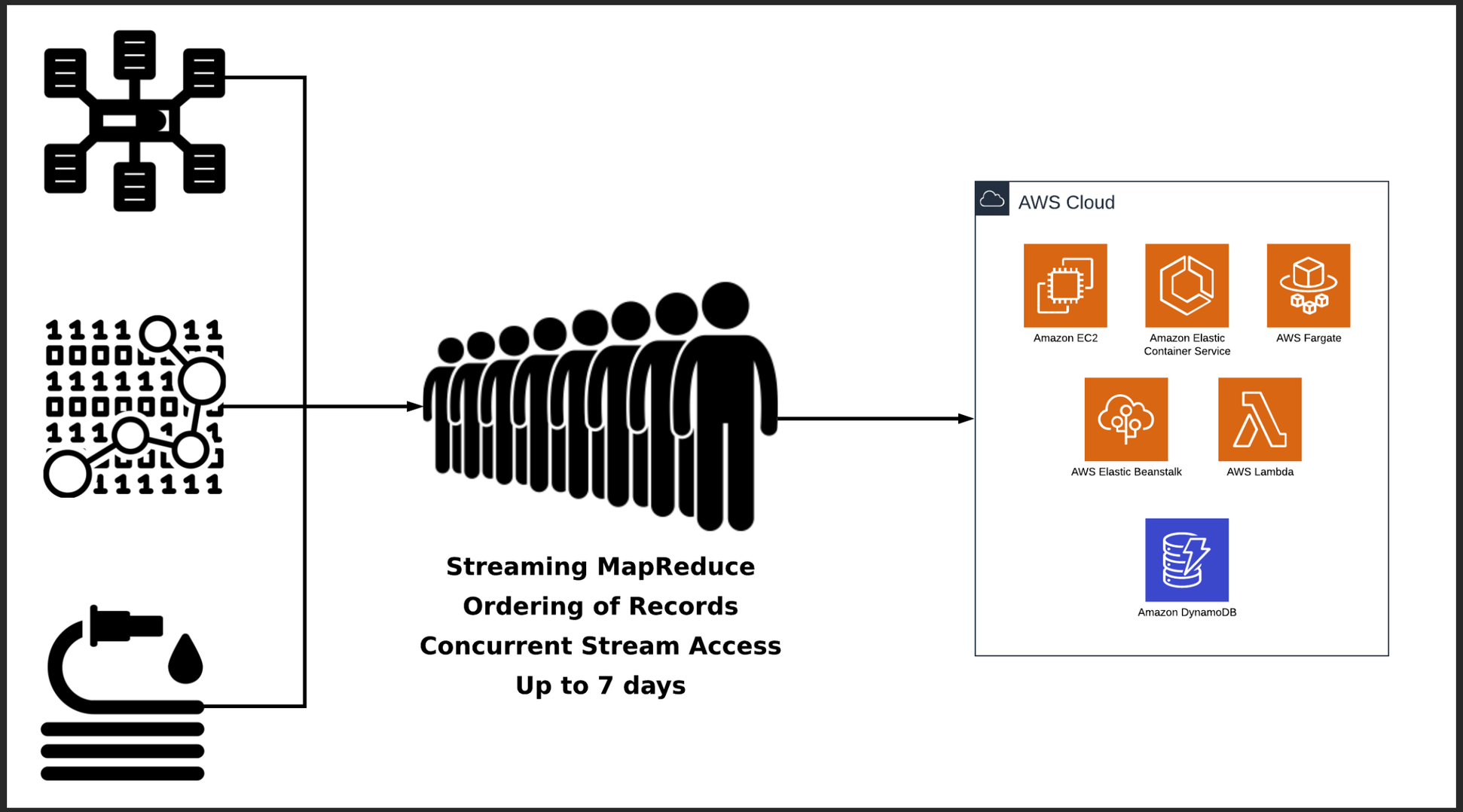
Key technologies

1. Amazon API Gateway
2. Amazon Kinesis Data Streams
3. AWS Glue
4. Amazon Athena
5. Amazon CloudWatch Logs
6. AWS Lambda functions

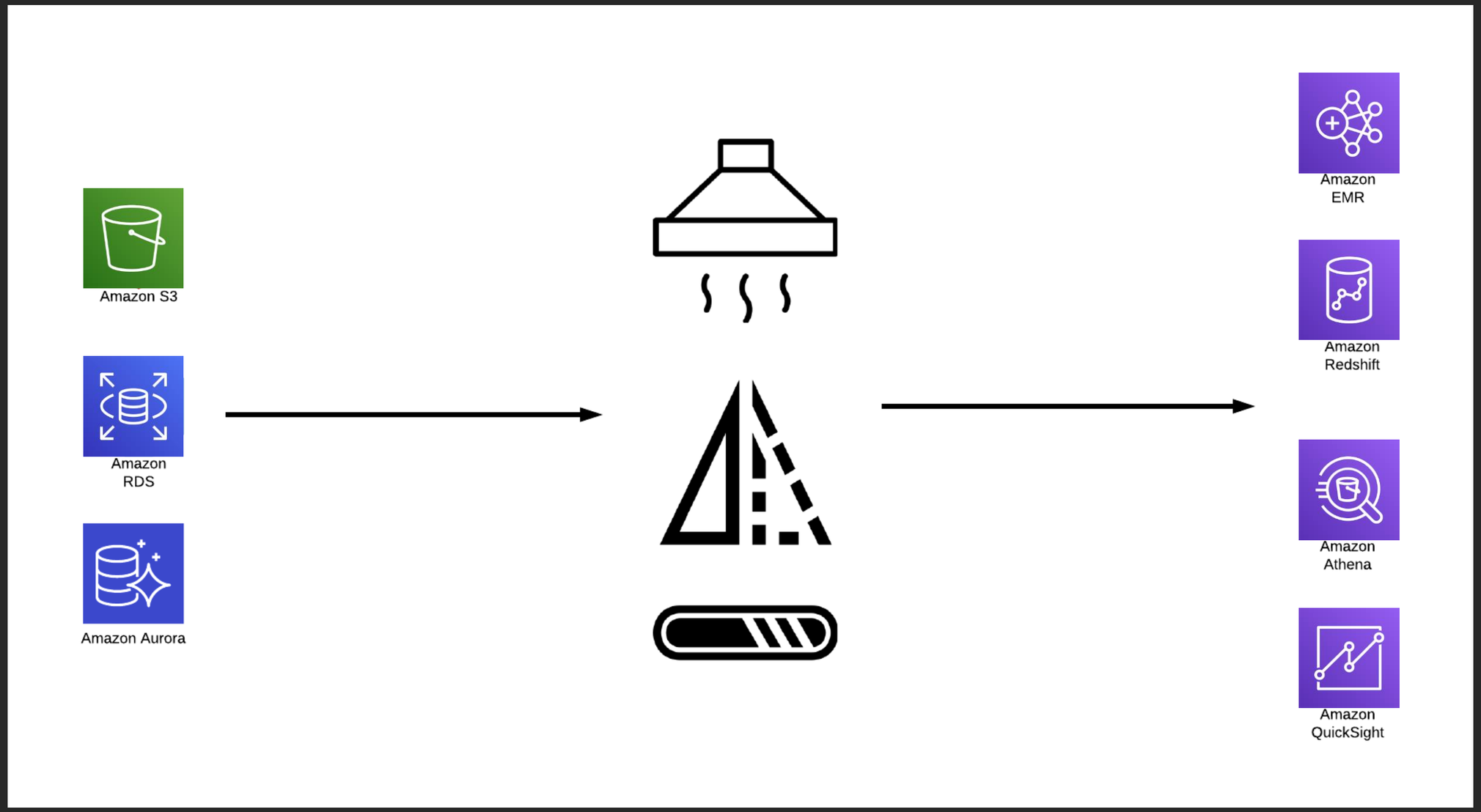
Amazon API Gateway



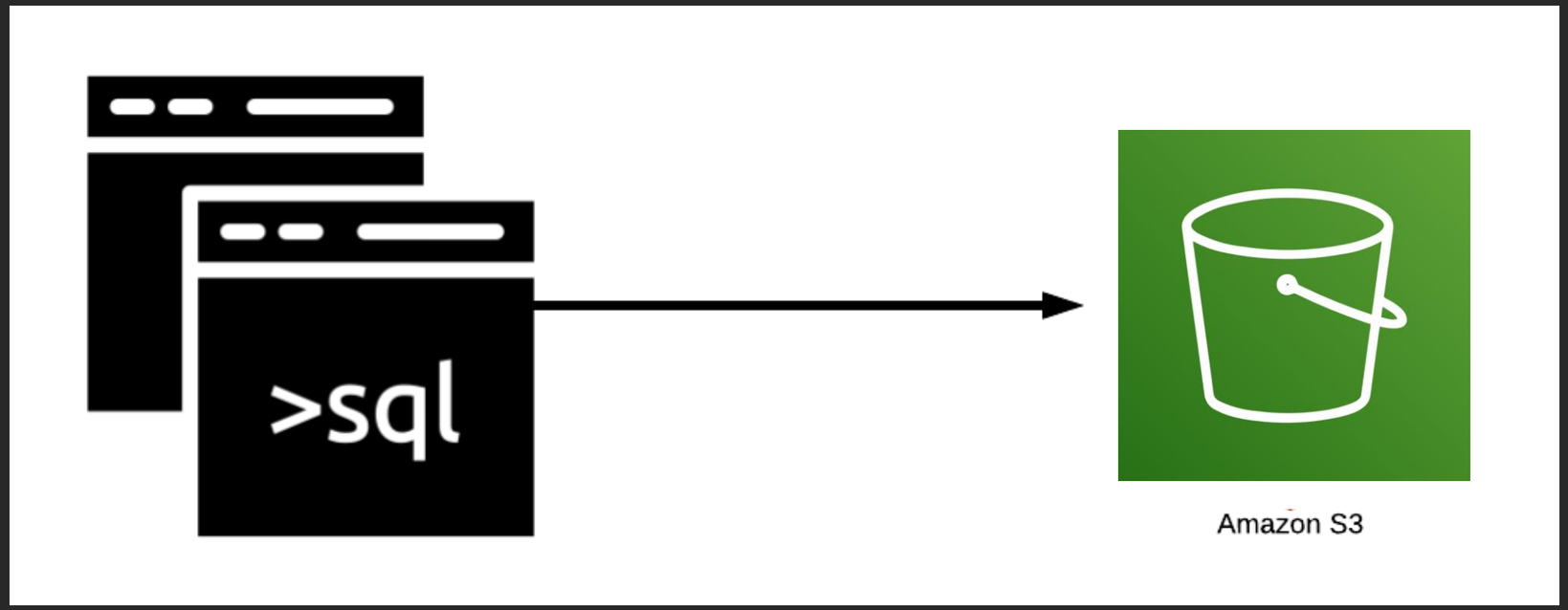
Amazon Kinesis



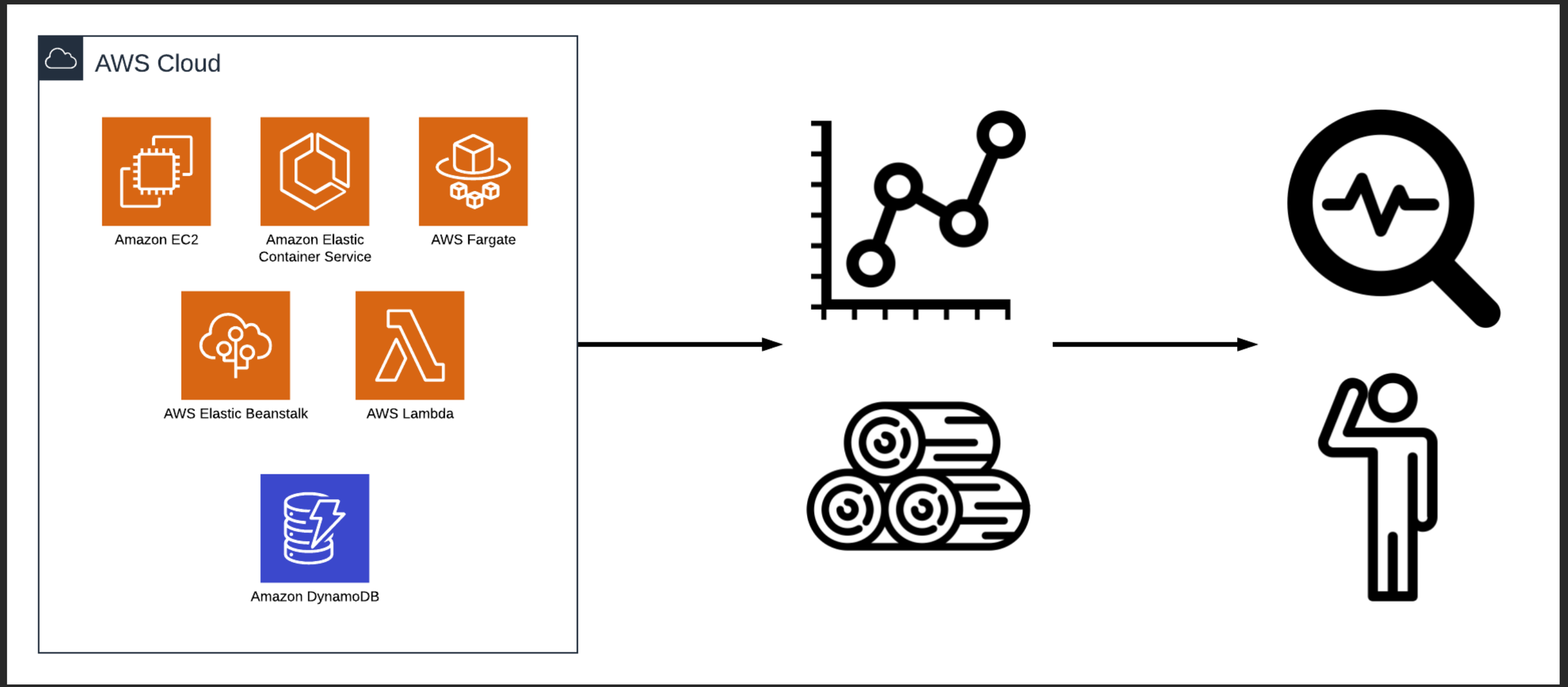
AWS Glue


Amazon S3
Amazon RDS
Amazon Aurora
Amazon EMR
Amazon Redshift
Amazon Athena
Amazon QuickSight

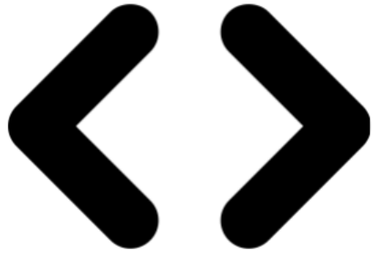
Amazon Athena



Amazon CloudWatch



AWS Lambda



js
py
rb
java
c#
go
ps1

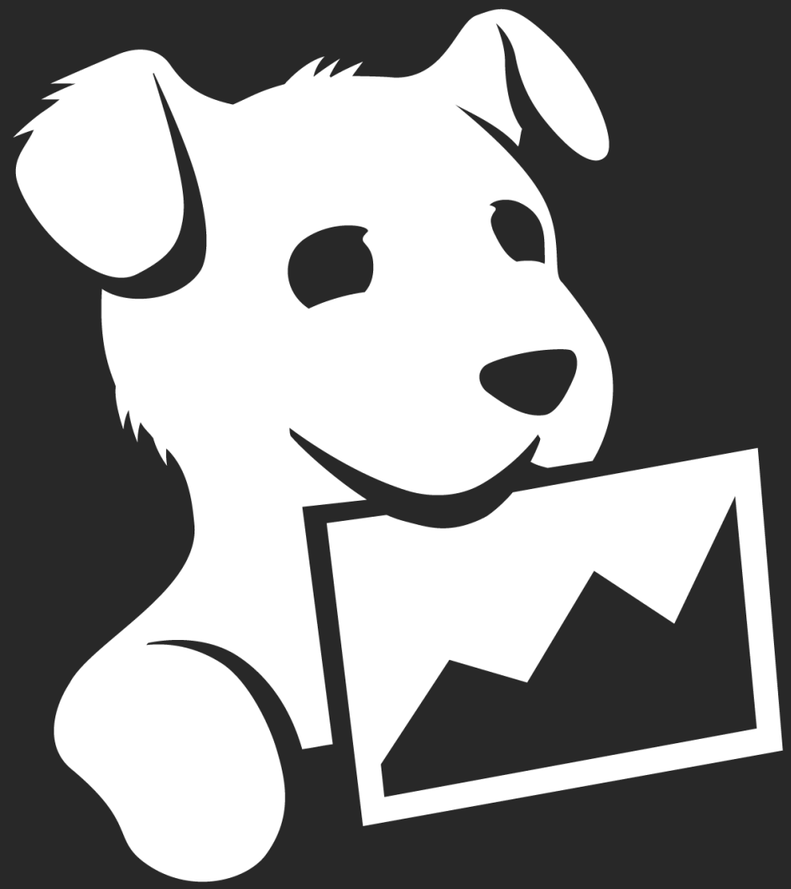
Managing observability across serverless stack

AWS re:Invent

aws

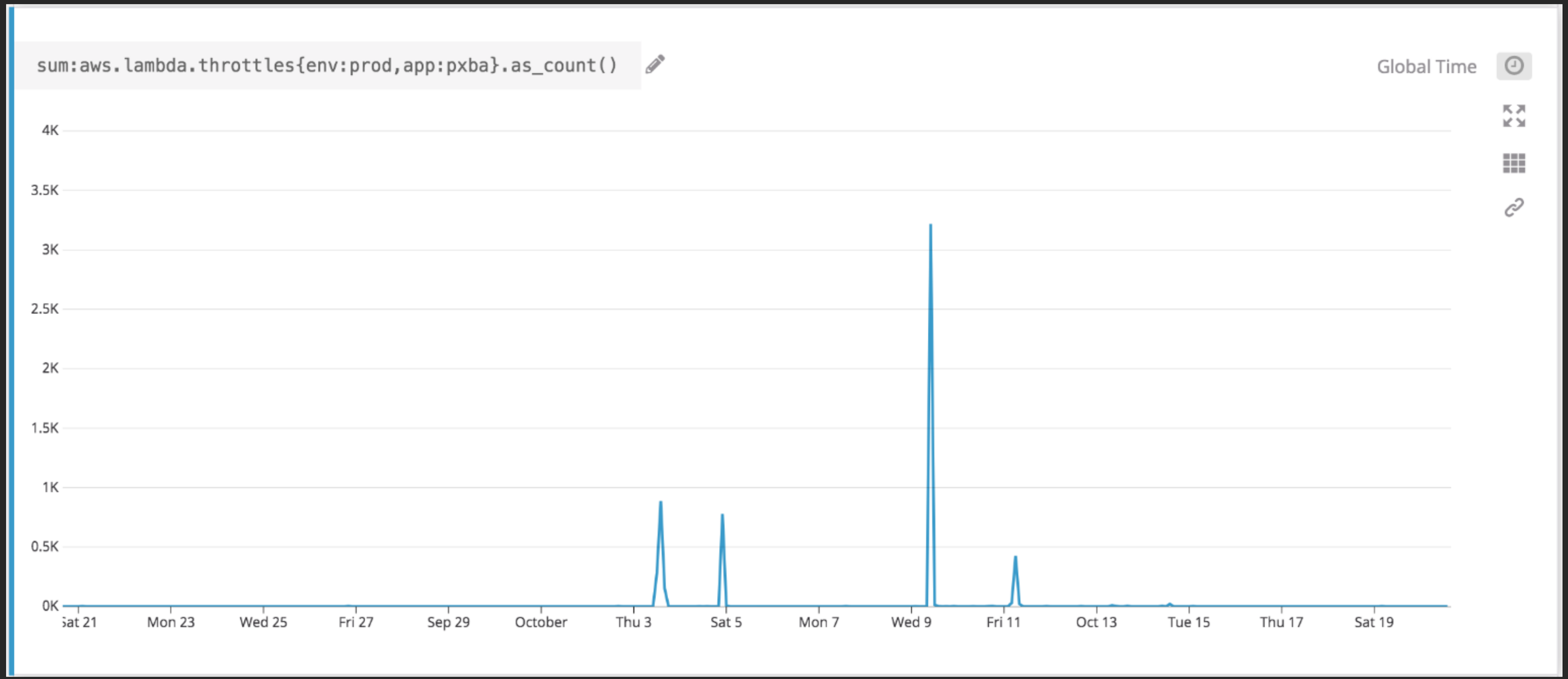
Datadog

- Out-of-the box AWS metrics
- Granular, business-level metrics
  - Embedded into application code

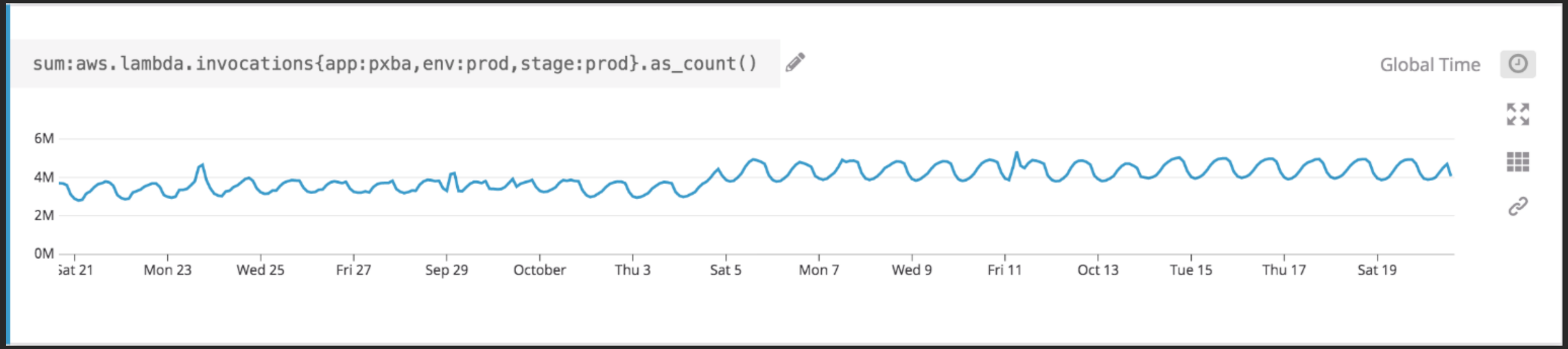


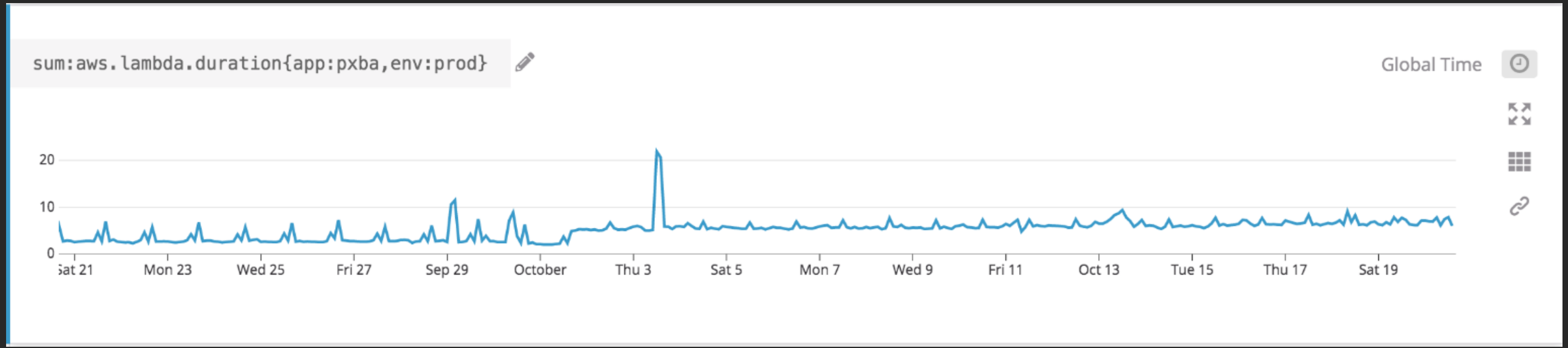
DATADOG

Total throttles to Lambda invocations (account-wide)

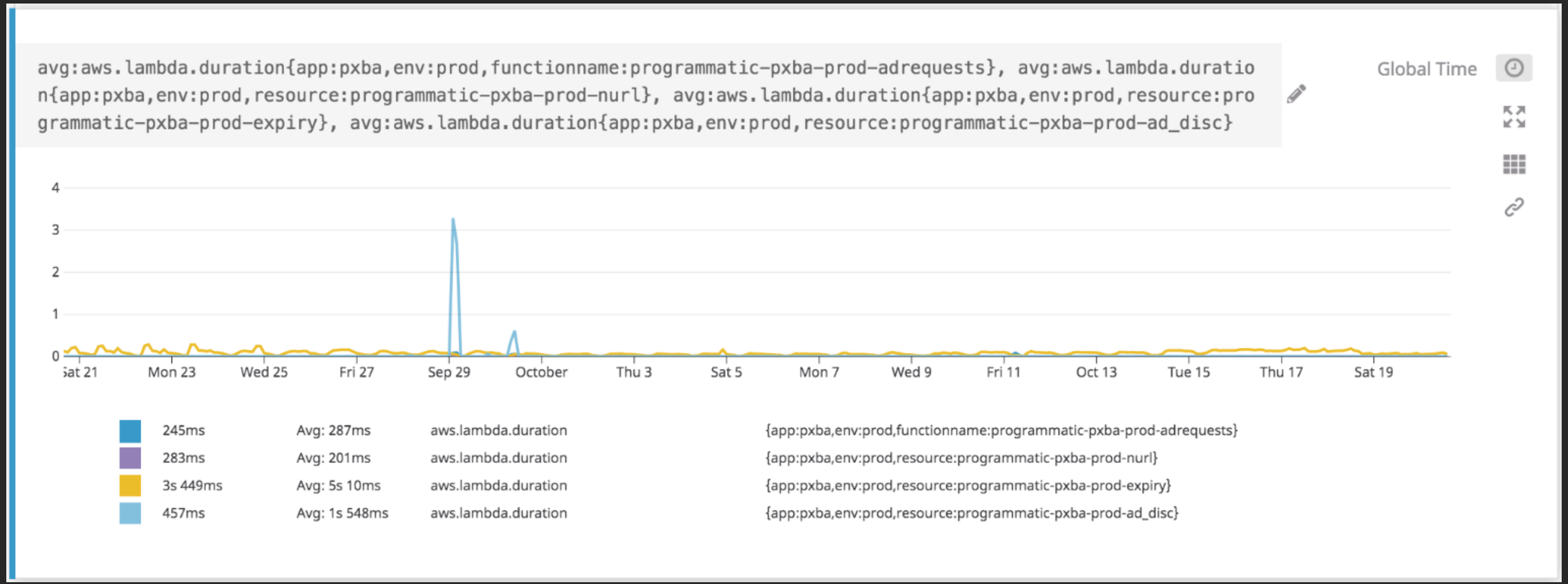


Lambda invocations vs. duration



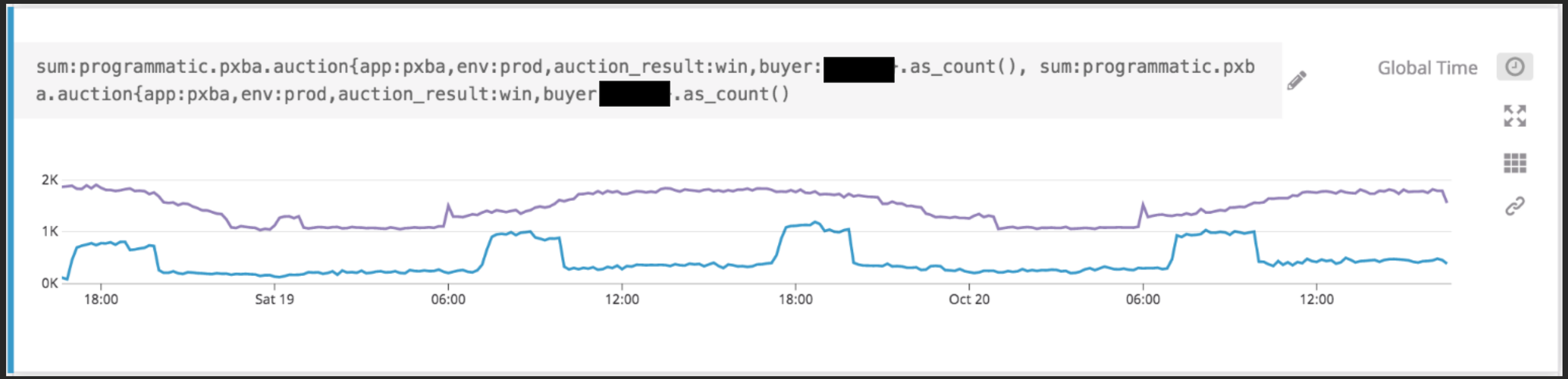


Duration by function name



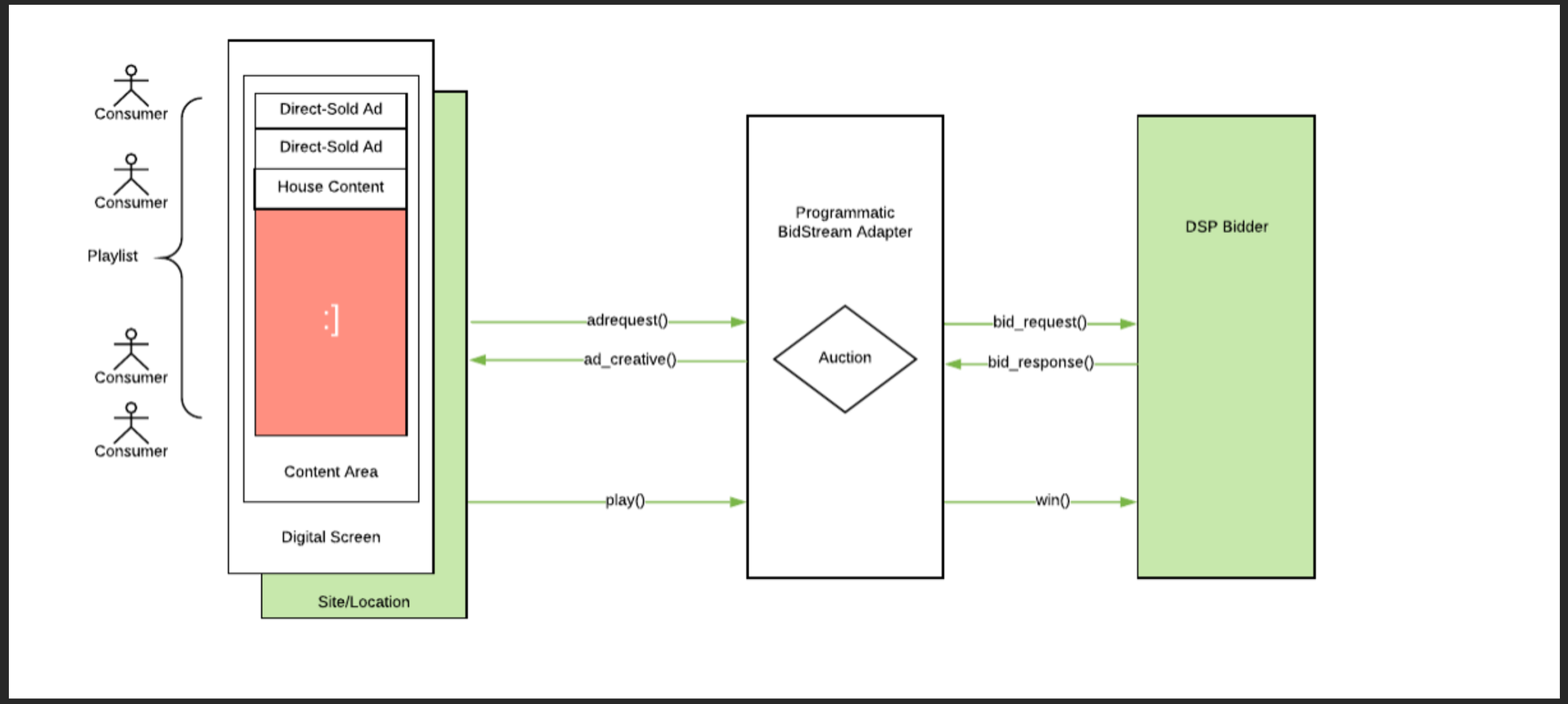
Winning auctions by DSP client

- Example of custom business use case metric (“wins”)
- Tags break out by customer and environment



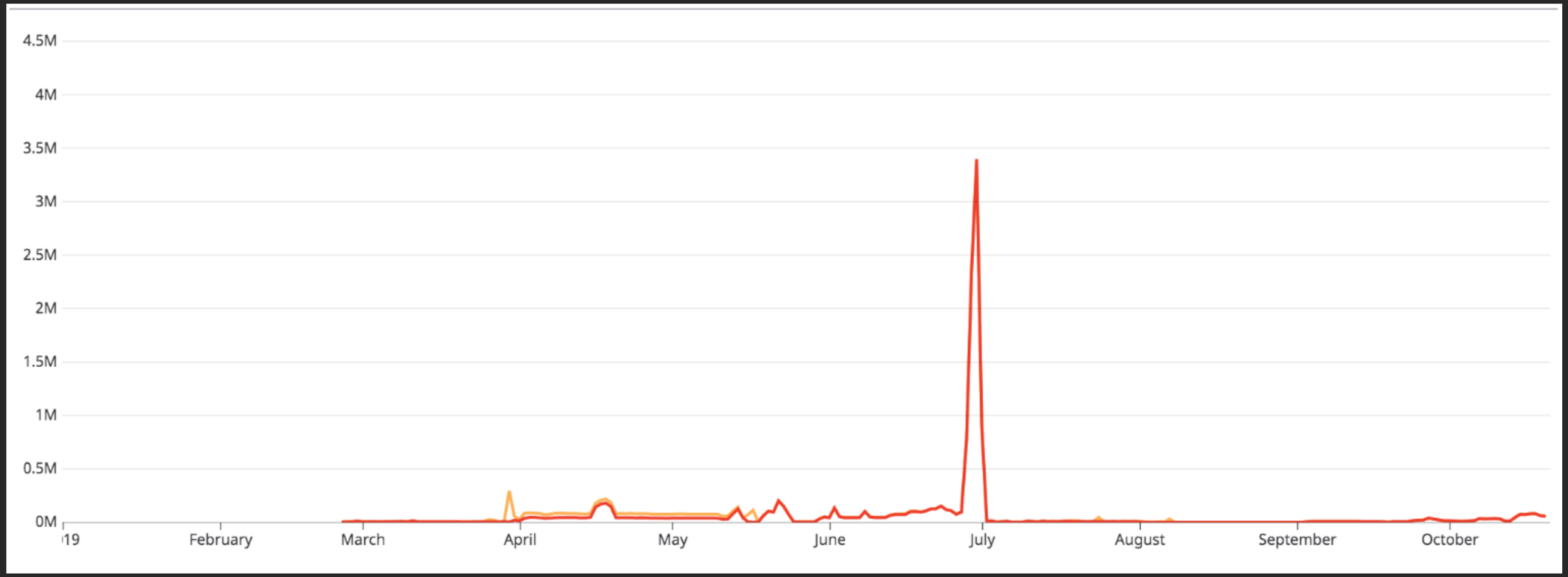
Same metric over one-month time frame

Ascertain expected vs. unexpected behaviors

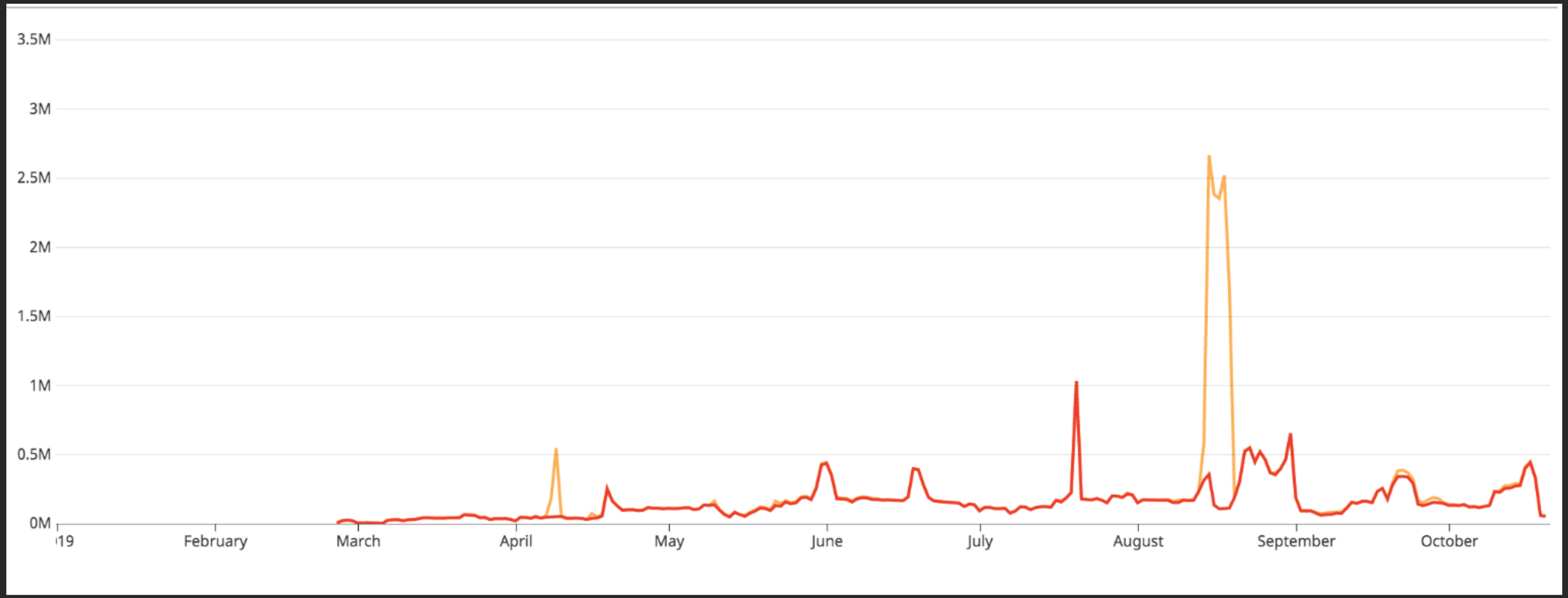


Expectation: 1:1 match between adrequests() and plays()

DSP partner 1 – Mostly 1:1 matching ✓



DSP partner 2 – Some discrepancies apparent ✕



Guts of a custom metric name

```
programmatic.pxba.lambda.cold_starts{app:pxba,functionname:programmatic-pxba-prod-adrequests}
```

- Service (programmatic)
- App (pxba)
- Category (Lambda)
- Metric (cold_starts)

Bid rejection reasons metric

```
programmatic.pxba.bidfilter{app:pxba,env:prod,name:invalidadfilter}
```

Tags

- Name (filter name, ENUM)
- Reason (human readable)
- Buyer (DSP partner)

Monitoring derived from metrics

- High number of cache misses detected for geocoding API
  - Key metric: geocode
- PXBA [BUYER_NAME] bid activity interruption
  - Key metric: buyer_response

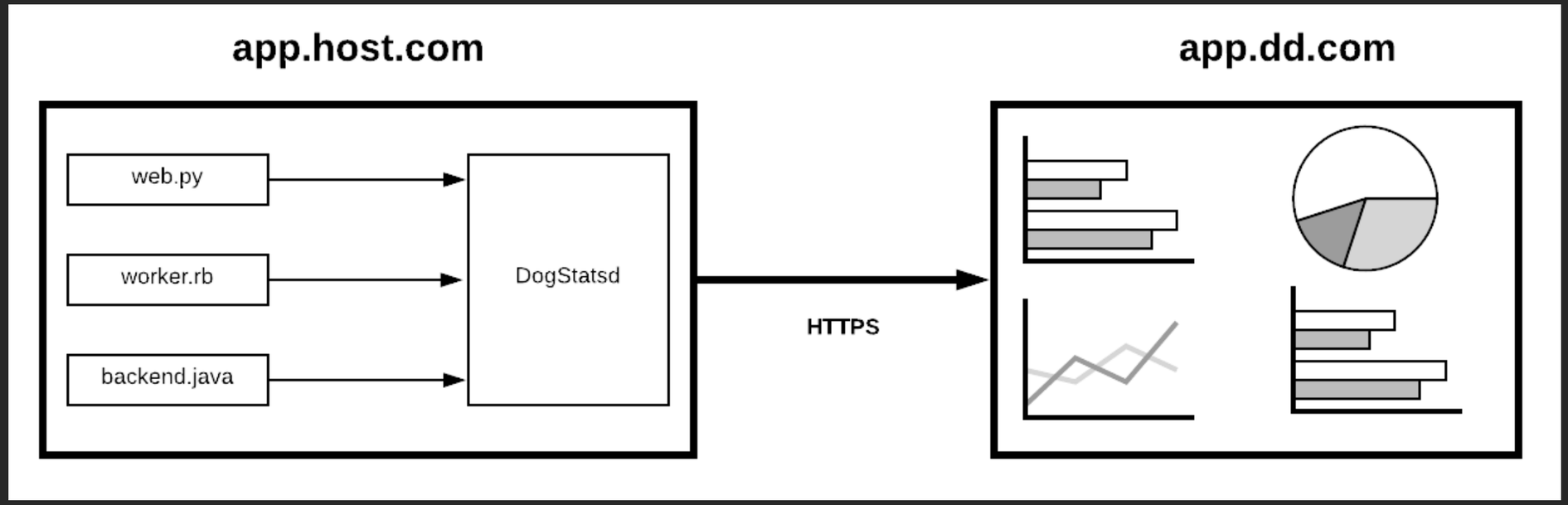

50K
0K
13:50
13:55
14:00
14:05
14:10
14:15
14:20
14:25
14:30
14:35
14:40
14:45
Auctions
Statistics related to Ad Plays and Auctions:
- Creative Bundle Actions
- Auction API calls
- Auction API results
- Display API callbacks
Bundle Renders
3K
2K
1K
0K
14:00
14:15
14:30
14:45
By Status
417.88K error
2.39K paid
92.00 error,…
By DealId
415.75K N/A
2.29K sixflags-ron-ms
2.00K foodkick-ron-ms
314.00 foodkick-ron-ms-
Auctions
6K
4K
2K
0K
14:00
14:15
14:30
14:45
By Result
883.25K no_bid
40.38K no_auction
11.25K win
576.00 no_win
Plays
100
50
0
By Result
9.69K valid

Collecting metrics from Lambda functions

AWS re:Invent

aws

Using StatsD for monitoring

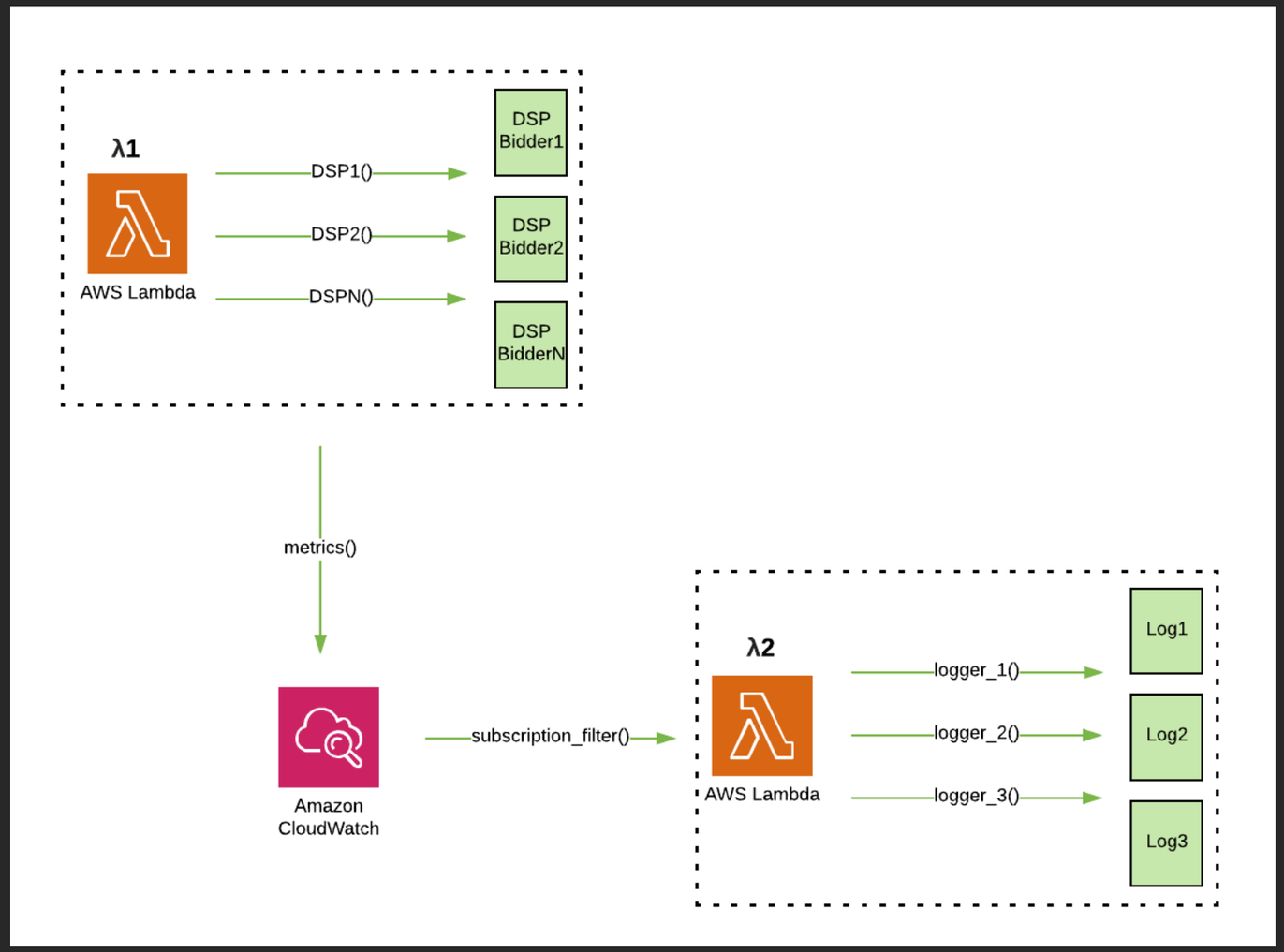


Typically, each host has a different hostname, which Datadog can leverage to dedupe on its end

Even a “long-lived” Lambda lives for 15 minutes max

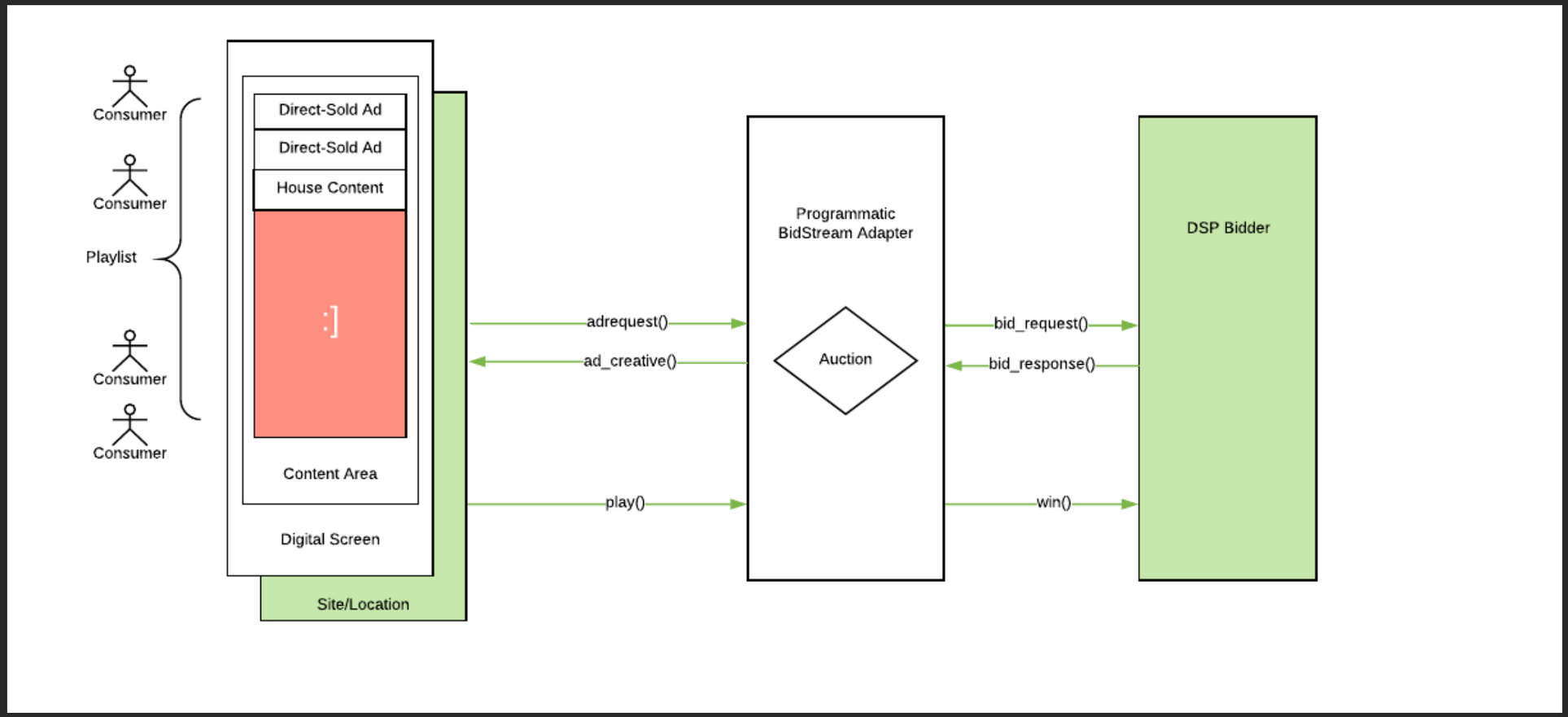
- DogStatsD is intended to be a long-lived process
- No concept of hostname or easy way to resolve Lambda invocations
- As a result, metrics/Lambda may overwrite each other

Implement Lambda with the distribution metrics API



- ☑ Operate on batches for long-lived Lambda
- ☑ Raw data is sent to Datadog
- ☑ No need to make HTTP calls on a “flush” event

System architecture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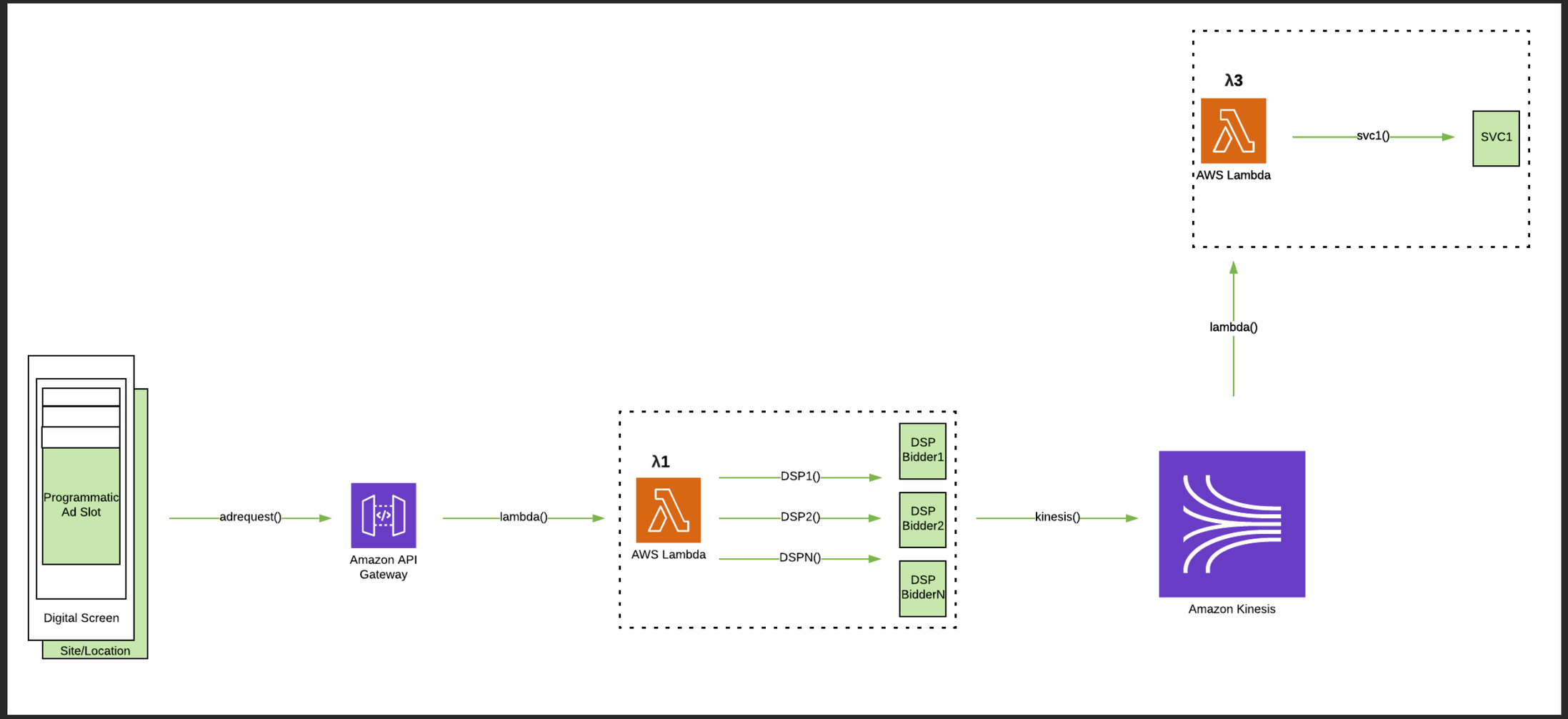
DSP Bidder

Data collection API endpoint



Metrics logged

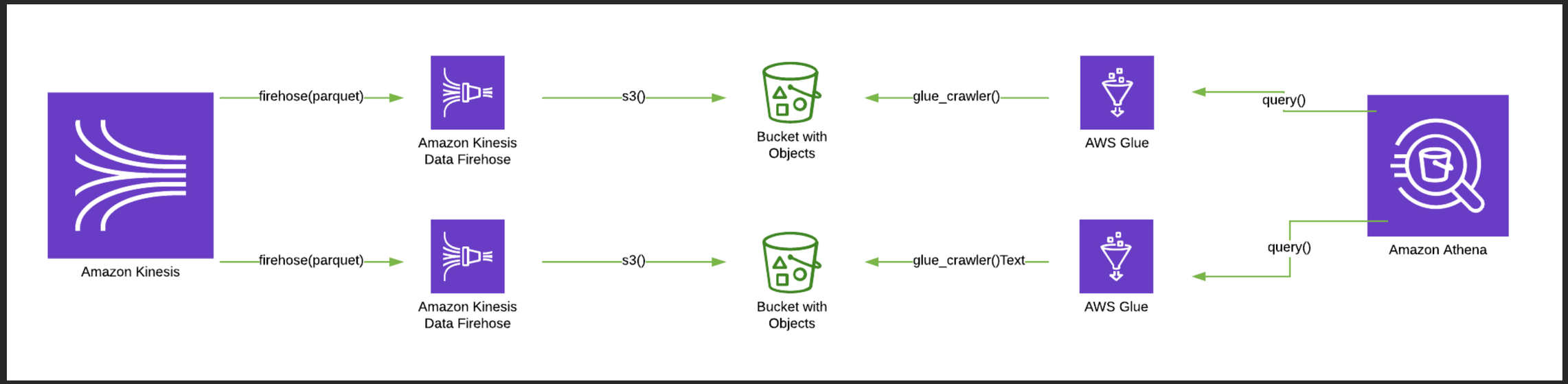
`geocode`: Cache hits/misses

`buyer_response:` Bid results by DSP

`auction:` Auction results

`Bid_filter:` Filtered bids by name/reason

Data processing & reporting

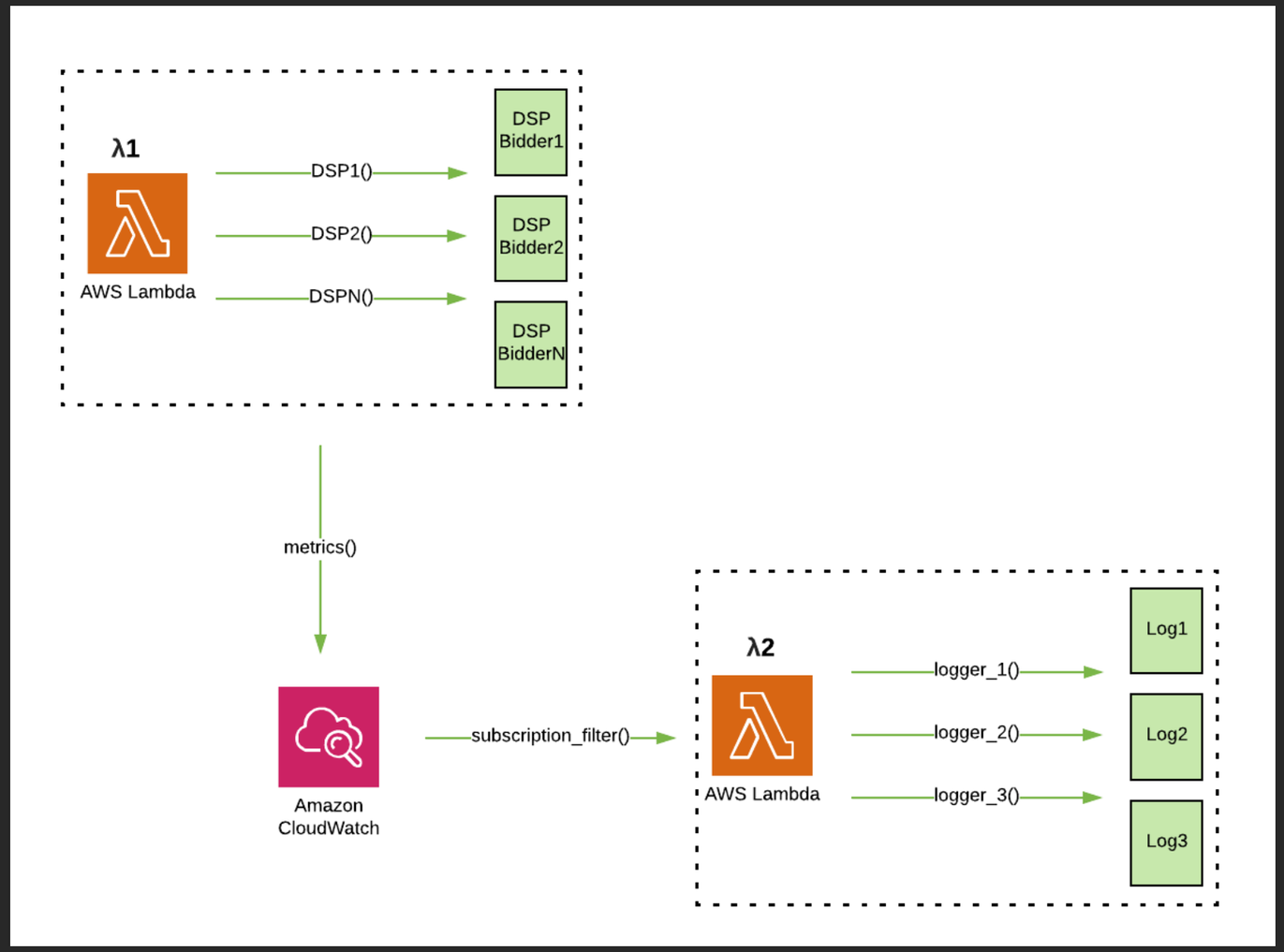


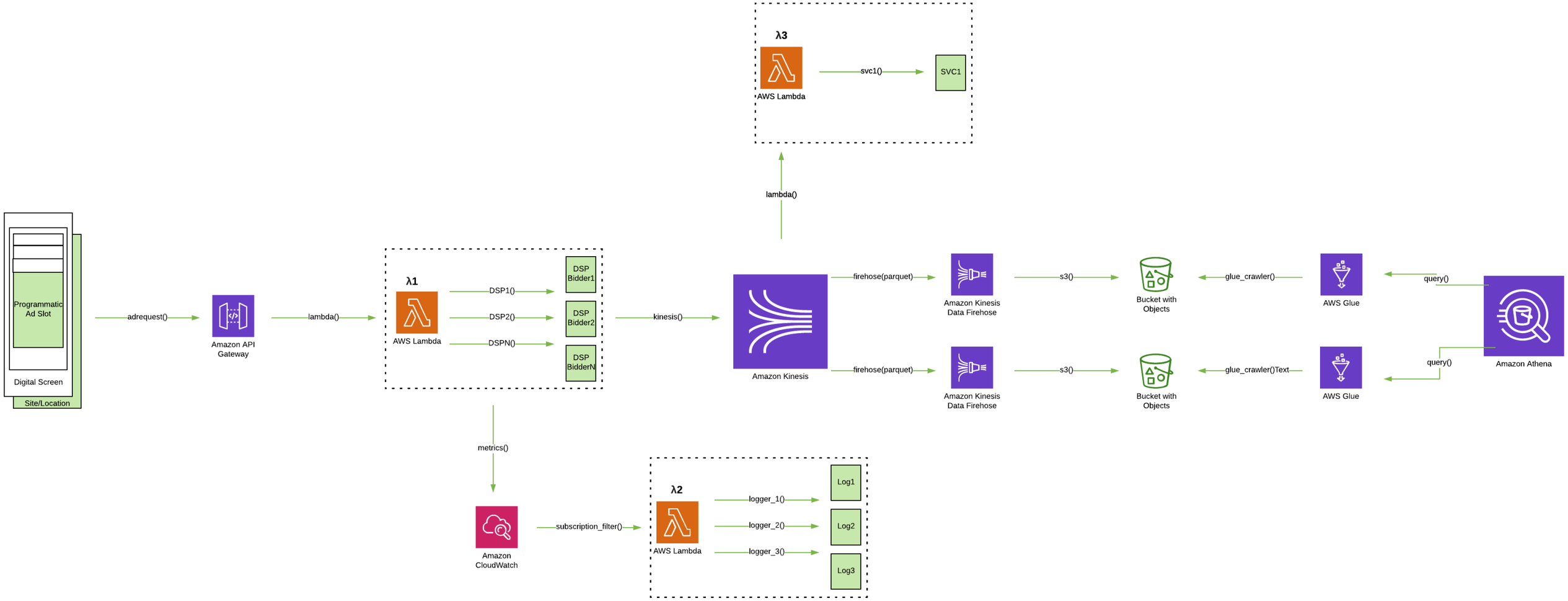
Metrics logged

`kinesis.send_duration`: Time taken to send krecords

`kinesis.send_retries:` Retries due to throttling

Logging and metrics

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SVC1
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Programmatic Ad Slot
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adrequest()
Amazon API Gateway
lambda()
λ1
AWS Lambda
DSP1()
DSP2()
DSPN()
DSP Bidder1
DSP Bidder2
DSP BidderN
kinesis()
Amazon Kinesis
firehose(parquet)
firehose(parquet)
Amazon Kinesis Data Firehose
Amazon Kinesis Data Firehose
s3()
s3()
Bucket with Objects
Bucket with Objects
glue_crawler()
glue_crawler()Text
AWS Glue
AWS Glue
query()
query()
Amazon Athena
metrics()
Amazon CloudWatch
subscription_filter()
λ2
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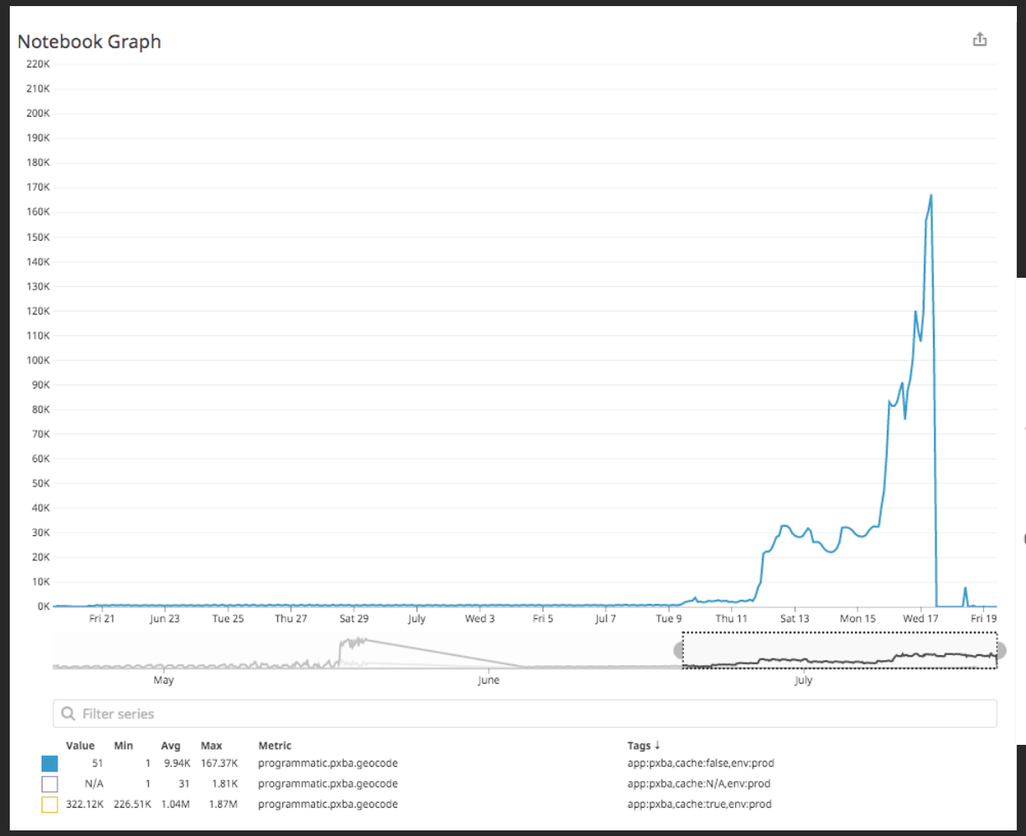
logger_1()
logger_2()
logger_3()
Log1
Log2
Log3

Case studies

Geocoding cost spike



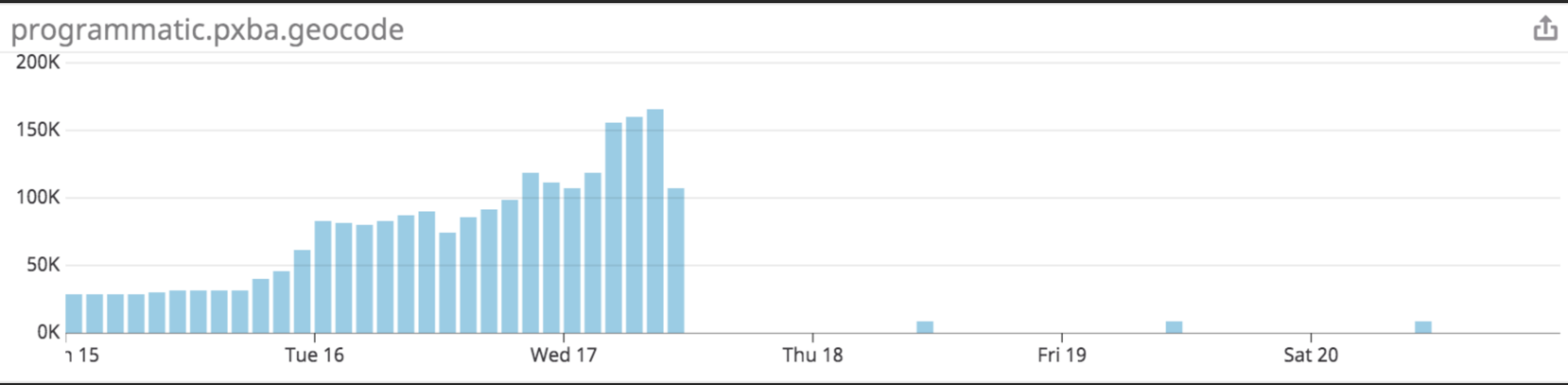
Caching policy for geocoding changed by vendor to ***5 minutes***
Previously ***24 hours***

As we scaled, we onboarded more units that needed more geocoding

Geocoding cost spike

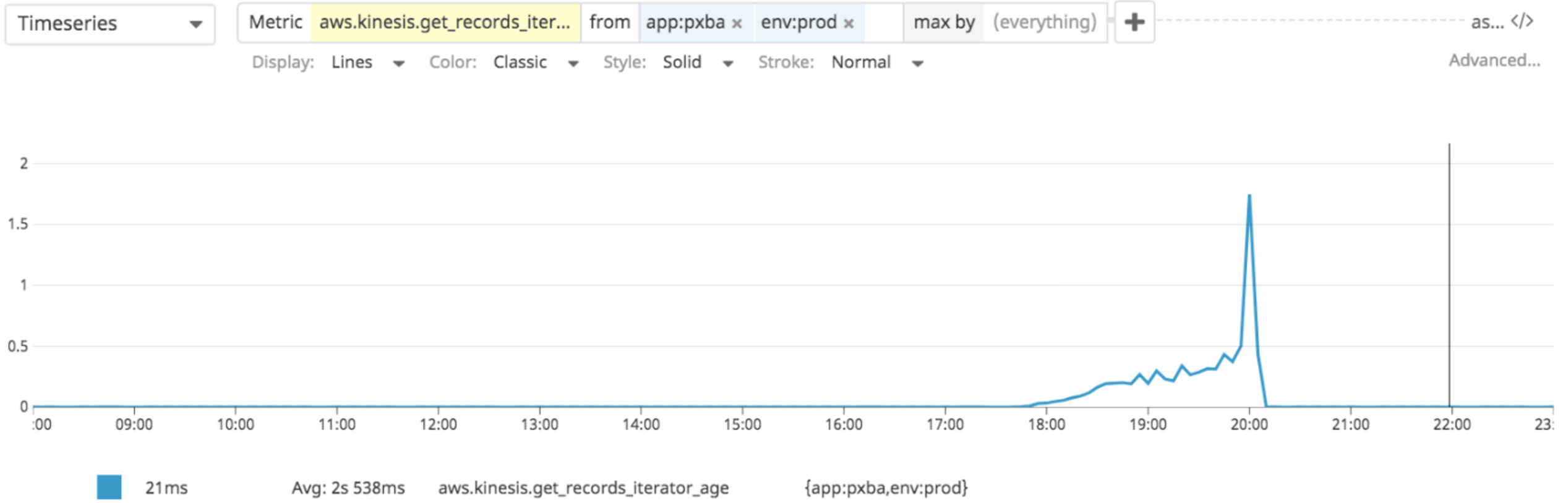
Cache misses dropped dramatically

The small bumps are for daily cache expiry



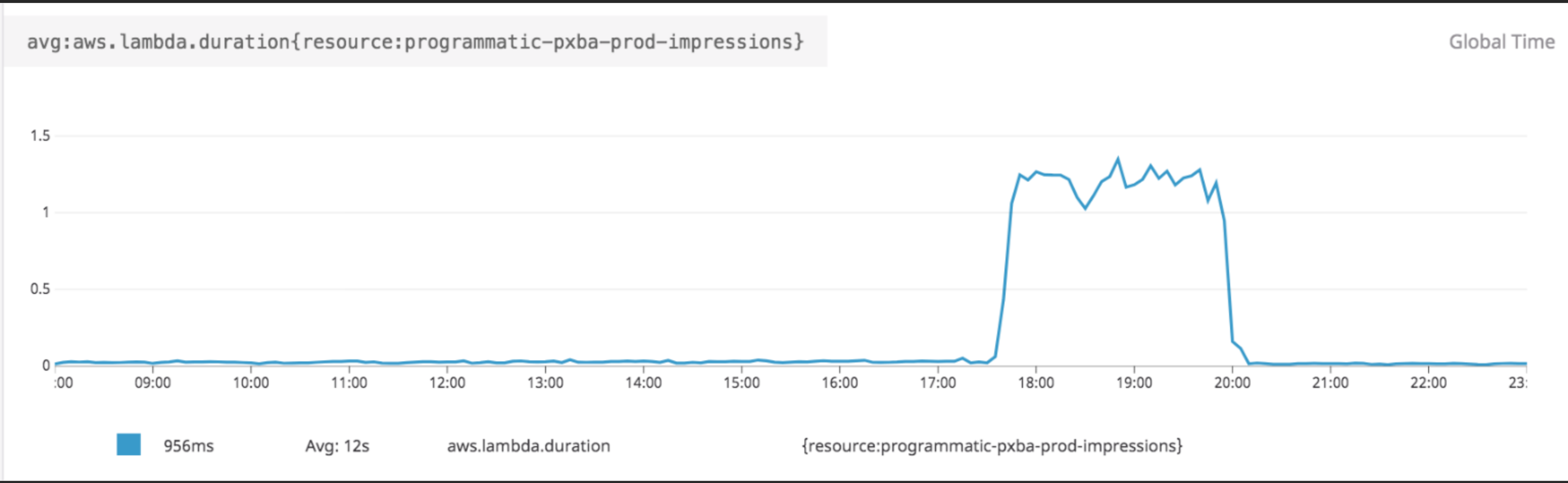
Amazon Elasticsearch Service perf observations

K-Stream Monitor triggered after hours



Amazon Elasticsearch Service perf observations

Reason? Amazon ES perf observations: Inferred from this **`aws.lambda.duration`** metric spike



PLACE EXCHANGE

Key takeaways

Time for coffee!

Thank you!

AWS re:Invent

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Please complete the session survey in the mobile app.