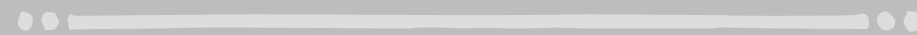


# i-tier: breaking up the monolith



sean mccullough



groupon engineering



@mcculloughsean

# this presentation is about

- how Groupon's software stopped working
- how we rewrote a part of it
- what went well and what didn't

# this presentation isn't about

→ node.js

→ javascript

Problems

# simple start

- monolithic Ruby on Rails app
- sustained business through hypergrowth
- small engineering team
- simple product

# acquisitions

- CityDeal.de (Germany, most of EU)
- SoSata (India)
- Needish (South America)

ran as separate platforms

# new products

→ Goods

→ Getaways

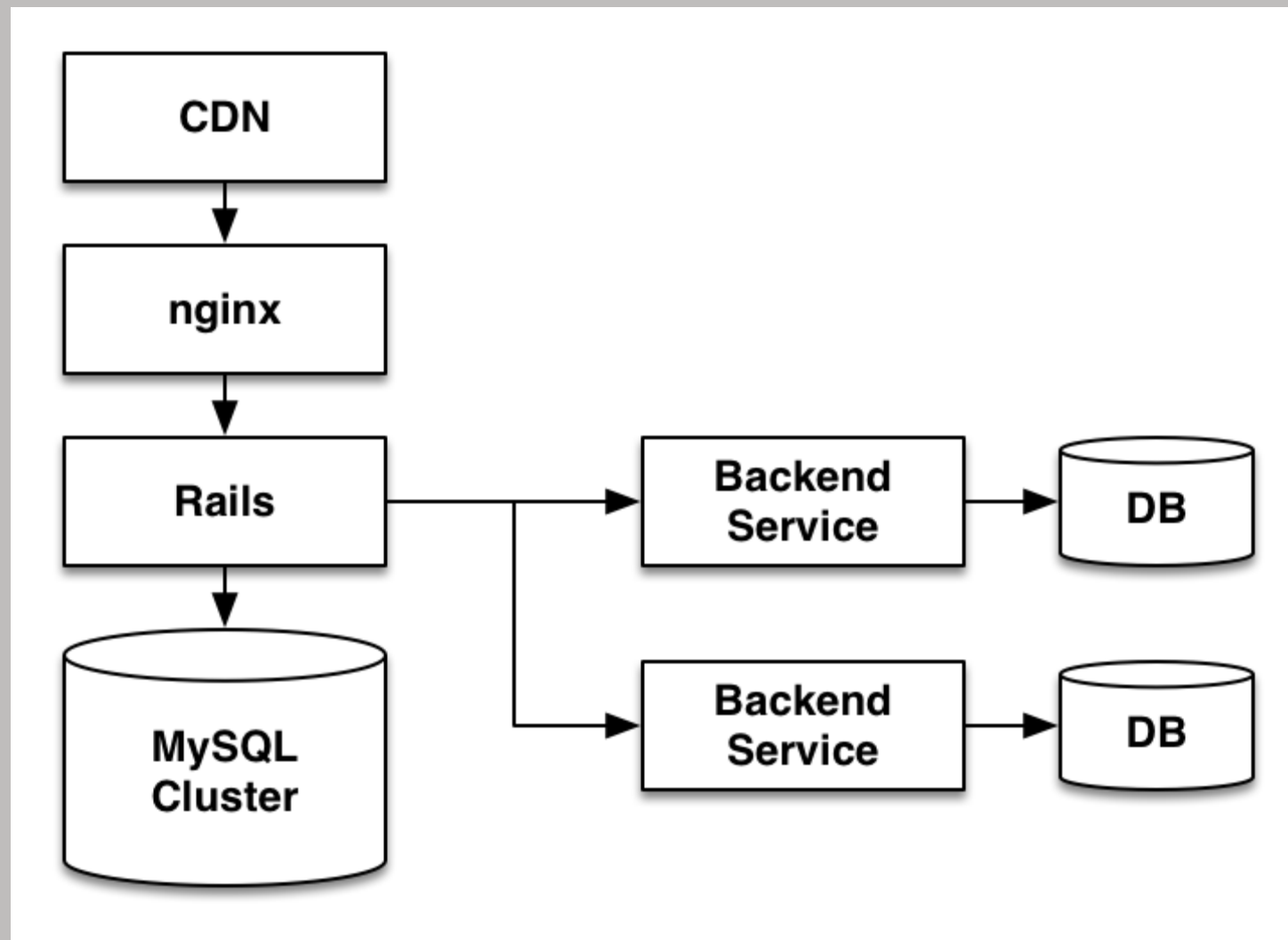
→ Reserve

# improvements

- Smart Deals
- Browse and Search
- Rocketman

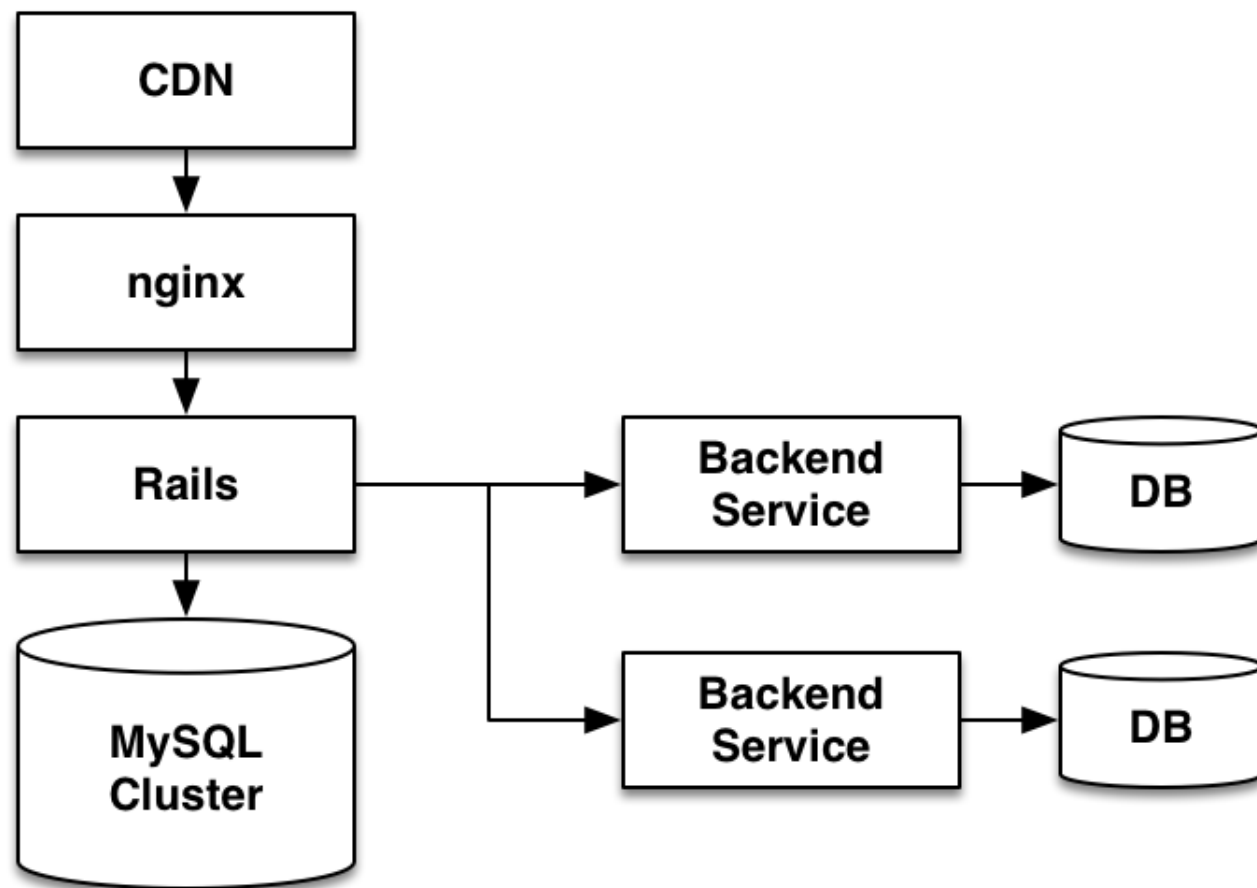


# one monolithic application

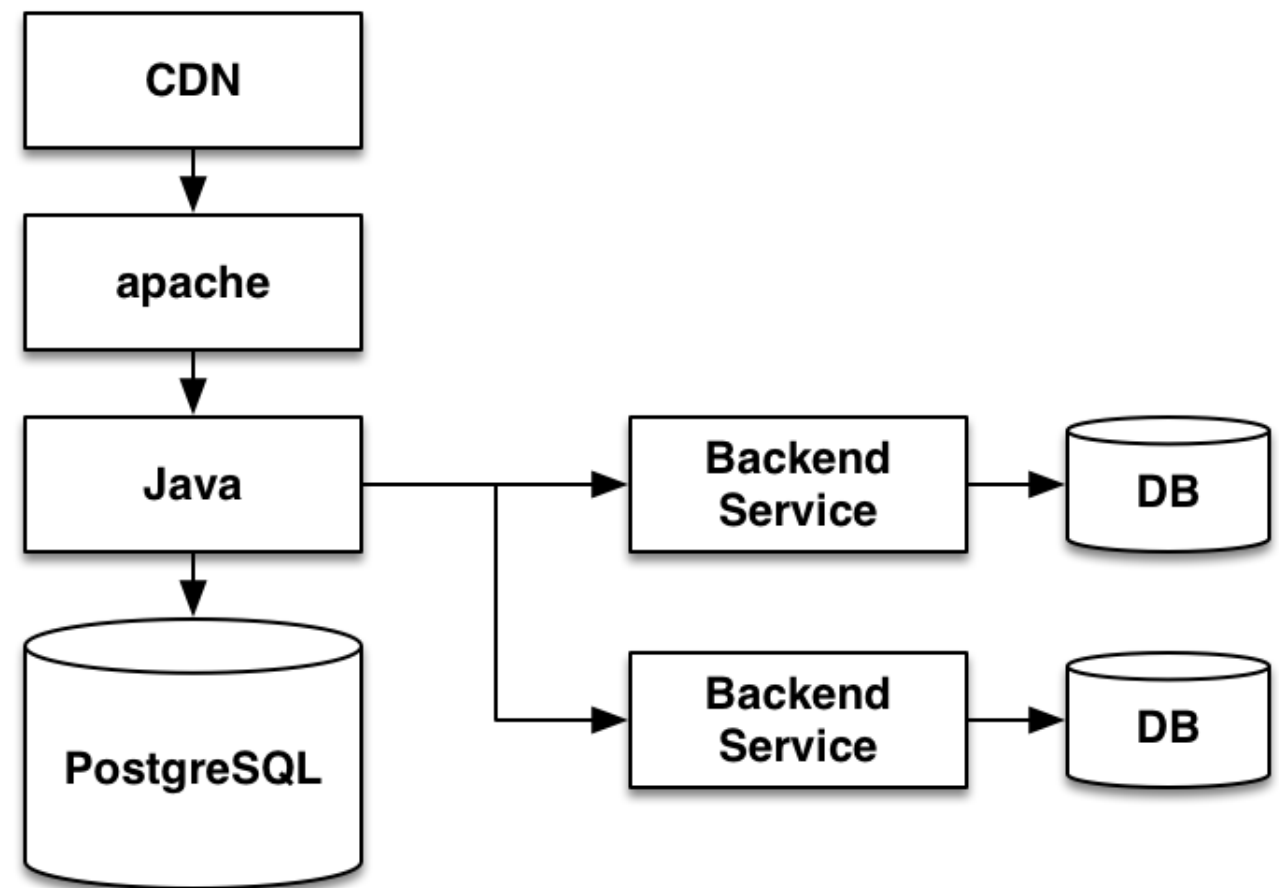


actually, two separate monoliths

## USA



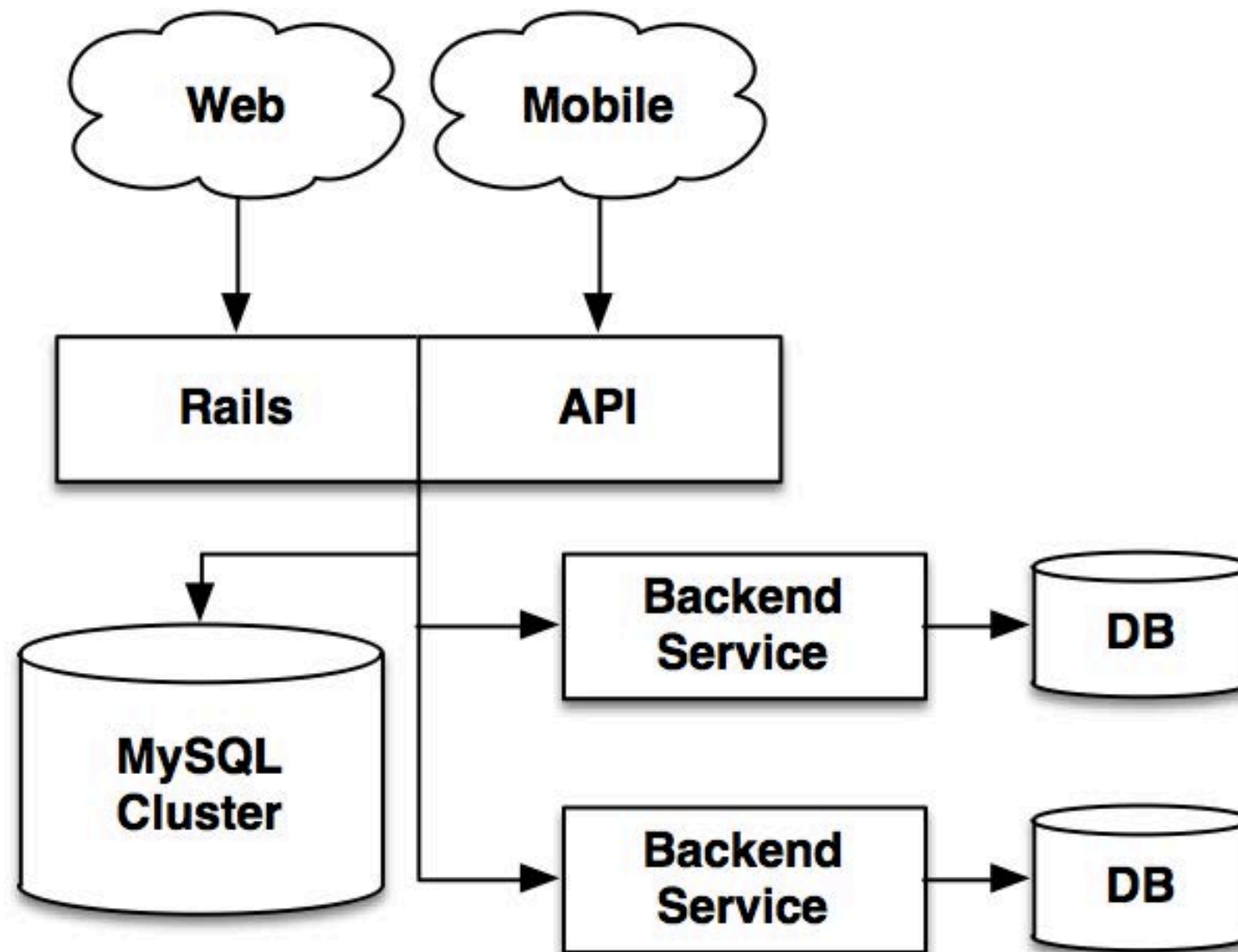
## Europe & Asia



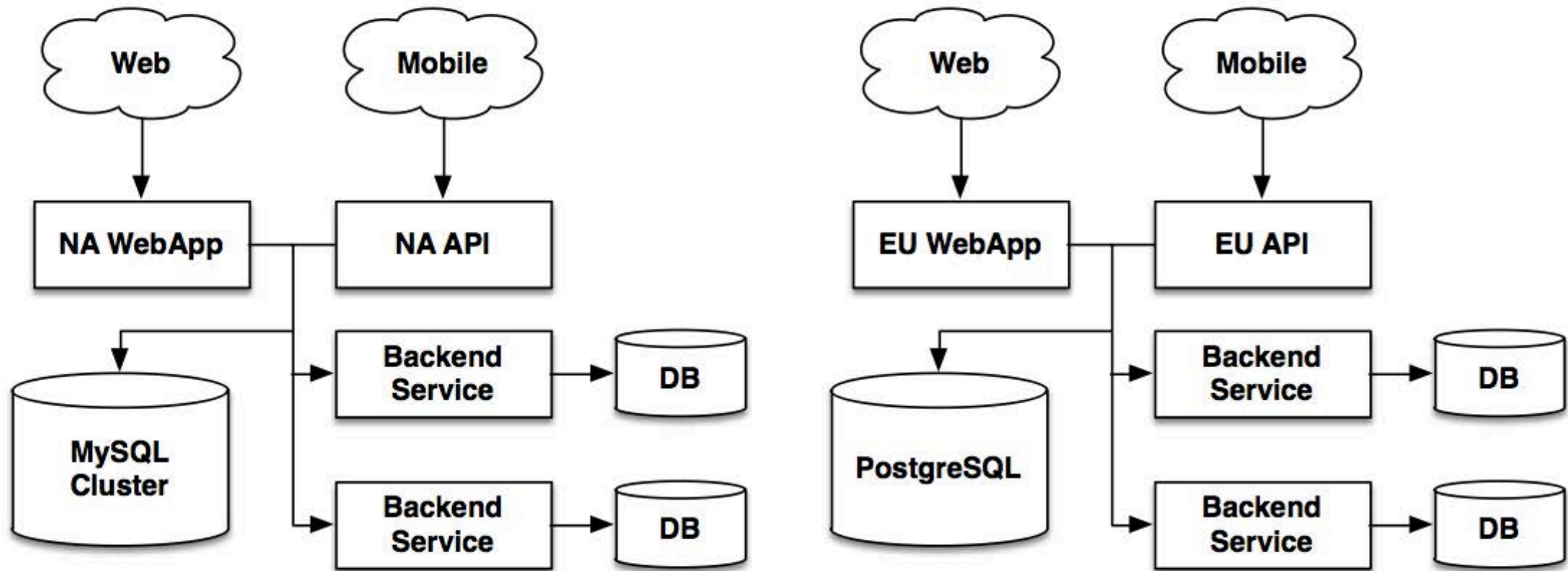
# move to mobile

- ~50% of global transactions
- streamlined user experience
- mobile uses REST API

two facets of the same monolith



# two facets X two monoliths



# business was stuck

- could not build features fast enough
- wanted to build features worldwide
- mobile and web lacked feature parity
- could not change look and feel

# The Plan

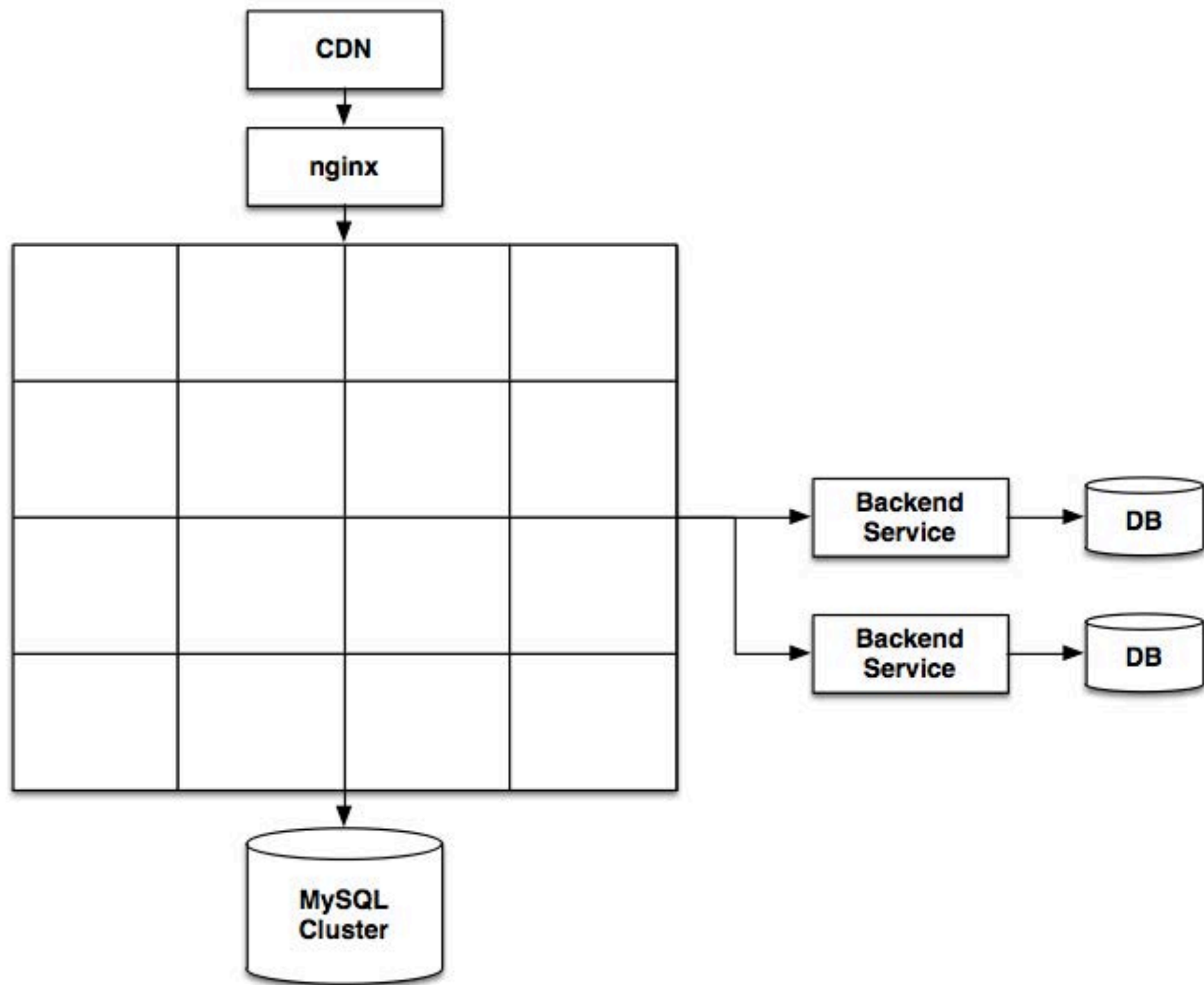
# start with the frontend

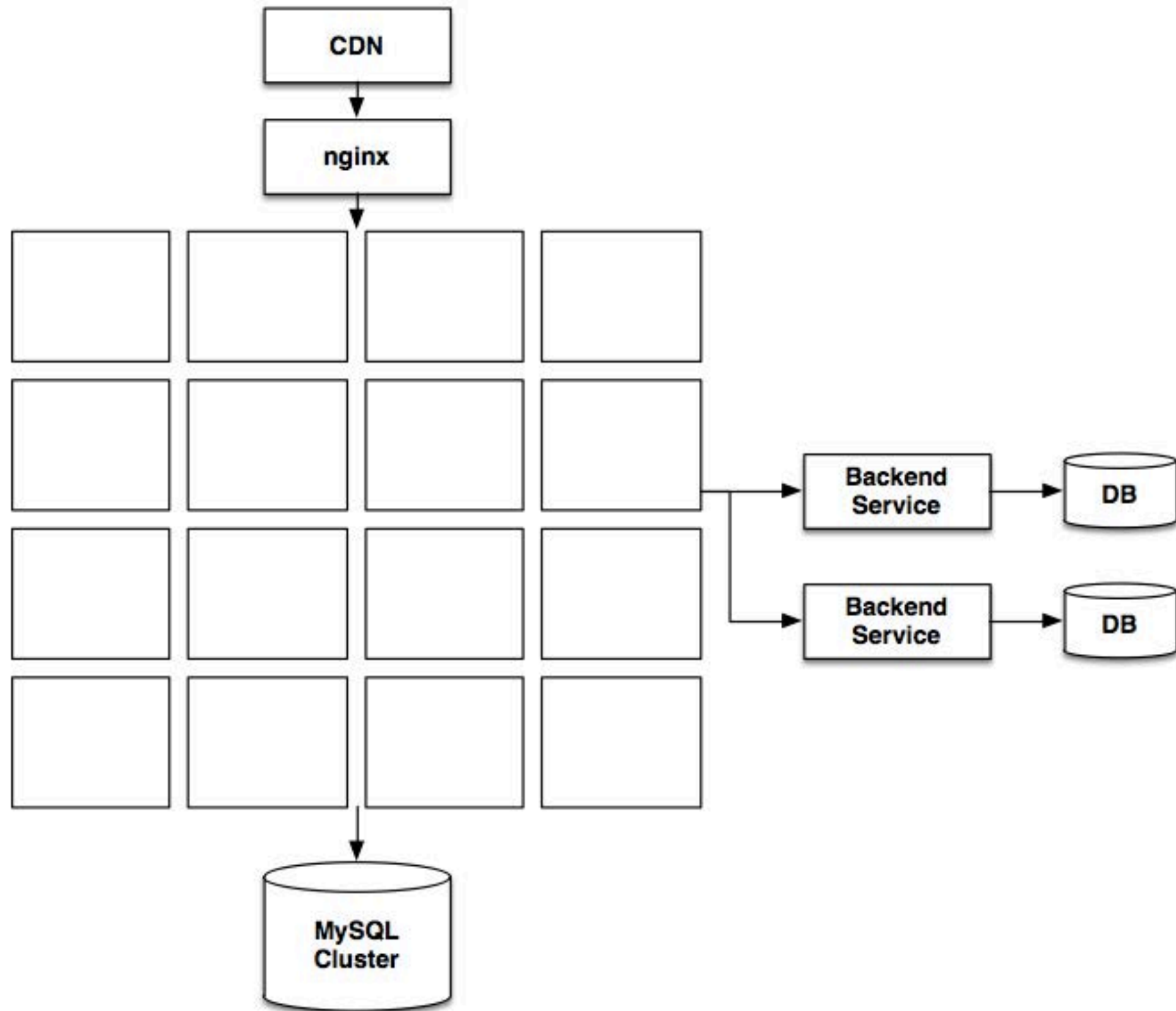
- unify global look and feel
- REST API already built for mobile
- backend services are more complicated to unite



# design goals

- decouple teams
- deploy apps on team schedule
- allow for global design changes
- $118n/L13n$
- be small, do the minimum





# bakeoff

- Node
- MRI Ruby/Rails, MRI Ruby/Sinatra
- JRuby/Rails, Sinatra
- MRI Ruby + Sinatra+EM
- Java/Play, Java/Vertx
- Python+Twisted
- PHP

# why node

- vibrant community
- NPM!
- frontend developers know javascript
- performant enough
- easy scaling (process model)

# GROUPON<sup>®</sup>

## Save 50% to 90% IN San Francisco

1

### Your Email Address

We'll send you unbeatable deals in San Francisco.

Continue

By clicking Continue, I agree to the [Terms of Service](#) and [Privacy Statement](#).

Already have an account? [Sign In](#) | [Privacy Statement](#)



# simple design

```
main: ( {attributes, renderCallback} ) ->
  # Presenter that sets the layout
  view = presenters.page 'subscribe', attributes

  # Grab the list of all the divisions
  grouponAPI.fetch { endpoint: 'divisions' }, (err, {divisions}, details) ->

    # If there's an error, bail and pass the error along
    return renderCallback err if err?

    divisionsPresenter = presenters.divisions divisions, {
      currentDivision: attributes.query?.division_p
    }

    view.set { divisions: divisionsPresenter }

    render.pageHtml view, renderCallback
```

# boundaries

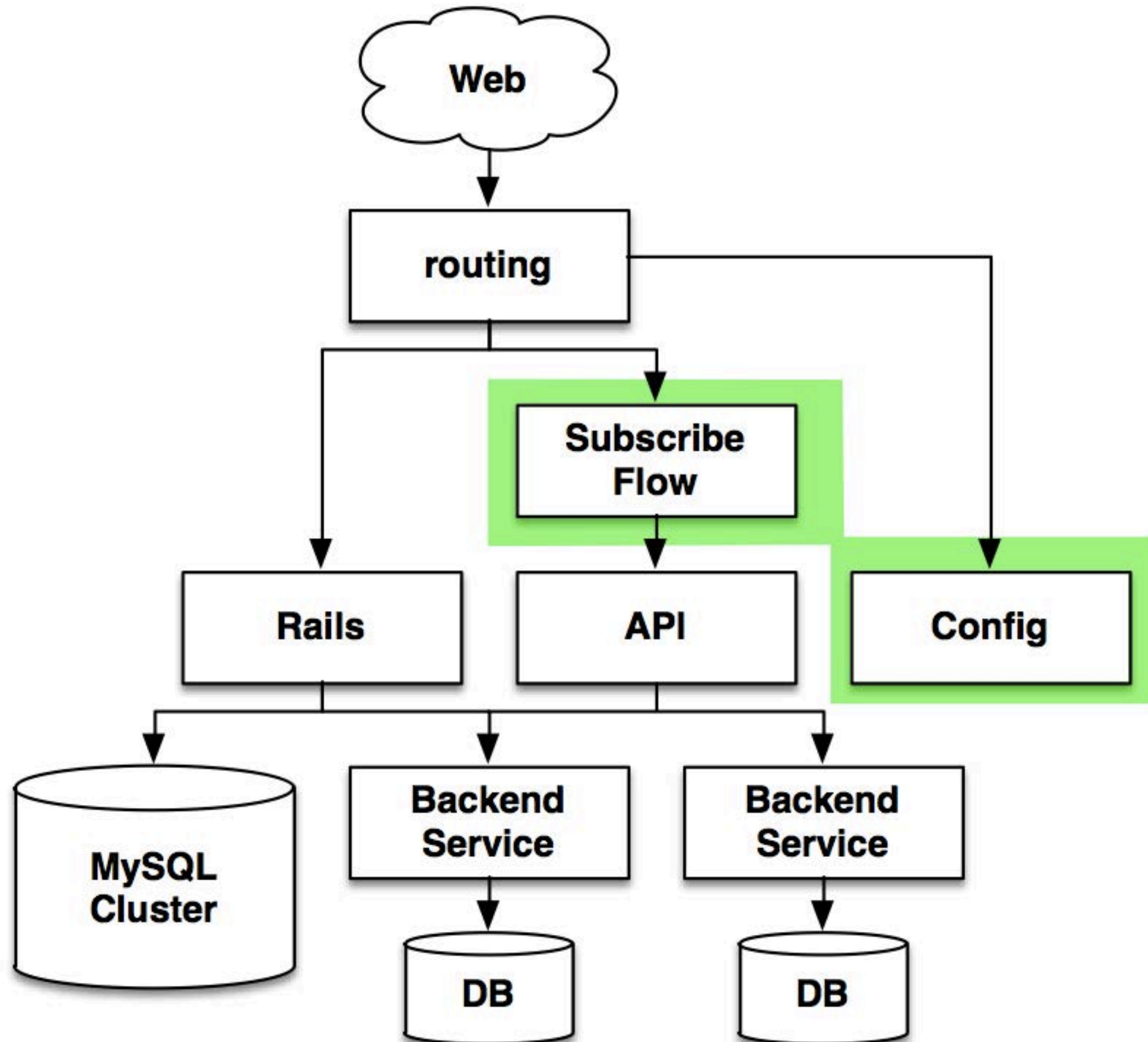
- apps only talk to api and memcached
- layout is in a separate application
- shared common asset bundle



# growing pains

→ max sockets

→ breaking our infrastructure



# subscribe page

- simple application
- partial implementation
- proved out the concept



Refer Friends, Get \$10\*



Pizza, massage, etc.

Location: San Jose, CA

GO

## Food & Drink

80 results



Blue Water Seafood and Crab

### Up to 41% Off at Blue Water Seafood and Crab

Selections of boiled crabs, mussels, clams, and shrimp pair with glasses of wine and house cocktails

San Jose

~~\$62.99~~ **\$37**

View Deal



### Up to 38% Off Three-Course Fondue Dinner at The Melting Pot

The Melting Pot  
San Mateo

~~\$136~~ **\$89**



### Half Off at Korea House

Korea House  
Santa Clara

~~\$39.95~~ **\$20**



### Half Off Sushi Dinner with Sake at Sushi Blvd

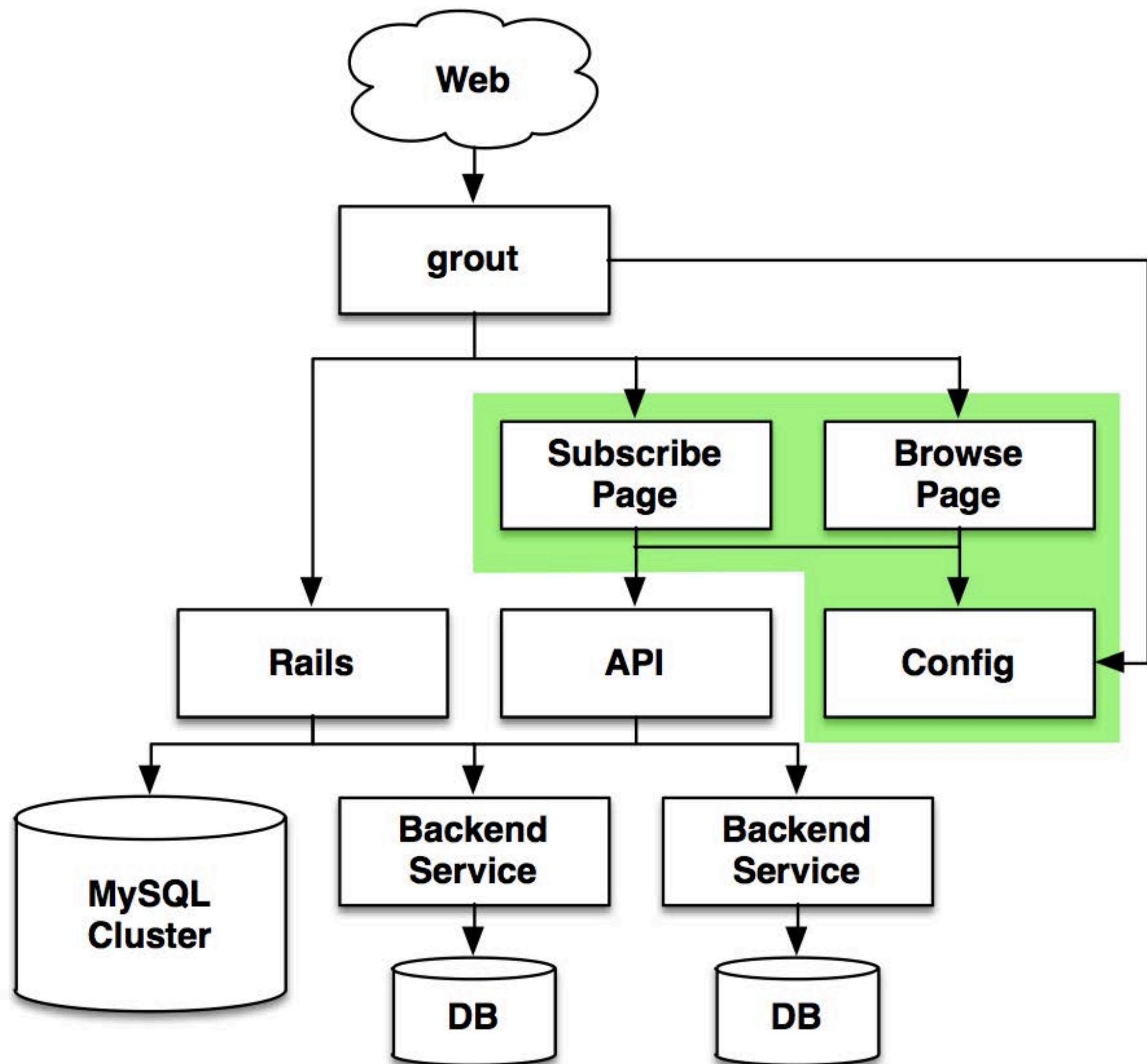
Sushi Blvd  
Sunnyvale

~~\$50~~ **\$25**

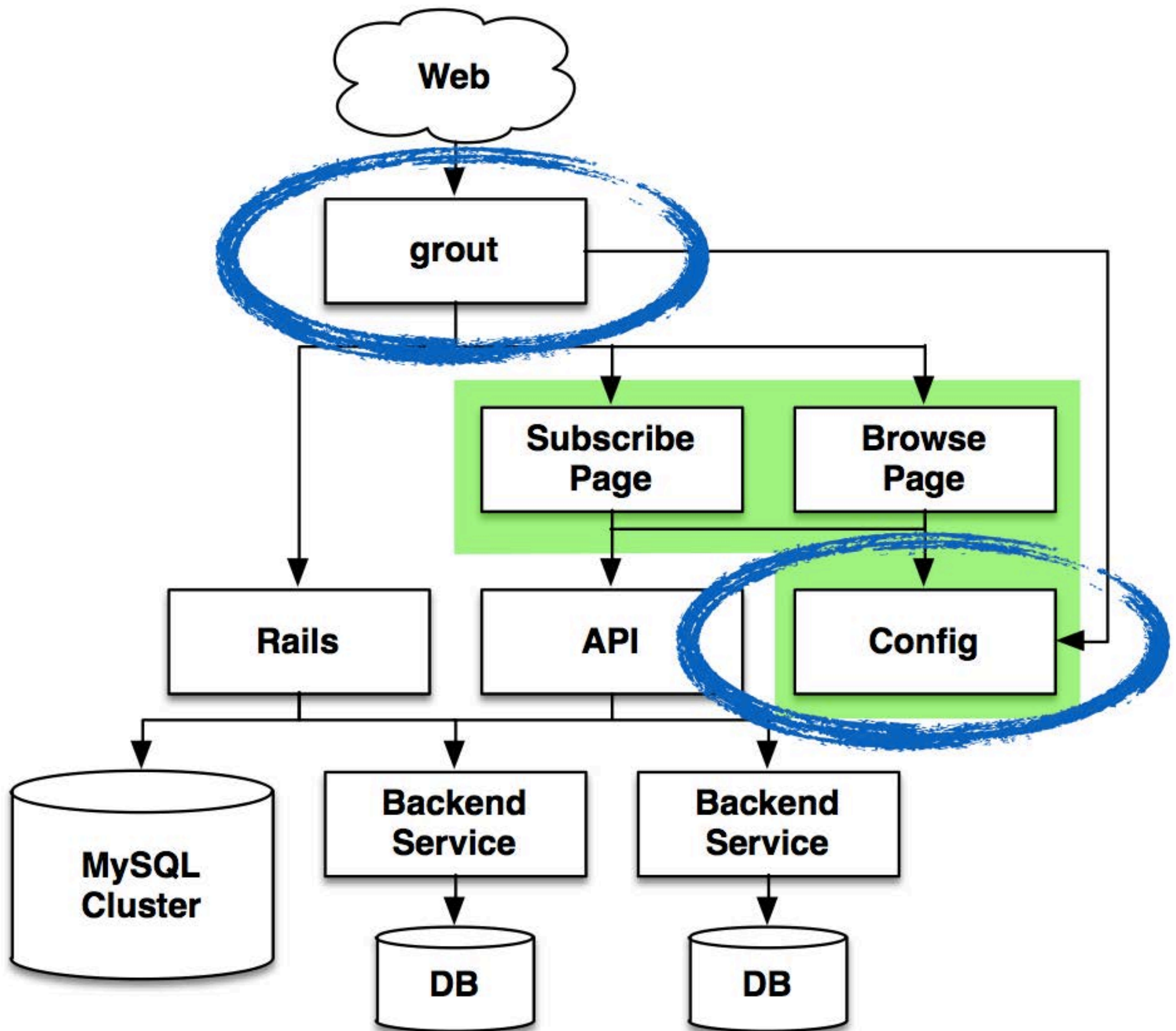
# new problems

- user authentication
- more service calls
- complicated routing
- more traffic
- share look and feel

# Part III - Architecture









# grout

switchboard for incoming requests to I-Tier applications

# grout

Route on:

- domain
- locale
- country
- experiments

# grout

- [groupon.com/deals/my-awesome-deal](https://groupon.com/deals/my-awesome-deal)
  - [itier-deal-page-vip.sncl/deals/my-awesome-deal](https://itier-deal-page-vip.sncl/deals/my-awesome-deal)
- [groupon.de/browse/berlin](https://groupon.de/browse/berlin)
  - [itier-browse-page-vip.lupl/browse/berlin](https://itier-browse-page-vip.lupl/browse/berlin)

# grout

- experiments between different applications on the same URL
- testing between alternative implementations (including the legacy monoliths!)

Routing Layers

Redirects

Realms

Destinations

Other

Deployments

## Routing Layers

Filter layers



Reorder

New Layer

### Layer Definitions

▼ Tracky de\_web ch\_web fr\_web es\_web it\_web nl\_web pl\_web se\_web tr\_web dk\_web Edit Layer

100% Tracky /tracky

▼ Layout Service de\_web ch\_web fr\_web es\_web it\_web nl\_web pl\_web se\_web tr\_web Edit Layer

100% Layout Service /layout

▼ SEM - Landing Pages CDA de\_web ch\_web fr\_web uk\_web es\_web it\_web nl\_web pl Edit Layer

100% SEM - Landing Pages CDA /lp, exact~/Newsletter.action

▼ FR Customer Support ITA fr\_web Edit Layer

100% FR Customer Support ITA /customer\_support, /kundenservice, /faq, /fragen\_und\_antworten

▼ Mobile Redirect ITA uk\_web fr\_web de\_web it\_web es\_web se\_web nl\_web Edit Layer

### Routing Priority

Tracky

/tracky

Layout Service

/layout

SEM - Landing Pages CDA

/lp

exact~/Newsletter.action

FR Customer Support ITA

/customer\_support

/kundenservice

/faq

/fragen\_und\_antworten

Mobile Redirect ITA

/mobile

/mobile-assets

UK Layer

exact~/

- 2% **Homepage** exact~/, /homepage-assets
- 2% **Content Pages** exact~/privacy, exact~/terms, exact~/cookie-policy, exact~/about, exact~/p...
- 2% **Deal Page** /deals/proxy, /deals/js, /deals/assets, /deals/inventory\_proxy, /deals/authenticat...
- 2% **Occasions** /occasions, /occasion
- 2% **Post Redemption Survey** /post\_redemption\_survey, /post\_redemption\_survey-assets
- 2% **Mobile Redirect** /mobile
- 2% **Checkout** /checkout, exact~/deals/:deal\_id/orders, exact~/deals/:deal\_id/orders/:order\_id, ...
- 2% **Goods - Browse** /goods
- 2% **Getaways - Browse** /getaways, /getaways-assets, exact~/:division/getaways, exact~/:divisi...
- 2% **Getaways - Hotels** exact~/hotels/confirmation, exact~/hotels/validateuser, exact~/hotels/:c...
- 2% **Getaways - Checkout** /getaways-checkout, /getaways-checkout-assets, exact~/hotels/:cit...
- 2% **Refer A Friend** /raf2\_assets, exact~/visitor\_referral, exact~/recommendation, exact~/visitor...
- 2% **My Groupons** exact~/mygroupon, exact~/myaccount, /mygroupon-assets, exact~/users/...
- 2% **My Gifts** exact~/gifts/:token, exact~/voucher/gift/:token, /gifts/preview, /mygifts, /voucher/g...
- 2% **My Account** /my-account-assets, /users/:user\_id/account, /users/:user\_id/email\_verificatio...
- 2% **User Sessions** exact~/login, exact~/login/iframe, exact~/signup, exact~/signup/iframe, exa...
- 2% **User Accounts** /subscription\_center, /subscriptions/hash
- 2% **Subscriptions** /app/subscriptions
- 2% **Browse** /browse, /browse/:division\_id, /deals, /deals/:division\_id, /all-deals/:division\_id
- 2% **SEM - Landing Pages** /lpo
- 2% **Support** /customer\_support, /faq
- 2% **GSM** /local, /biz, /articles, /lgsp-assets

# gconfig

configuration as a service

some config can change on the fly

config can be promoted from uat -> staging  
-> prod

## skeletor\_node\_examples Configuration

### dynamicConfig



```
{
  "interval": 60000
}
```

### server



```
{
  "child_processes": 2,
  "max_sockets": 100,
  "port": 8000,
  "secret": "adf879fqewtj98gjas9dfsda0f9qwerqewr183942uf",
  "airbrake_api_key": ""
}
```

### api



```
{
  "defaults": {
    "timeout": 10000,
    "connectTimeout": 1000
  },
  "endpoints": {},
  "base_urls": {
    "main": {
      "url": "http://localhost:8000/"
    }
  }
}
```



# layout service

maintain consistent look and feel across  
site

# layout service options

- distribute layout as library
- use ESIs for top/bottom of page
- apps are called through a “chrome service”
- fetch templates from service

# layout service

chose a service

- independent rollouts
- changes can be shipped without redploying all apps
- easy to use in development

# layout service

- Uses semantic versioning
- Roll forward with bug fixes
- Stay locked on a specific version
- Enable Site-Wide Experiments

**GROUPON**

Featured Deal

All Deals

Getaways

Goods

{{#hasCategories}}

{{friendlyName}}

{{#categories}} {{/categories}}

{{#hasChildren}} {{/hasChildren}}

{{/hasCategories}}



**Refer Friends, Get \$10\***

{{{body}}}

**GROUPON**

🔍 What are you looking for?

📍 Enter your location

[SIGN IN](#) | [SIGN UP](#)

All Deals

Goods

Getaways

{{body}}

## Great Deals at Your Fingertips

Search, Purchase and Redeem



### GROUPON Works™

#### Grow Your Business

Get new customers and  
grow your business by  
selling on Groupon. See

### GROUPON Grassroots™

#### Help Your Community

Discover local causes and  
lend a helping hand. Make a  
big impact with one little  
click. Get involved.



American Express® Cards  
Welcomed by Groupon

Rewrite All The  
Things!

# rewrite

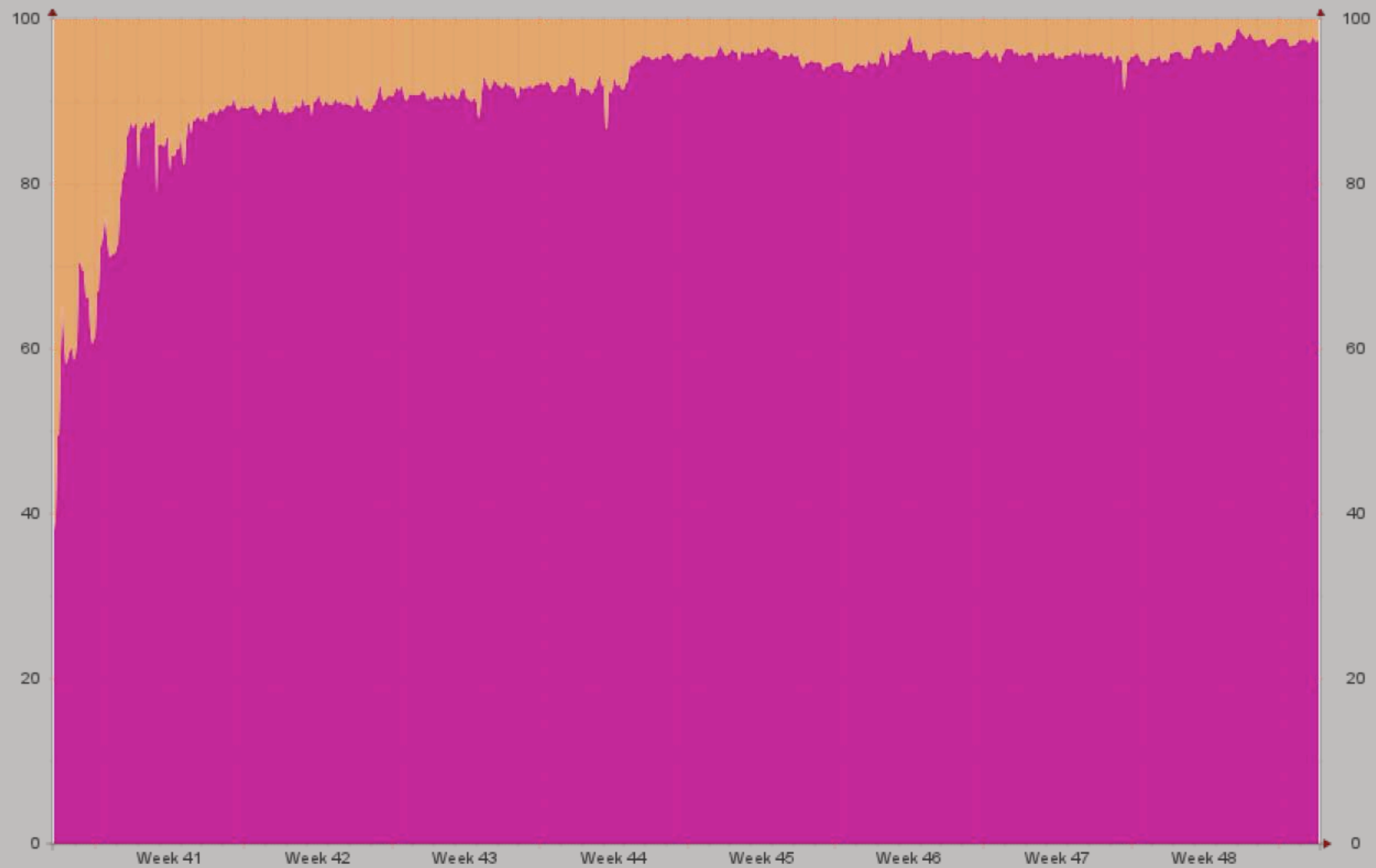
- get the whole company to move at once
- supporting two platforms is hard
- as of June 2012 - move to I-Tier by September 1st



# rewrite

- ~150 developers
- global effort
- feature freeze – A/B testing against mostly the same features

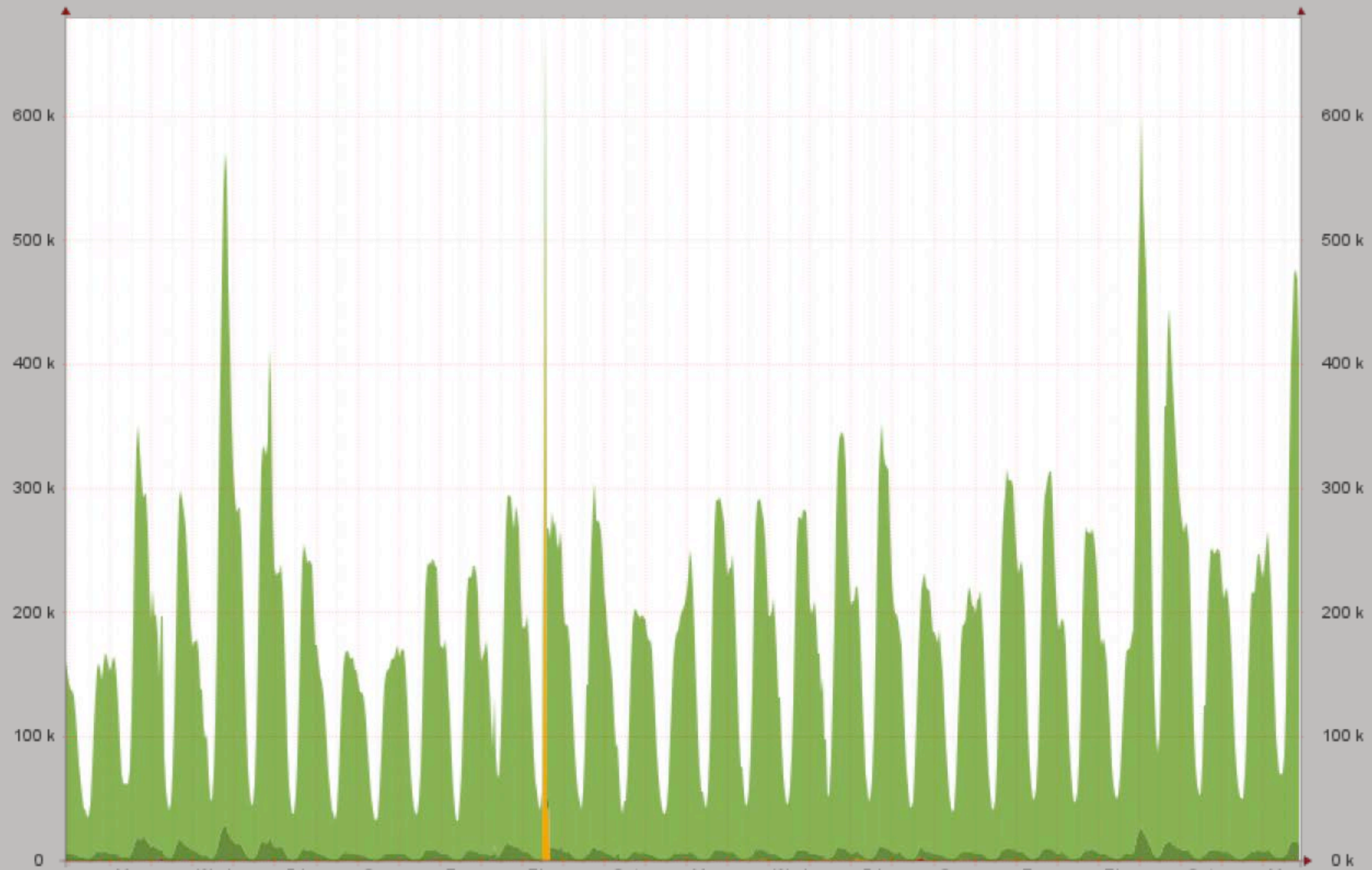
it worked!



# webpages got faster

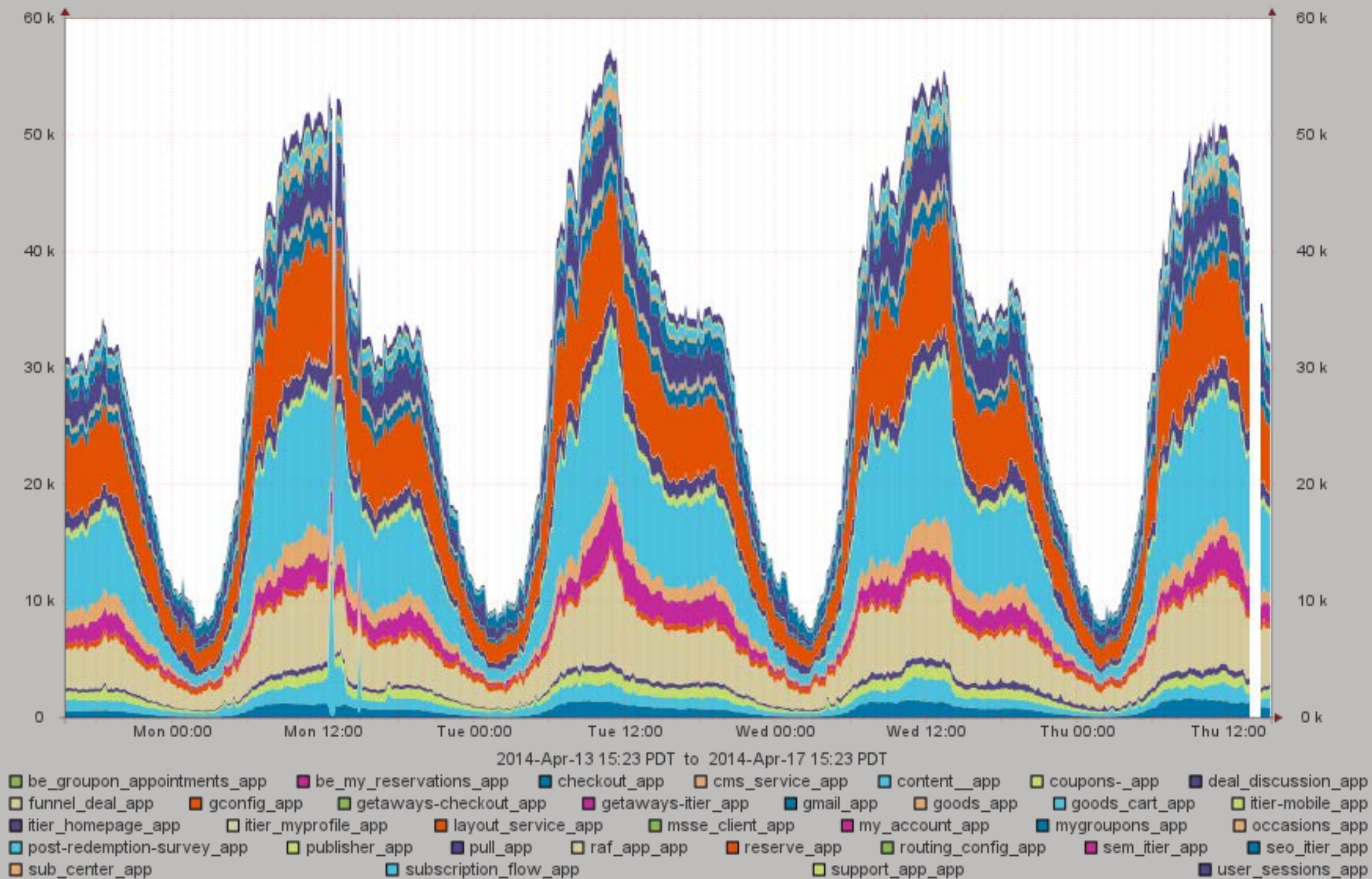


# sustained record traffic





## Itier Global Rpm By App Name - splunk-itier-snc1.snc1



# what doesn't work

- increased testing burden
- tooling needs to catch up
- increased operational overhead

# culture problems

- changed team workflow
- teams are silos
- code quality varies

# next steps

- streaming responses for better performance
- better resiliency to outages
- distributed tracing
- international (launching today!)
- open source – testium



# tl;dr

- monolith
  - federated frontend
  - service oriented architecture
- grout
- gconfig
- layout service

# thanks!

slides: <http://gr.pn/PqFLdo>

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