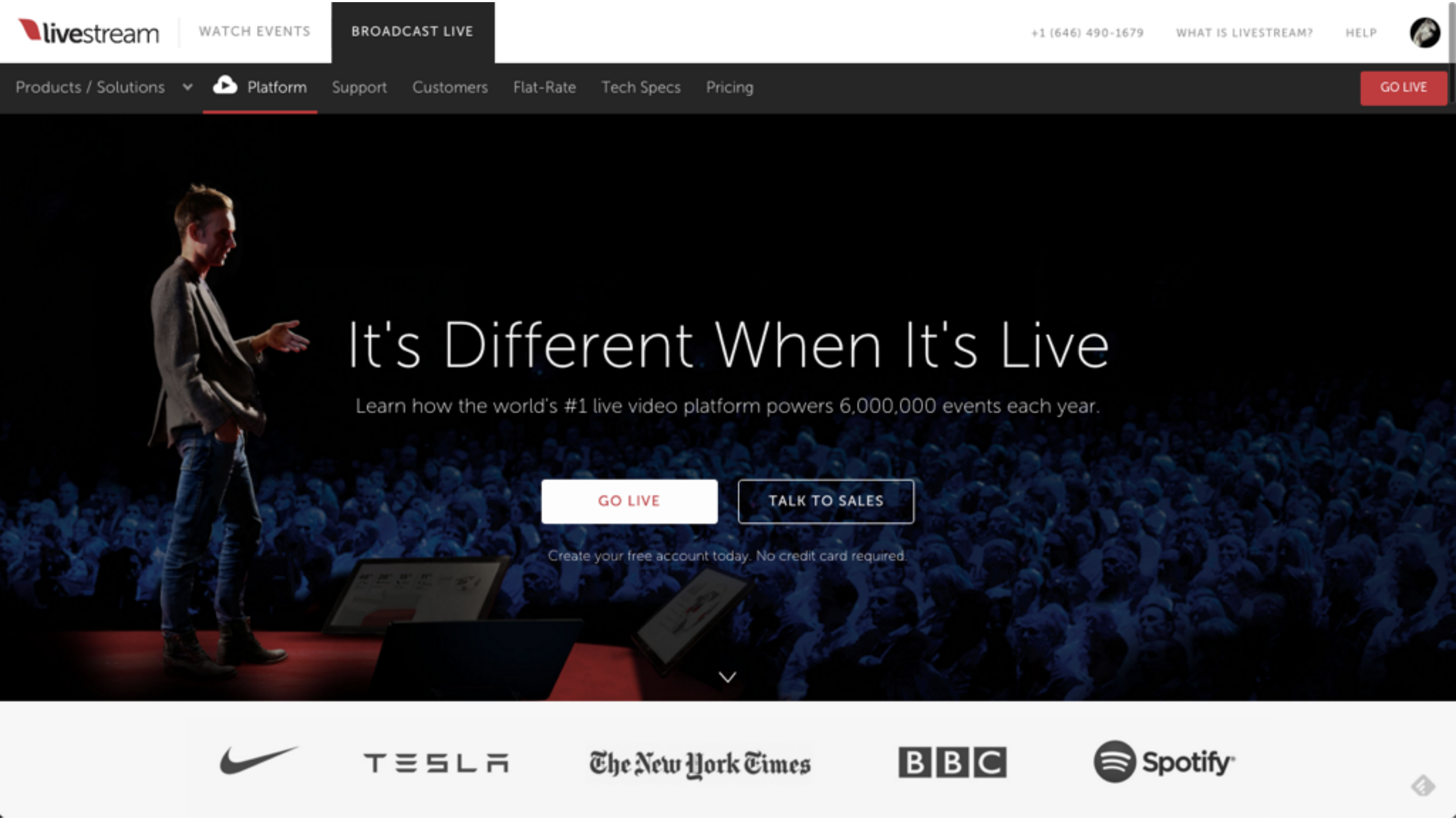
A few things about video…

Dave Yeu
Livestream

Dev StackUp: Video Tech
March 15, 2016

livestream



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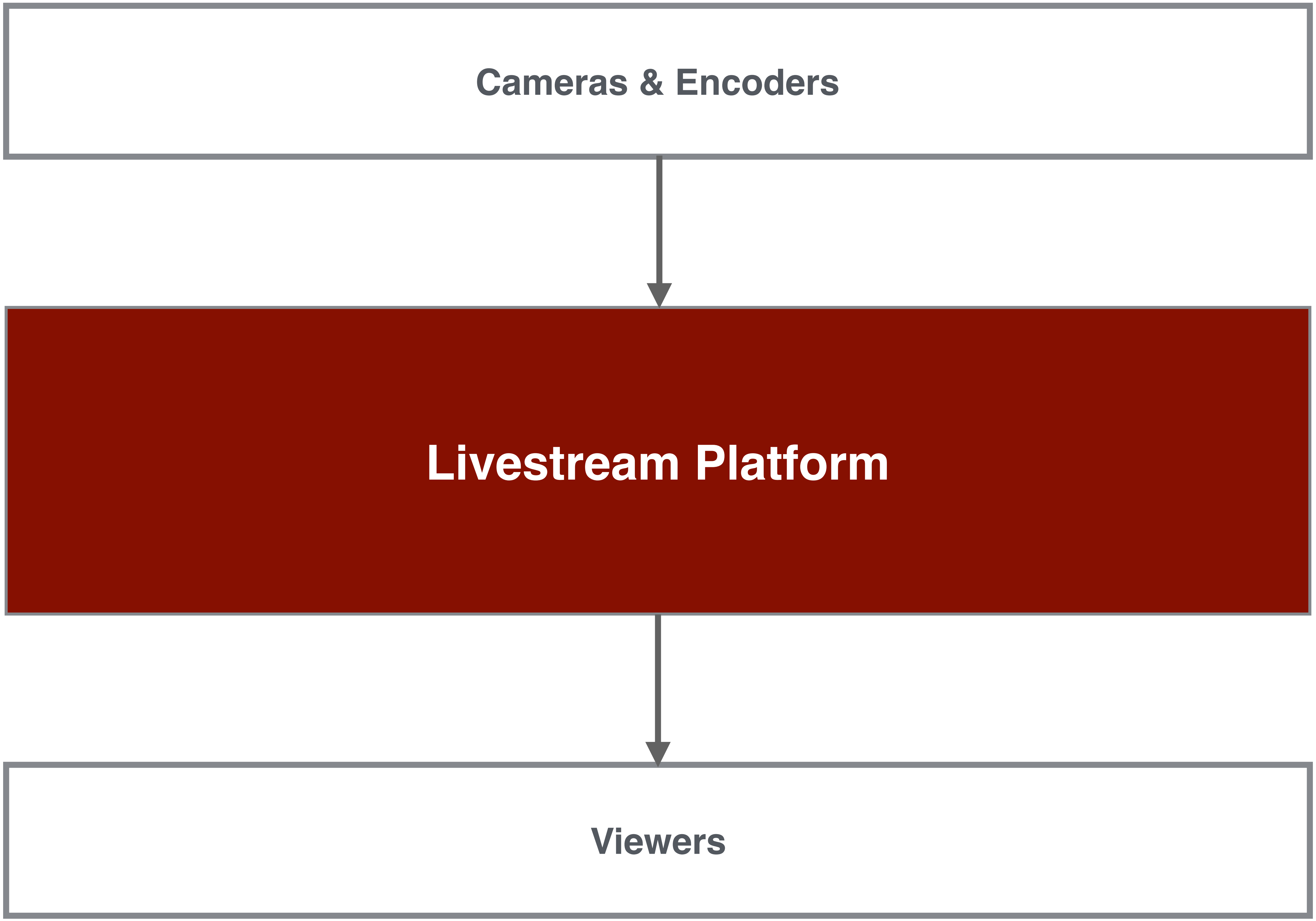
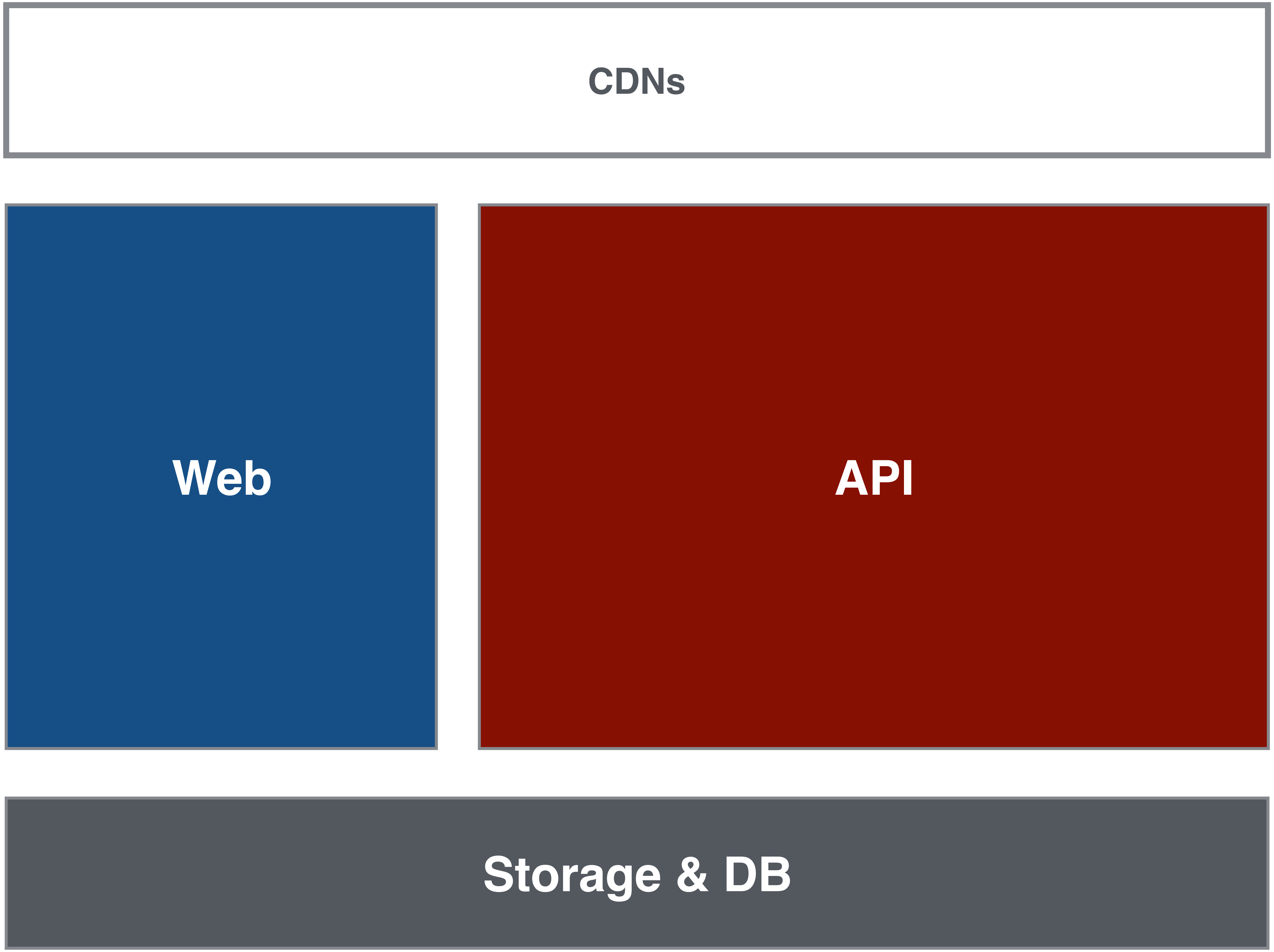


Cameras & Encoders

Livestream Platform

Viewers

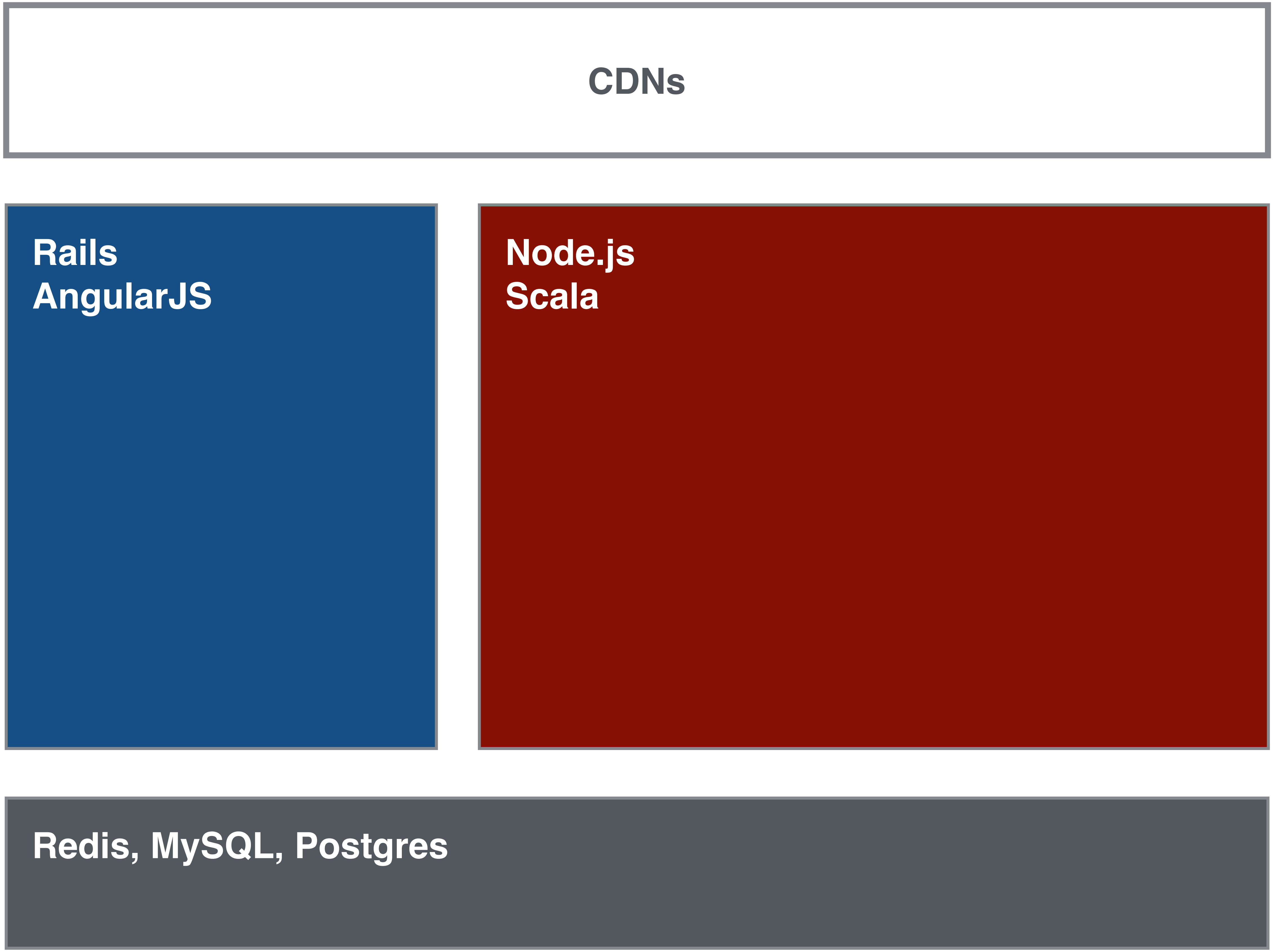


CDNs

Web

API

Storage & DB

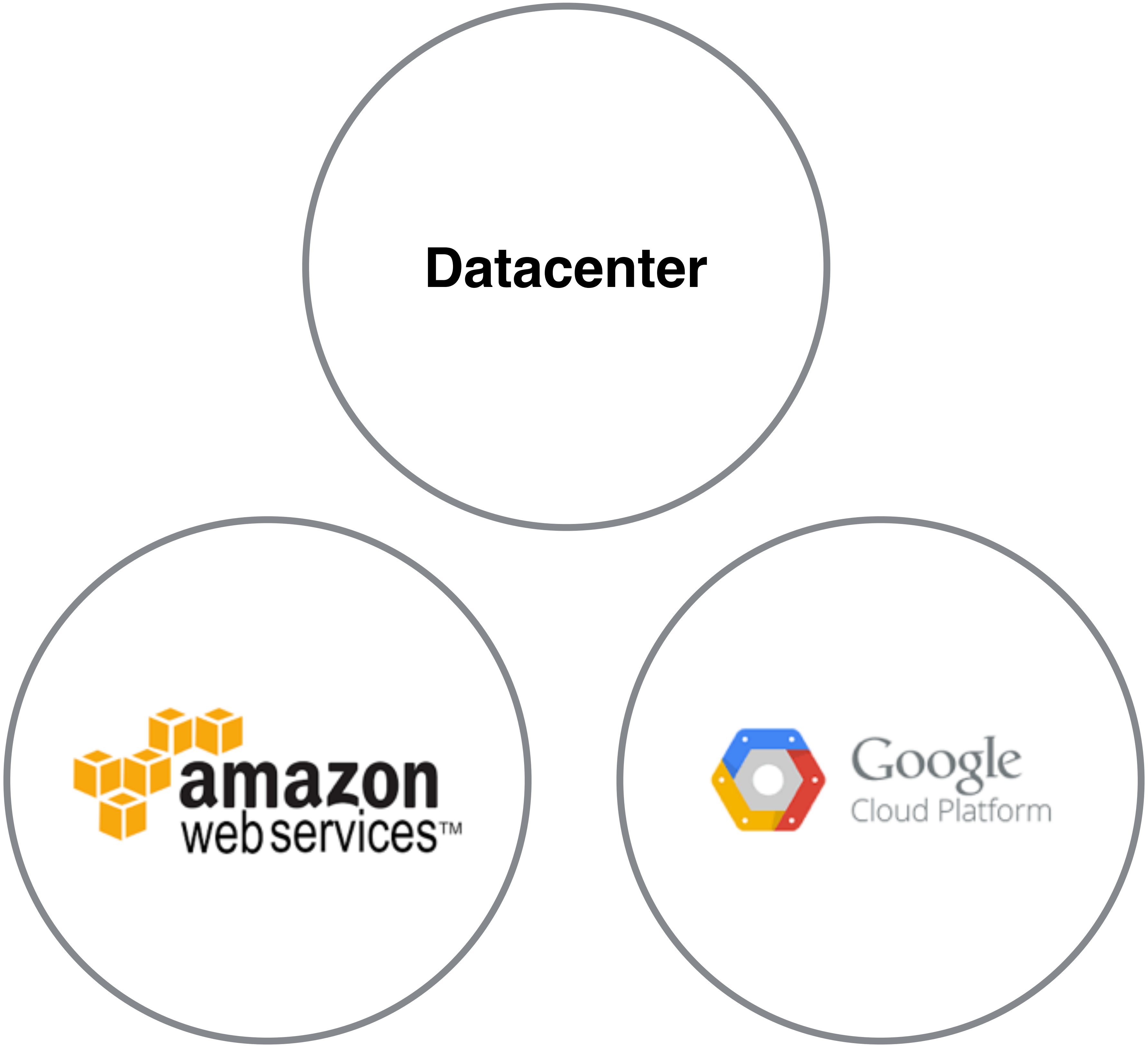


CDNs

Rails
AngularJS

Node.js
Scala

Redis, MySQL, Postgres

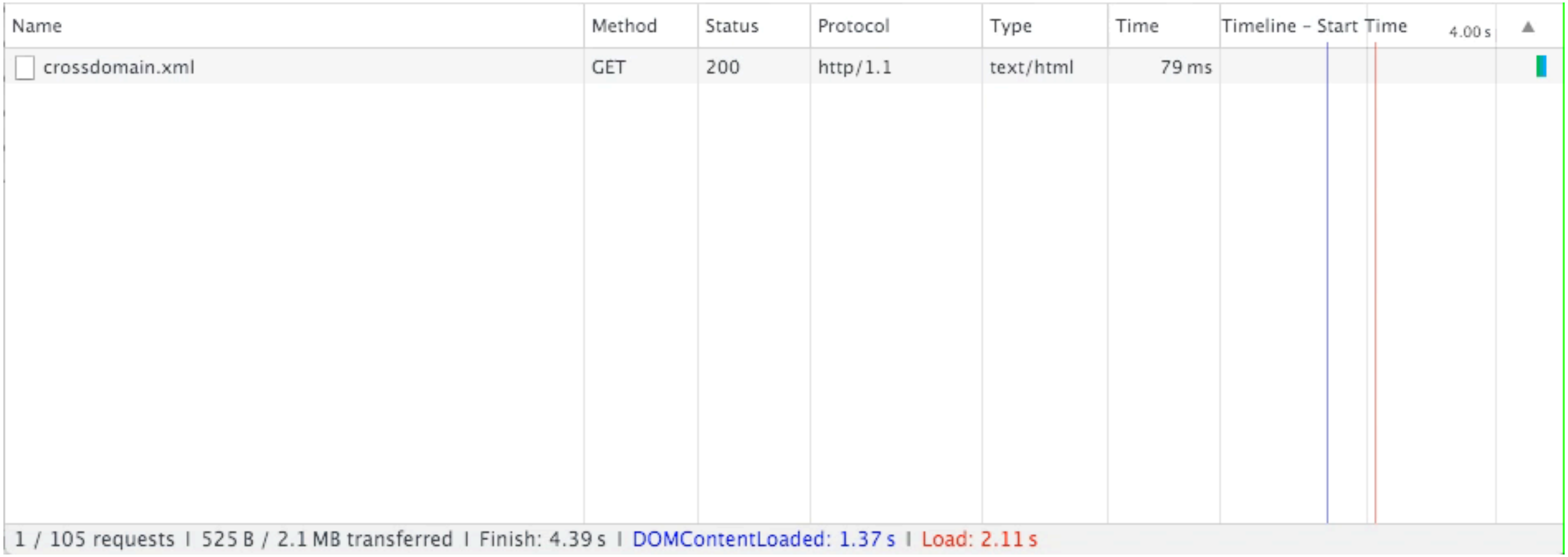


Datacenter

1) HLS Everywhere

Traditionally, streaming video meant long-lived connections.

This can be unreliable, hard to control, and hard to scale.



Name	Method	Status	Protocol	Type	Time	Timeline – Start Time
□ crossdomain.xml	GET	200	http/1.1	text/html	79 ms	

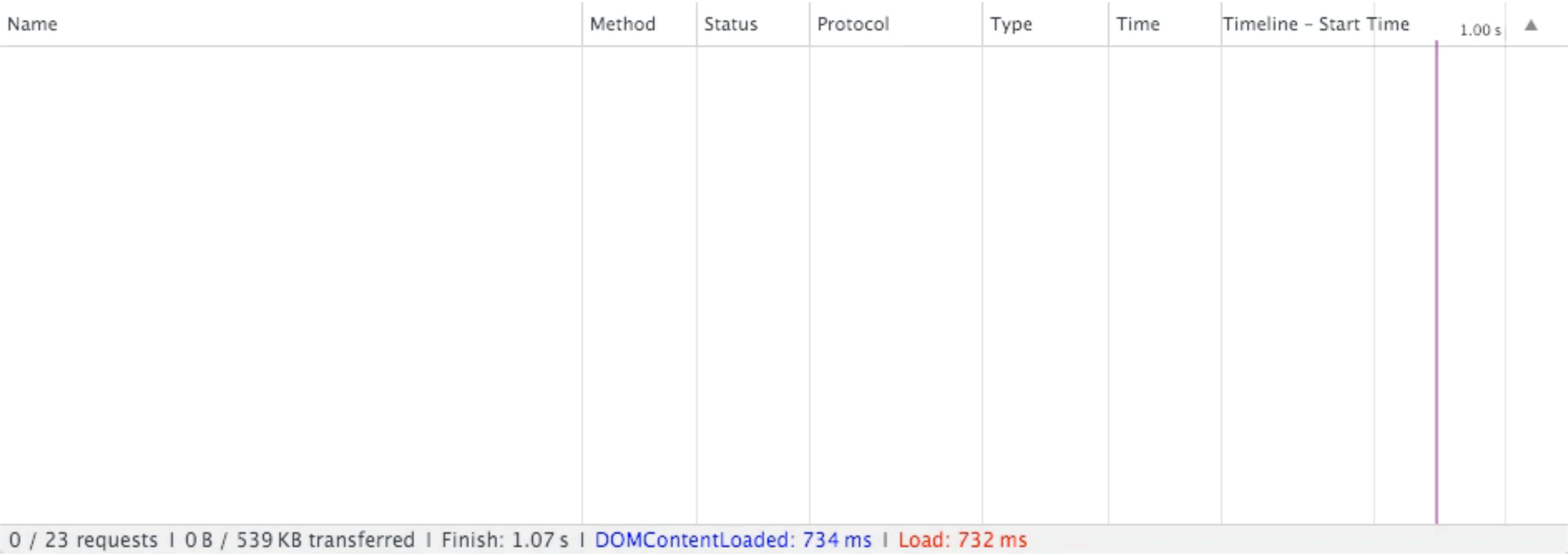
1 / 105 requests | 525 B / 2.1 MB transferred | Finish: 4.39 s | DOMContentLoaded: 1.37 s | Load: 2.11 s

HTTP Live Streaming (HLS)

Decomposes the video into a playlist, and short, downloadable chunks.

Easier to control, and easier to scale.

There’s a wealth of tools surrounding HTTP, and caching, in particular, becomes simpler.



Name	Method	Status	Protocol	Type	Time	Timeline – Start Time

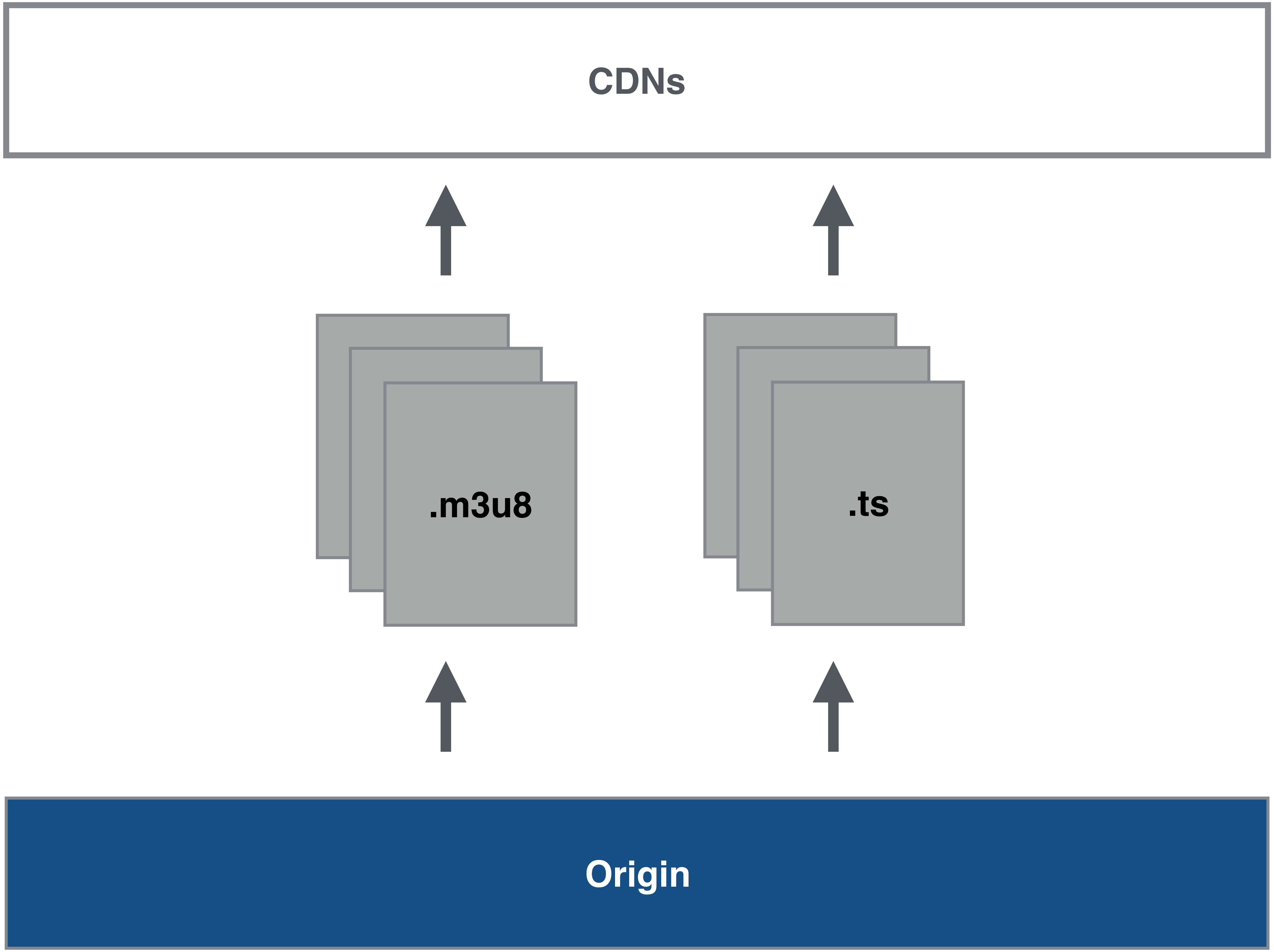
0 / 23 requests | 0 B / 539 KB transferred | Finish: 1.07 s | DOMContentLoaded: 734 ms | Load: 732 ms

HLS isn’t necessarily ideal for live video.

Repeated calls against the playlist (m3u8) must be made continuously.

Reducing the chunk size for better latency means increasing the frequency of requests.

DASH is a possible alternative.



CDNs

.m3u8

.ts

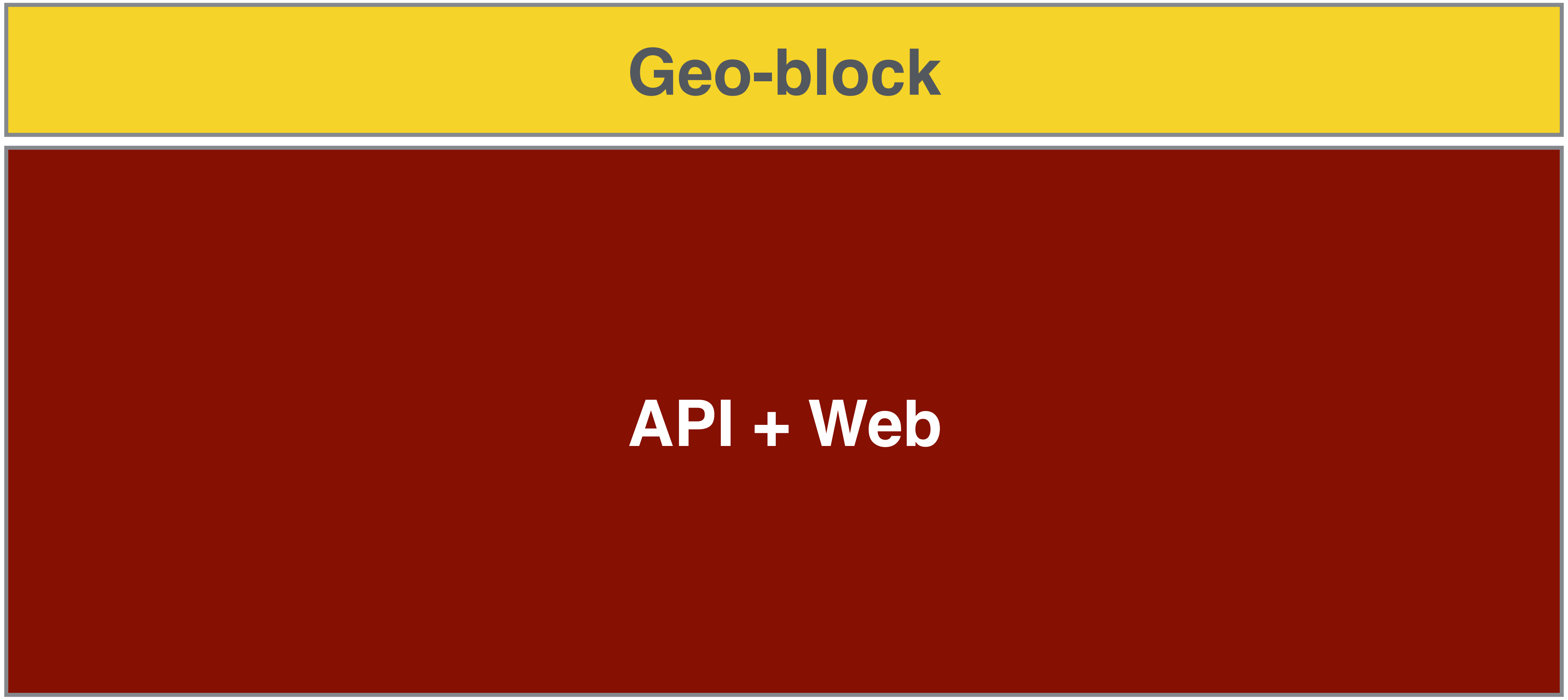
Origin

Serving video at the edges means that authorization must live there as well.

We can use Varnish to help.

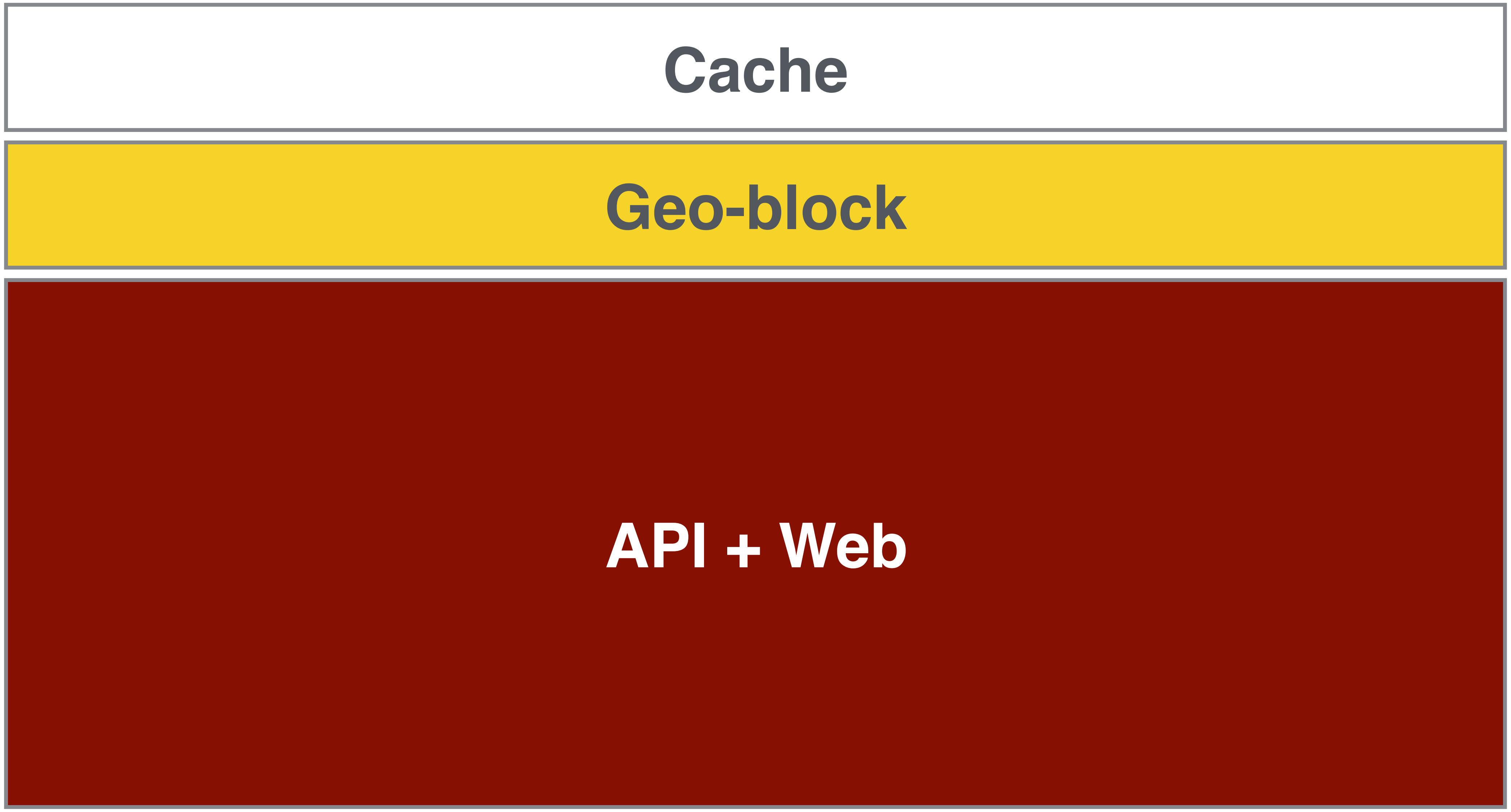
```
/* make sure there is a token */
if (req.url !~ ".+\?.*token=(\d{10,11})_([^&]+)") {
  error 403;
}

/* extract token expiration and signature */
set req.http.X-Exp = re.group.1;
set req.http.X-Sig = re.group.2;

/* validate signature */
if (req.http.X-Sig == regsub(digest.hmac_sha1(digest.base64_decode("SECRET"),
                             req.url.path req.http.X-Exp), "^0x", "")) {

  /* check that expiration time has not elapsed */
  if (time.is_after(now, std.integer2time(std.atoi(req.http.X-Exp)))) {
    error 410;
  }

} else {
  error 403;
}

/* cleanup variables */
unset req.http.X-Sig;
unset req.http.X-Exp;
```

2) Geo-blocking



Geo-block

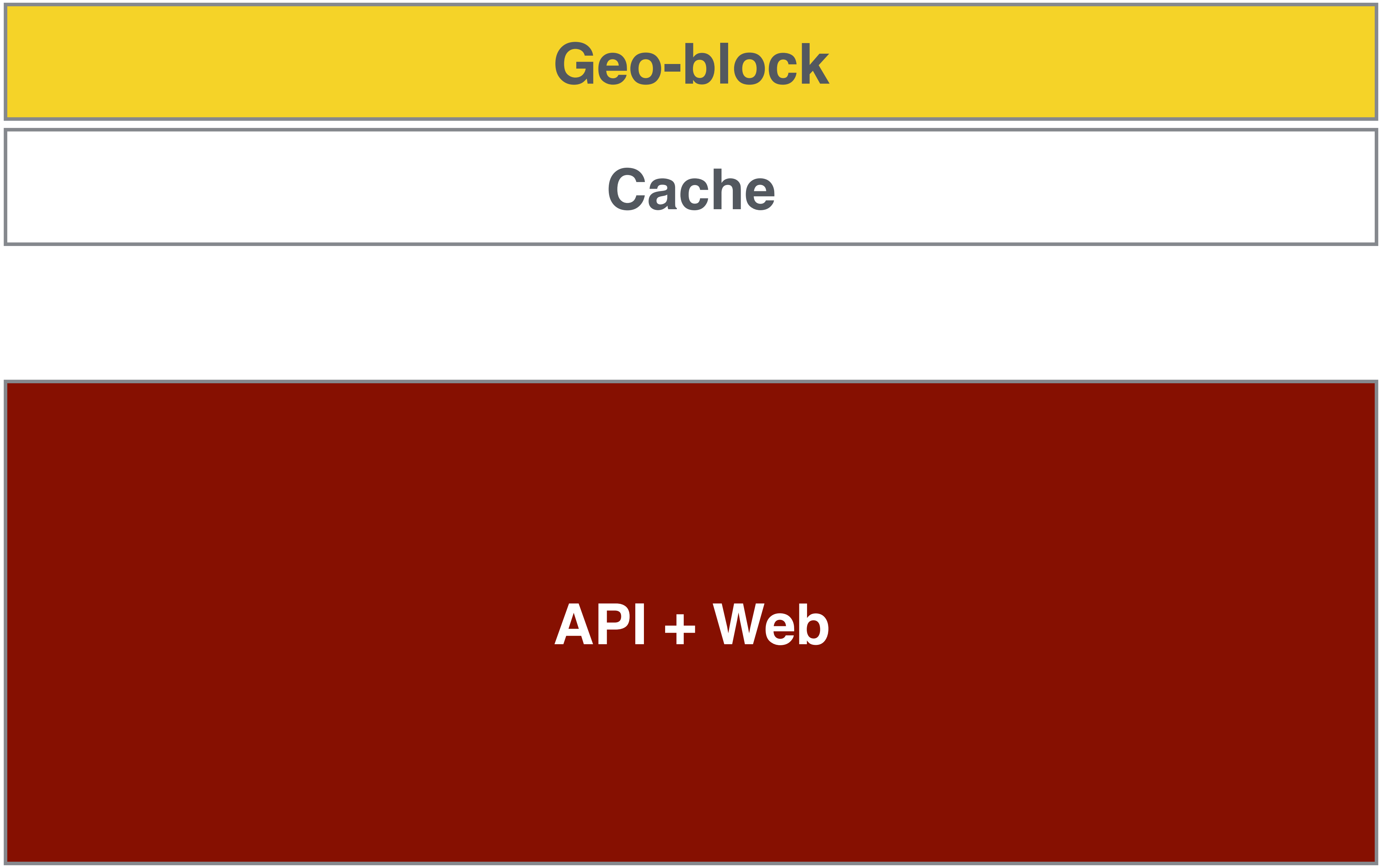
API + Web



Cache

Geo-block

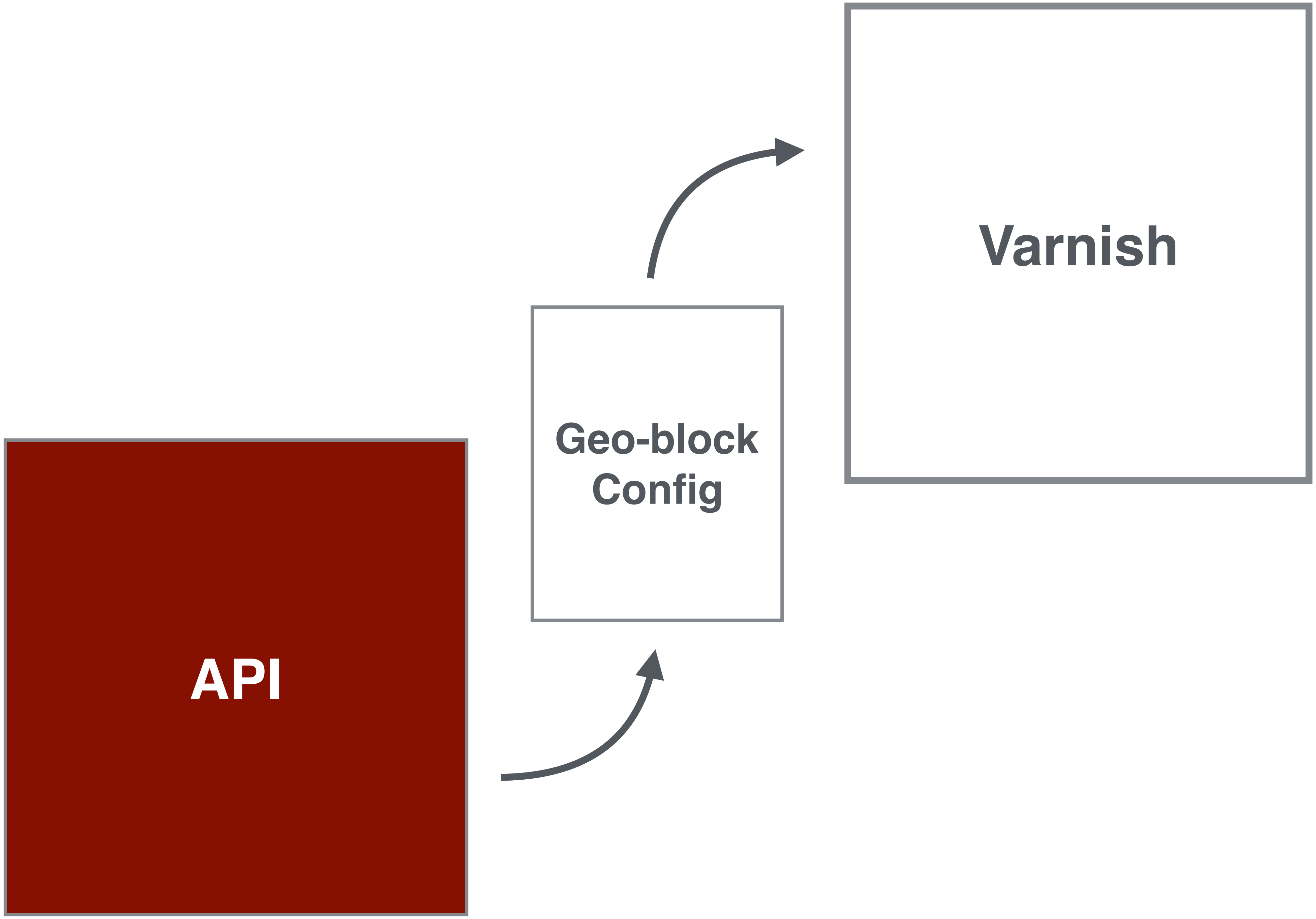
API + Web

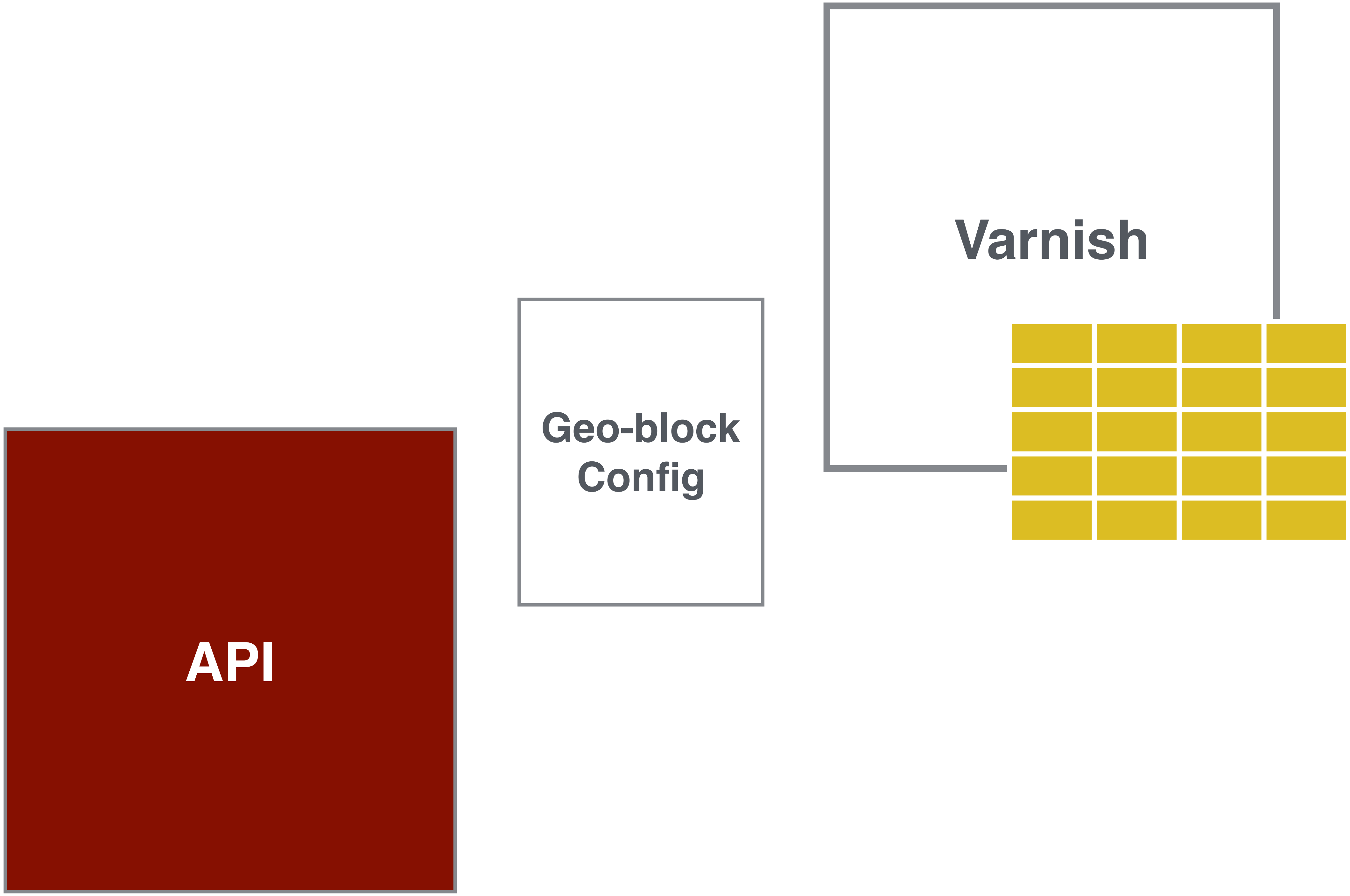


Geo-block

Cache

API + Web

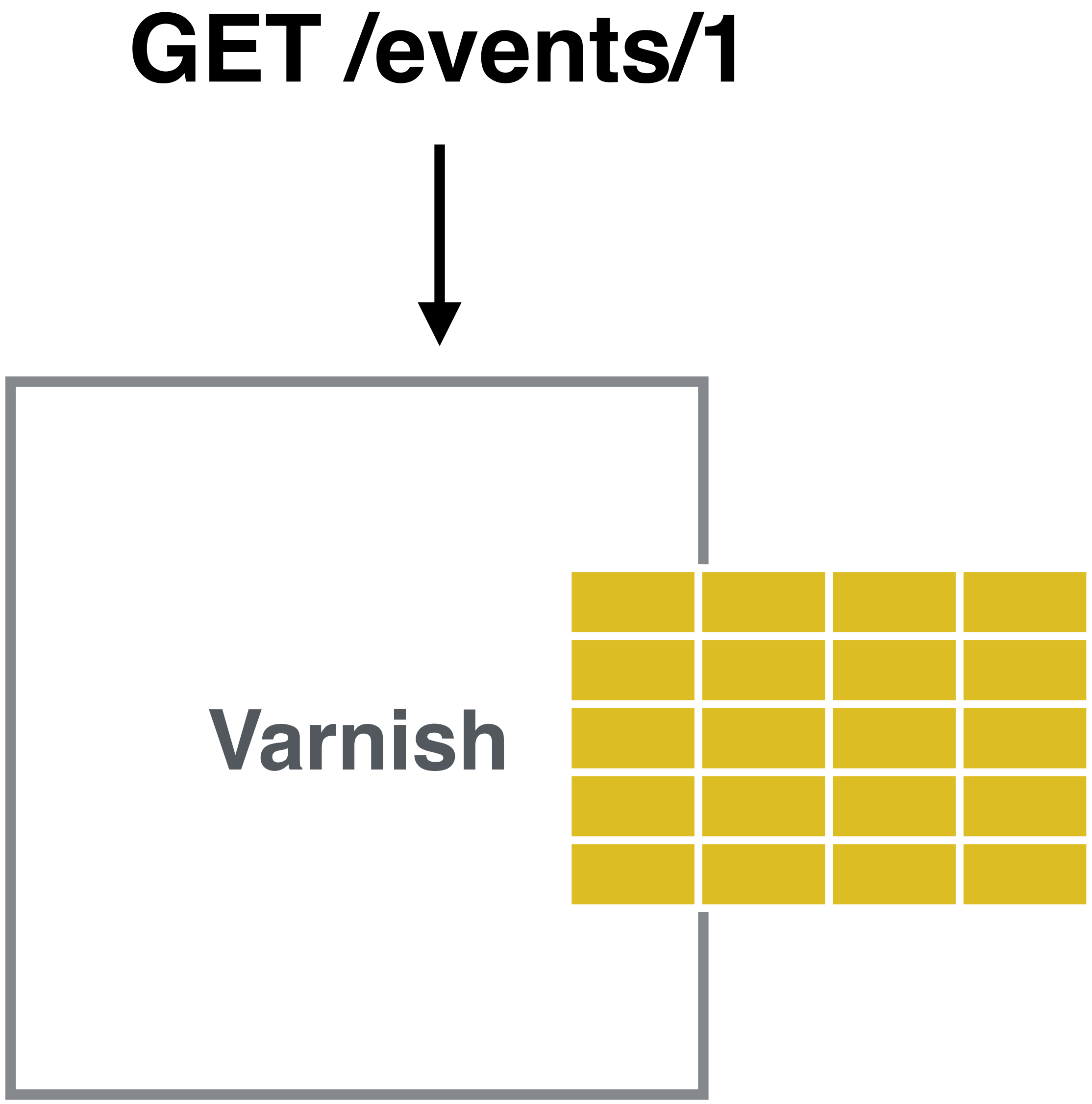

Varnish
Geo-block Config
API



Varnish

Geo-block
Config

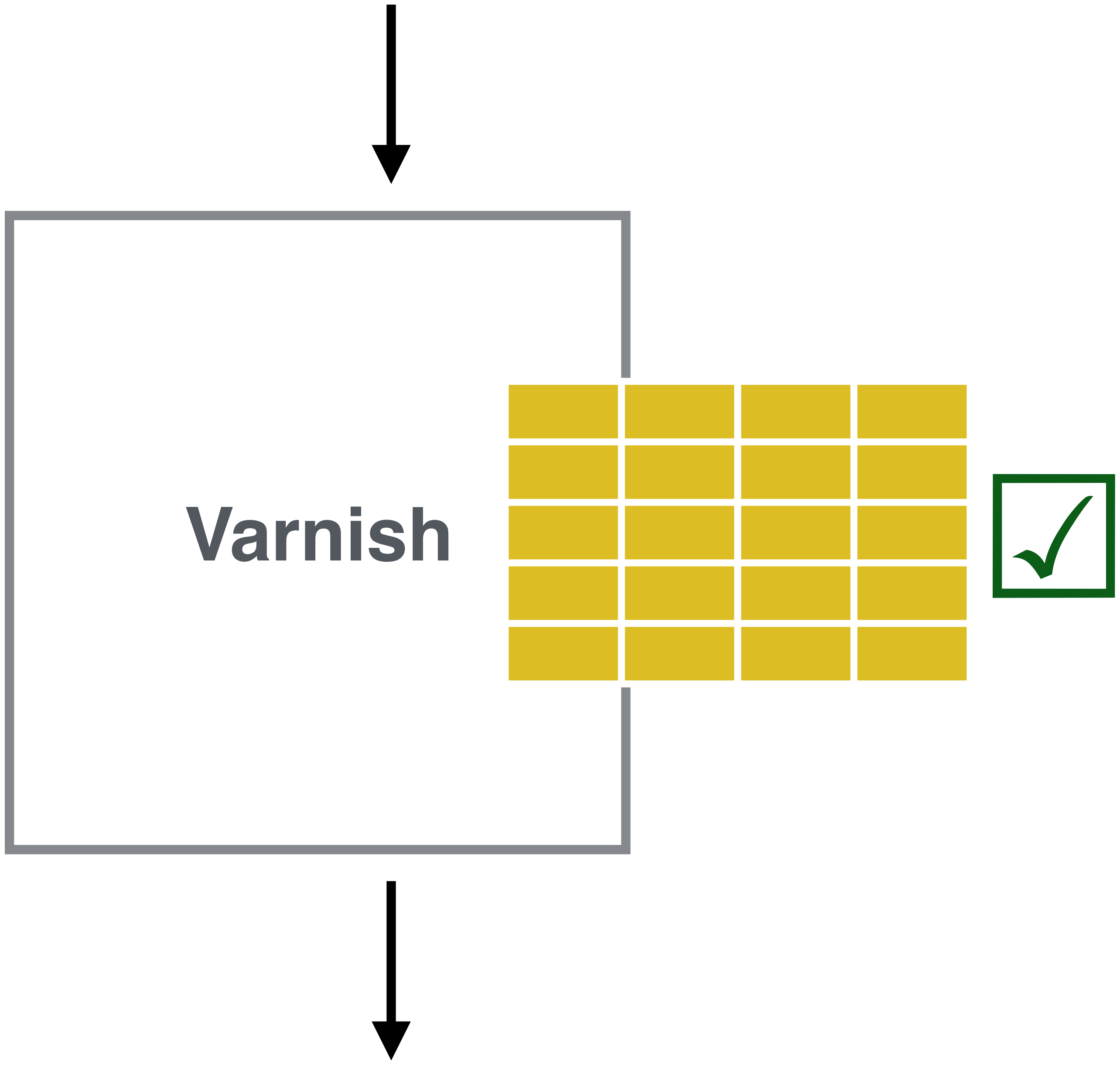
API



GET /events/1

Varnish

GET /events/1



Varnish

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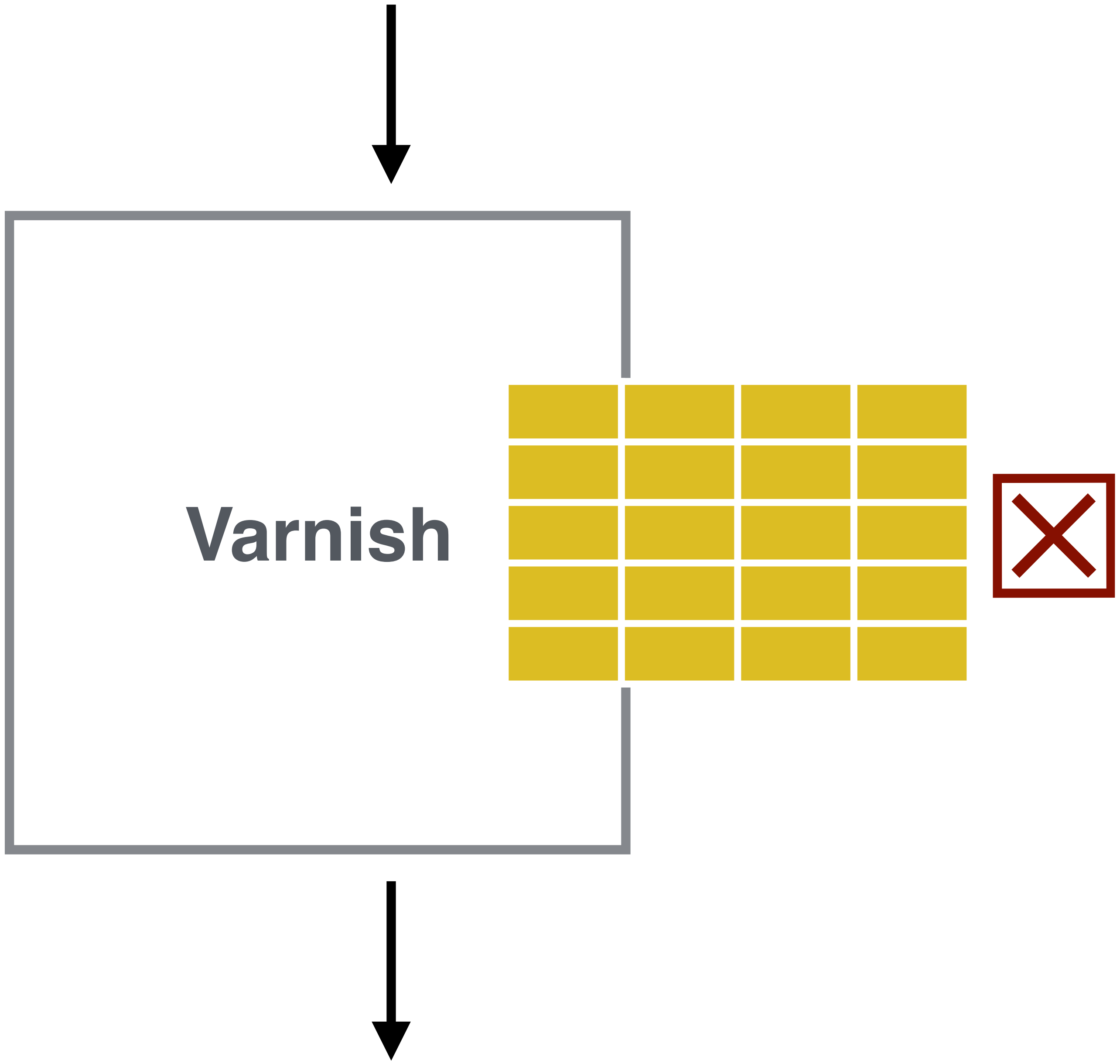

Varnish

GET /events/1.geoblocked

Perfect?

By no means.

There are obvious memory constraints, for one.

3) Cloud migration

Livestream began life in the cloud, on AWS, as an early EC2 customer.

We migrated to a datacenter once the limits of the early cloud were reached.

And now we’re moving back.

Why?

The cloud has matured — it’s stable and it has a vibrant ecosystem.

It’s hard to hire for cloud + DC.

And we want to move faster.

One of our bigger challenges is achieving cloud-independence.

You have to design for the lowest-common denominator.

But there are tools to help:

- **Spinnaker (Netflix)**
- **Terraform (HashiCorp)**

Thanks!

We’re hiring!

http://livestream.com/jobs

dave.yeu@livestream.com

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