KubeCon | CloudNativeCon

Europe 2018

IBM | The Weather Company

Istio

The Weather Company's Journey

Presented By:

Nick Nellis

wsi

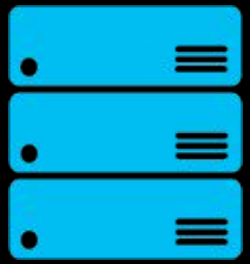
The
Weather
Channel

WEATHER UNDERGROUND

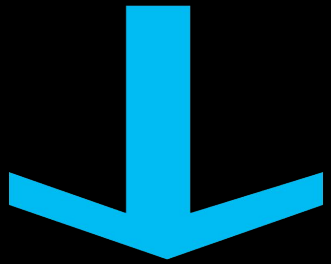
api.weather.com

A platform built to sell and distribute weather data

known as the *Sun Platform*.

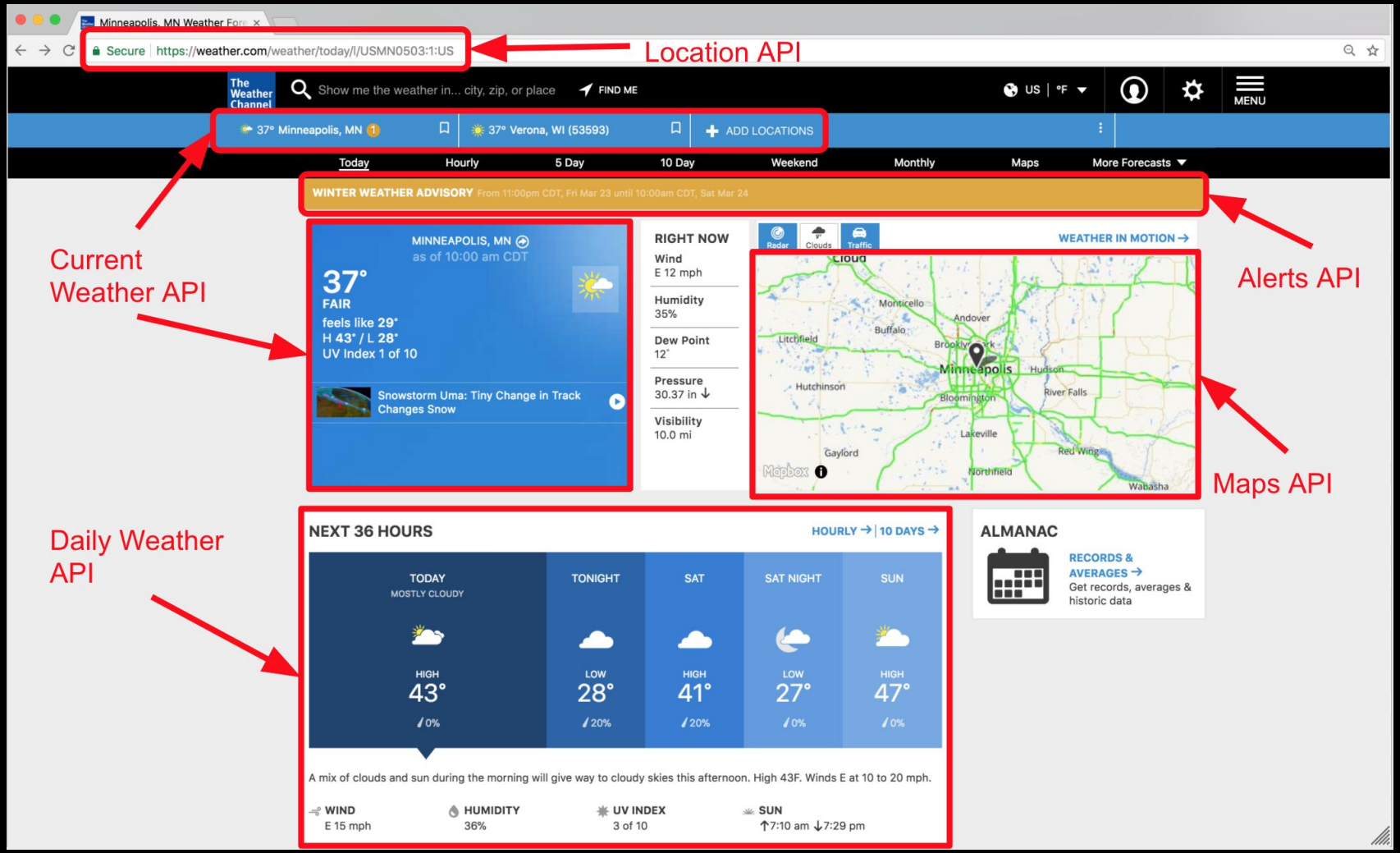


Over 40 microservices

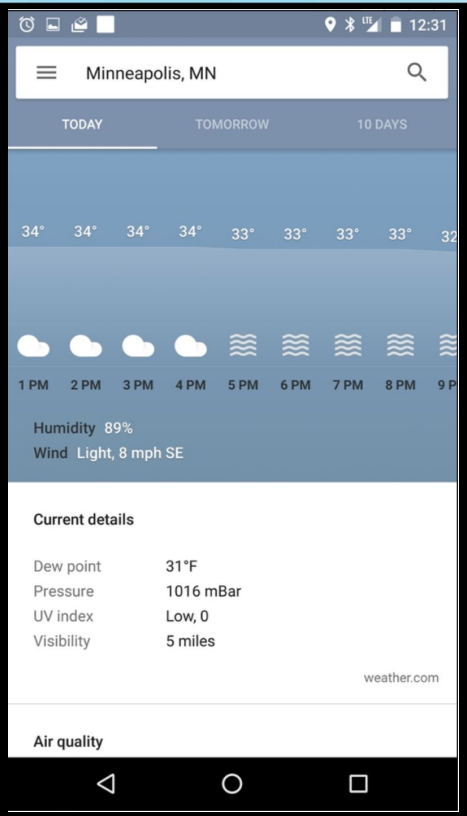


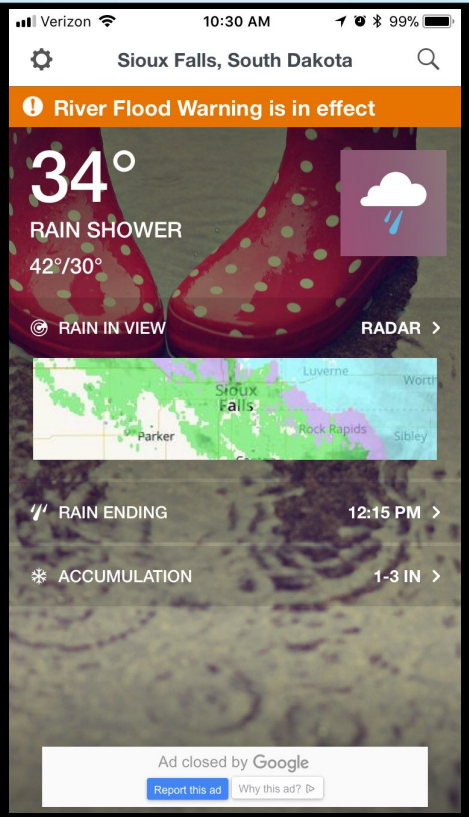
Billions of hits per day

4 regions worldwide

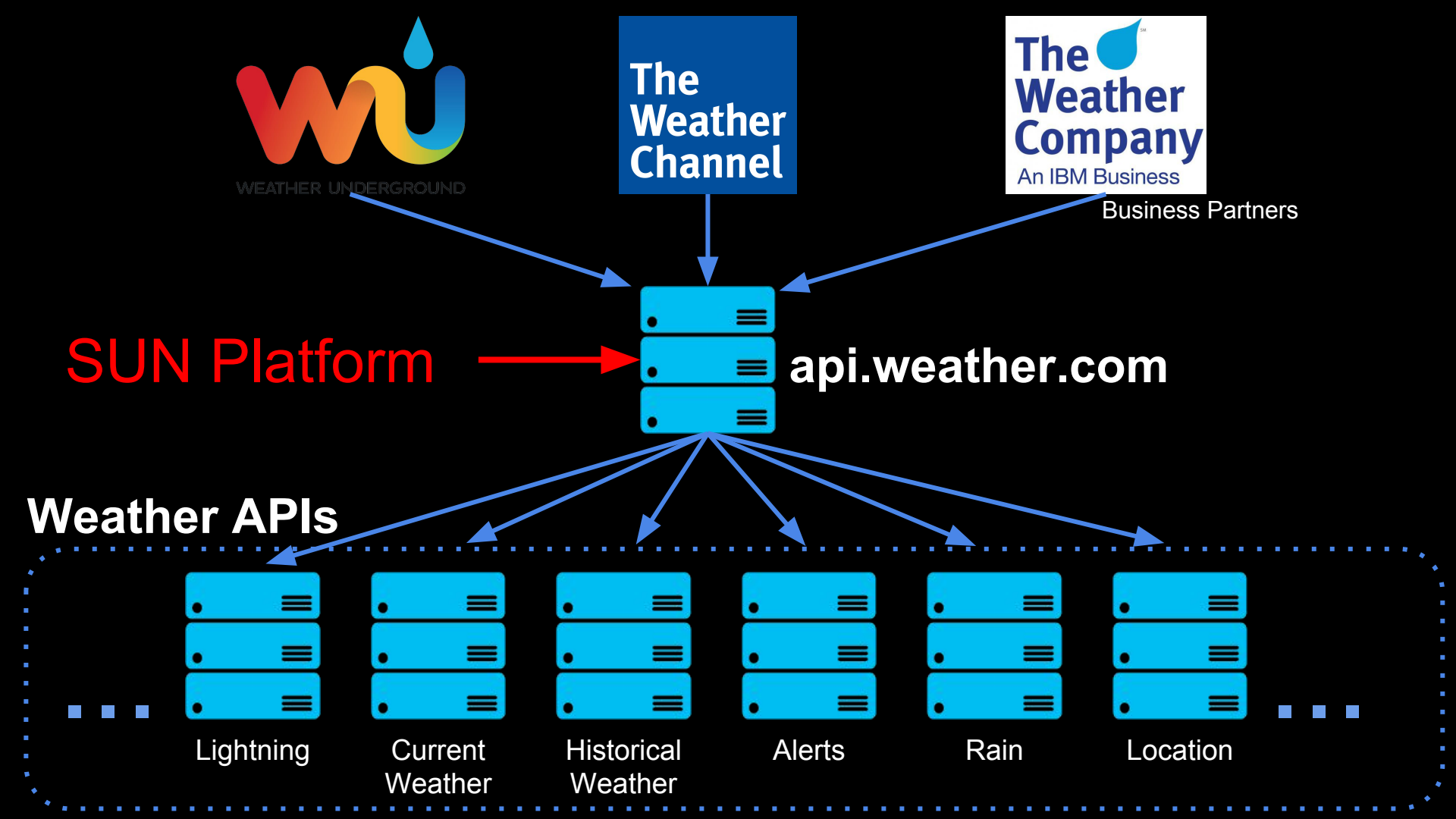

Minneapolis, MN Weather Fore
Secure https://weather.com/weather/today/l/USMN0503:1:US
Location API
The Weather Channel
Show me the weather in... city, zip, or place
FIND ME
US | °F
MENU
37° Minneapolis, MN
37° Verona, WI (53593)
ADD LOCATIONS
Today
Hourly
5 Day
10 Day
Weekend
Monthly
Maps
More Forecasts
WINTER WEATHER ADVISORY From 11:00pm CDT, Fri Mar 23 until 10:00am CDT, Sat Mar 24
Current Weather API
MINNEAPOLIS, MN
as of 10:00 am CDT
37°
FAIR
feels like 29°
H 43° / L 28°
UV Index 1 of 10
Snowstorm Uma: Tiny Change in Track Changes Snow
RIGHT NOW
Wind
E 12 mph
Humidity
35%
Dew Point
12°
Pressure
30.37 in
Visibility
10.0 mi
Radar
Clouds
Traffic
WEATHER IN MOTION
Monticello
Buffalo
Andover
Litchfield
Brooklyn Park
Minneapolis
Hudson
Hutchinson
Bloomington
River Falls
Lakeville
Gaylord
Red Wing
Northfield
Wabasha
Mapbox
Alerts API
Maps API
Daily Weather API
NEXT 36 HOURS
HOURLY → | 10 DAYS →
TODAY
MOSTLY CLOUDY
HIGH
43°
0%
TONIGHT
LOW
28°
20%
SAT
HIGH
41°
20%
SAT NIGHT
LOW
27°
0%
SUN
HIGH
47°
0%
A mix of clouds and sun during the morning will give way to cloudy skies this afternoon. High 43F. Winds E at 10 to 20 mph.
WIND
E 15 mph
HUMIDITY
36%
UV INDEX
3 of 10
SUN
↑7:10 am ↓7:29 pm
ALMANAC
RECORDS & AVERAGES →
Get records, averages & historic data

Android / iOS


12:31
Minneapolis, MN
TODAY
TOMORROW
10 DAYS
34° 34° 34° 34° 33° 33° 33° 33°
1 PM 2 PM 3 PM 4 PM 5 PM 6 PM 7 PM 8 PM
Humidity 89%
Wind Light, 8 mph SE
Current details
Dew point 31°F
Pressure 1016 mBar
UV index Low, 0
Visibility 5 miles
weather.com
Air quality


Verizon
10:30 AM
99%
Sioux Falls, South Dakota
River Flood Warning is in effect
34°
RAIN SHOWER
42°/30°
RAIN IN VIEW
RADAR
Sioux Falls
Parker
Rock Rapids
Sibley
RAIN ENDING
12:15 PM
ACCUMULATION
1-3 IN
Ad closed by Google
Report this ad
Why this ad?

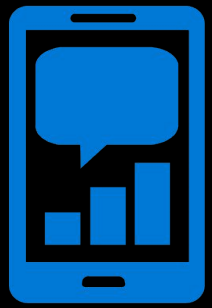
Verizon
8:17 AM
100%
Madison
Partly Cloudy
32°
Saturday TODAY 39 23
Now 9AM 10AM 11AM 12PM 1PM
32° 34° 36° 37° 37° 37°
Sunday 44 26
Monday 49 40
Tuesday 52 33
Wednesday 56 33
Thursday 49 25
Friday 44 23
Saturday 40 23


WEATHER UNDERGROUND
The Weather Channel
The Weather Company
An IBM Business
Business Partners
SUN Platform
api.weather.com
Weather APIs
Lightning
Current Weather
Historical Weather
Alerts
Rain
Location

SUN Platform

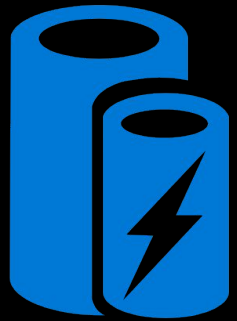
Authentication
Authorization

API Key
Management

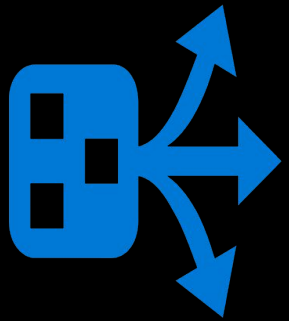


Sales

Monitoring



Caching



Routing

Billing

Existing SUN Platform

- “Home grown”
- Router / Cache generator
- 3 auth/billing applications
- Docker / Kubernetes
- Cloudwatch HTTP monitoring

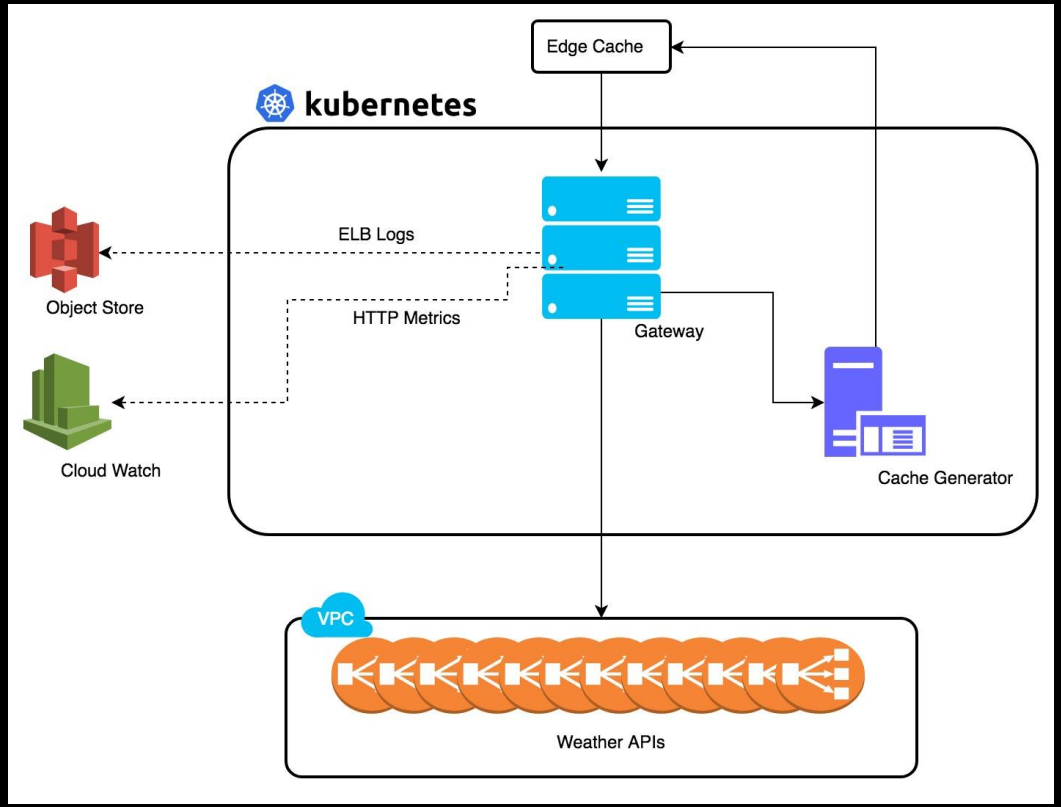
- Deployments
  - Every 2 weeks
  - Route changes = rebuild
  - Depends on upstream release schedules
  - Takes hours

SUN Routing

- 40 Load balanced backend services
- APIs Managed by many different teams
- HTTP path based routing
- Intercept calls for cache generation

- 400k RPS globally
  - 60% request cache hit
  - 90% data cached
  - 20k-50k RPS per region to gateway

Sun Routing Platform

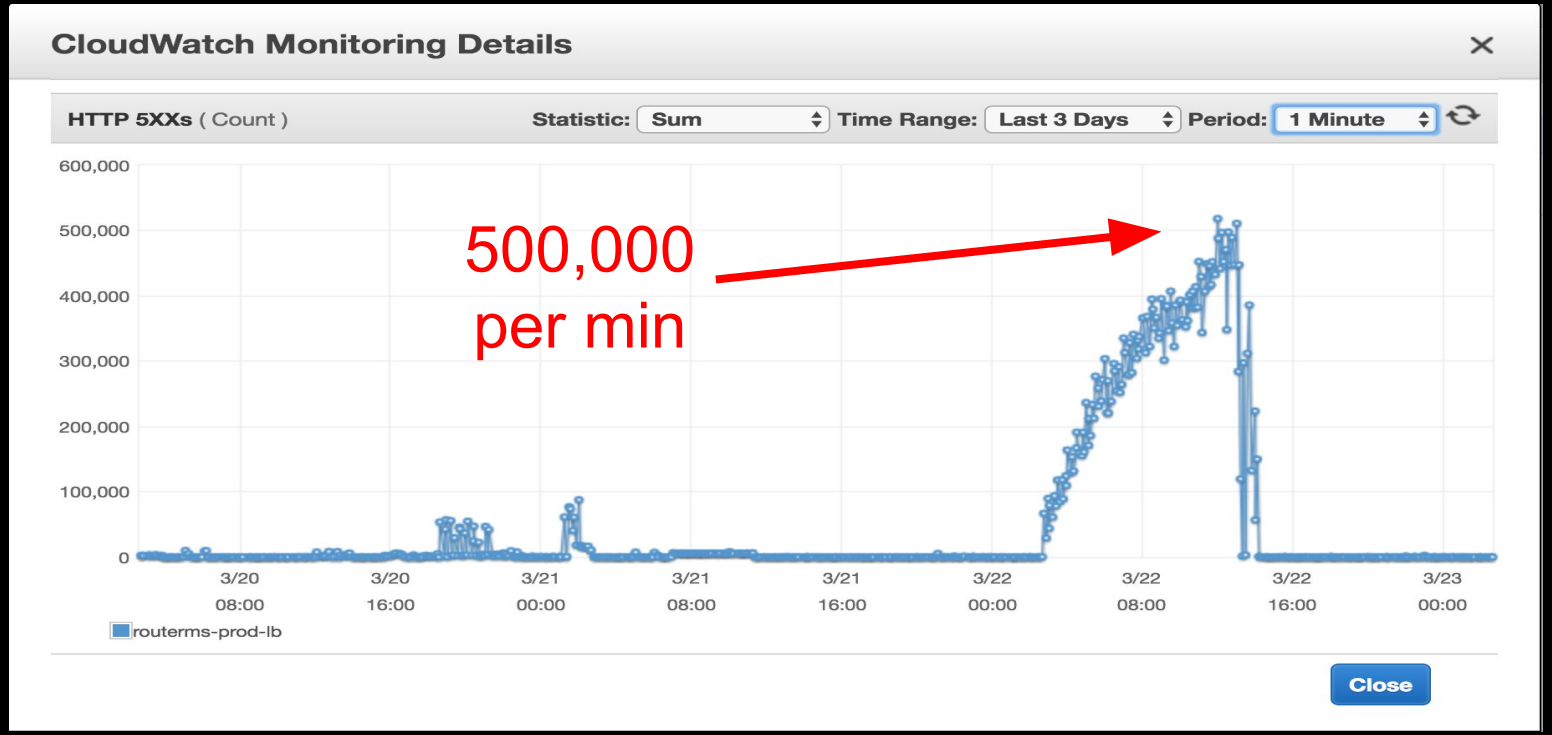


Areas of Improvement

- Deployments
- Wants...
  - Self-service routing
  - Circuit breaking
  - Retries
  - Blue / green, canary

- Visibility
  - Monitoring - HTTP
  - Alerting
  - Changes

Ugh Oh!


CloudWatch Monitoring Details
HTTP 5XXs (Count)
Statistic: Sum
Time Range: Last 3 Days
Period: 1 Minute
600,000
500,000
400,000
300,000
200,000
100,000
0
500,000
per min
3/20 08:00
3/20 16:00
3/21 00:00
3/21 08:00
3/21 16:00
3/22 00:00
3/22 08:00
3/22 16:00
3/23 00:00
routerms-prod-lb
Close

Istio

Why Istio?

- Single platform for many tools
- Significantly less code to write
- Enterprise support and testing
- Cloud agnostic
- Cloud native

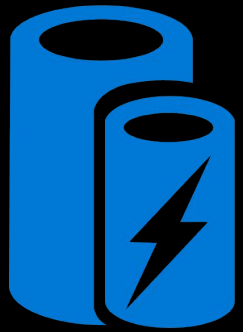
SUN With Istio

Authentication
Authorization

API Key
Management

Sales

Monitoring



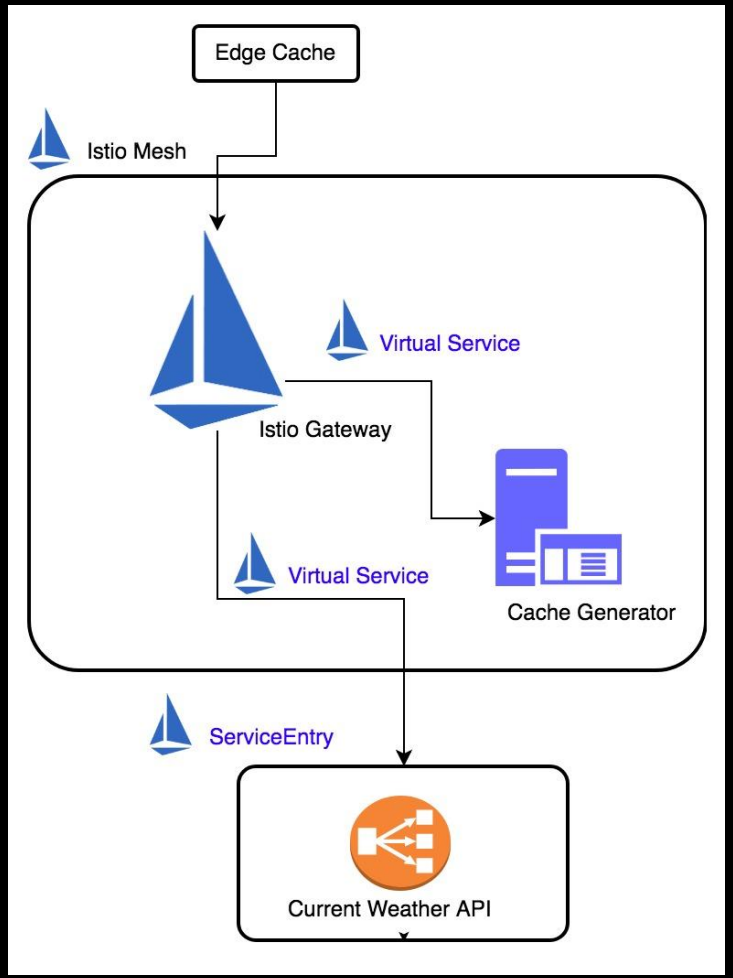
Caching

Routing

Billing

Routing

(0.8.0)



Client Request

```
/v3/wx/observations/current?...
```

Cache Template Example (Edge side include)

```
<esi:try>
<esi:attempt>
  <esi:include
src="/origin/v3/wx/observations/current?..."  />
</esi:attempt>
</esi:try>
```

Service Entry


```
apiVersion: networking.istio.io/v1alpha3
kind: ServiceEntry
metadata:
 name: current-weather
spec:
 hosts:
 - current-weather.internal-weather.com
 ports:
 - number: 80
   protocol: http
   name: http
 discovery: 2
```

- 40 service entries
- Dynamically updateable
- Can use mTLS

Gateways

```yaml
apiVersion: networking.istio.io/v1alpha3
kind: Gateway
metadata:
 name: istio-ingressgateway
 namespace: istio-system
spec:
 selector:
   istio: ingressgateway
 servers:
 - port:
     number: 80
     name: http
     protocol: HTTP
   hosts:
   - api.weather.com
```

- Can have n number of Gateways
- Same control plane
- Ingress and Egress

Routing - Cache Intercept


```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
 name: current-weather-cache
spec:
 gateways:
 - istio-ingress
 hosts:
 - api.weather.com
 http:
 - route:
   - destination:
       name: cache-generator
  - match:
   - uri:
       exact: /v3/wx/observations/current
```

- Virtual service is new route rule
- Dynamically updateable
- Gateway selector

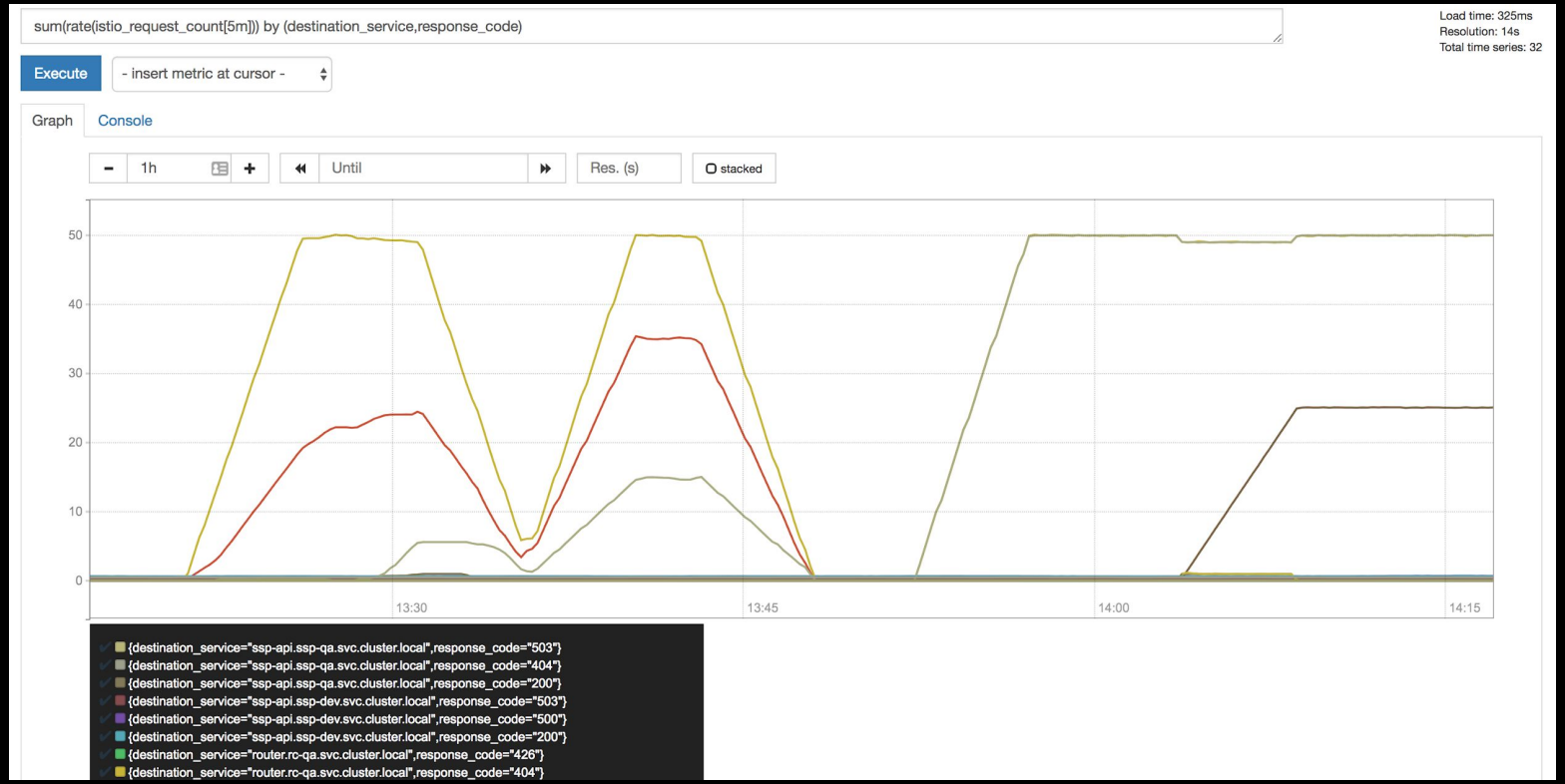
Routing - Data API


```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
 name: current-weather
spec:
 gateways:
 - istio-ingress
 hosts:
 - api.weather.com
 http:
 - route:
   - destination:
       name: current-weather
  - match:
   - uri:
       exact: /origin/v3/wx/observations/current
   rewrite:
     uri: /v3/wx/observations/current
```

- Individual timeouts
- Route specific
  - Retries
  - Destination Weights

Monitoring

Monitoring


sum(rate(istio_request_count[5m])) by (destination_service,response_code)
Load time: 325ms
Resolution: 14s
Total time series: 32
Execute
- insert metric at cursor -
Graph
Console
1h
Until
Res. (s)
stacked
50
40
30
20
10
0
13:30
13:45
14:00
14:15
{destination_service="ssp-api.ssp-qa.svc.cluster.local",response_code="503"}
{destination_service="ssp-api.ssp-qa.svc.cluster.local",response_code="404"}
{destination_service="ssp-api.ssp-qa.svc.cluster.local",response_code="200"}
{destination_service="ssp-api.ssp-dev.svc.cluster.local",response_code="503"}
{destination_service="ssp-api.ssp-dev.svc.cluster.local",response_code="500"}
{destination_service="ssp-api.ssp-dev.svc.cluster.local",response_code="200"}
{destination_service="router.rc-qa.svc.cluster.local",response_code="426"}
{destination_service="router.rc-qa.svc.cluster.local",response_code="404"}

Monitoring

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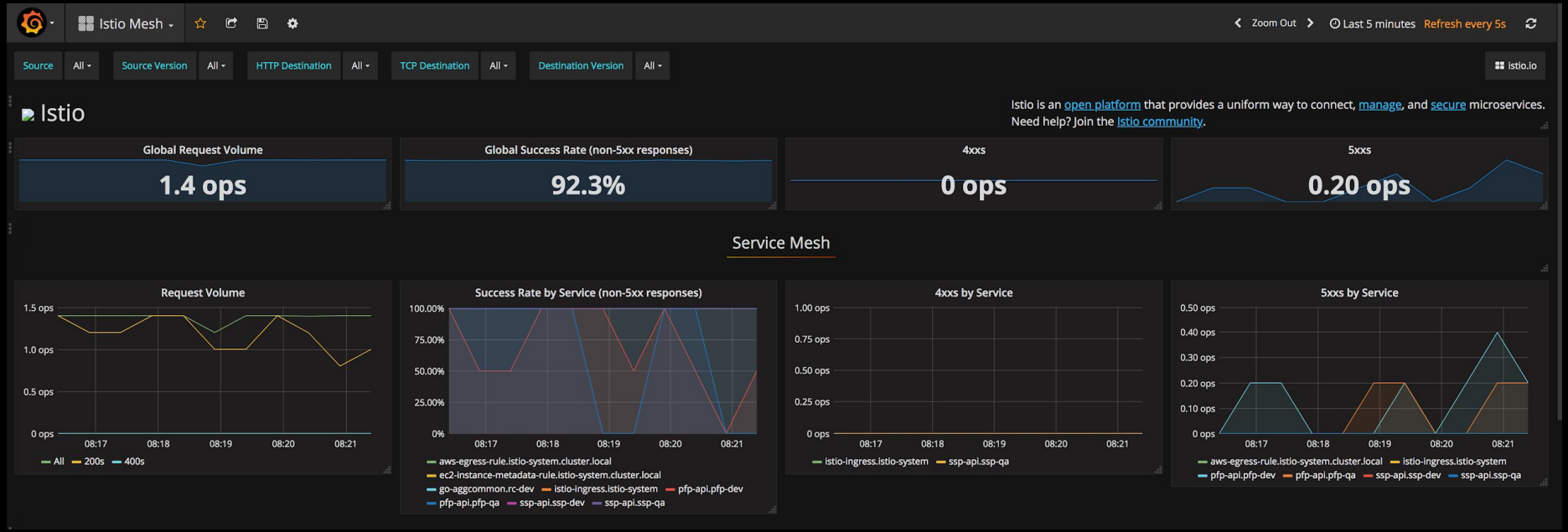

#Vistio

Where are we today?

- Using Istio 8 months
- api.weather.com not in production yet
- Some smaller APIs using Istio in production
- Actively working on 0.8.0 support

Using Istio

- Start small
- Sidecars are difficult at times
- Upgrades have to be tightly managed
- Stability is coming!

Recap

- Istio allows us to …
  - Resolve issues faster
  - Mitigate backend issues
  - Be more transparent
  - Reduce use of custom code
  - Make route changes at will

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Thanks!