

Real-time Server Telemetry

The downfall of logging and rise of data
pipelines.

STeve Shary
github.com/STeveShary
stevesmashcode.com
linkedin.com/in/stephenshary

Myself

- Technical Lead
- Kroger Customer Facing Website
- Full-stack Web Teams
 - 20+ teams
 - JVM (Java, Clojure)
 - JS (ES6, ClojureScript)
 - (a bit of GOLANG)

Kroger



2,778

Supermarkets and Multi-
Department Stores

323



Fine Jewelry
Stores



2.3

billion

Kilowatts of
electricity saved

1,387

Supermarket
Fuel Centers



Almost
181

million
Prescriptions
filled



\$109.8

billion

2015 Total Sales

Our Office

- In <https://maps.google.com>
 - Search for “Kroger Technology Center”



What we will Cover

- A failed example of traditional logging
- Products you can buy
- What we do at Kroger Digital

Example:

When things go bump in the night

- Get a text
 - From: Boss “Can you look at production?”
- You check your email
 - Kind of incoherent
 - Very unhappy
- What do you do?

Option 1: Maybe they're Crazy.

- Check the webpage.

The screenshot shows the HealthCare.gov homepage. At the top, there's a navigation bar with links for 'Learn', 'Get Insurance', 'Log in', and 'Español'. Below this is a secondary navigation bar with links for 'Individuals & Families', 'Small Businesses', and 'All Topics'. There's also a search bar with a 'SEARCH' button. The main content area features a large, bold message: 'The System is down at the moment.' followed by the subtext: 'We're working to resolve the issue as soon as possible. Please try again later.' At the bottom of the page, there's a footer with contact information: 'Please include the reference ID below if you wish to contact us at 1-800-318-2596' and 'Error from: https://www.healthcare.gov/marketplace/global/en_US/registration% Reference ID: 0.cdc7c117.1380633115.2739dce8'

Option 2: Maybe There's a problem

- Brilliant idea!
 - Look at the log files

Step 1: Get the files

- You don't have access to the box.
 - You can fill out a form and request it
 - 1 hour SLA to handle all SEV-1 requests
- Wait... the file is 3.5Gb!?!
 - I'm on the VPN. That'll take hours
- Ok, Let's just look at the files on the box.

Step 2: Look at the log file.

- Ok.... Still 3.5 GB
- Oh, there's 5 other rolled files
- Most common editor on the server boxes:
 - Notepad
 - Vi
- Brilliant idea!
 - Let's tail the logs

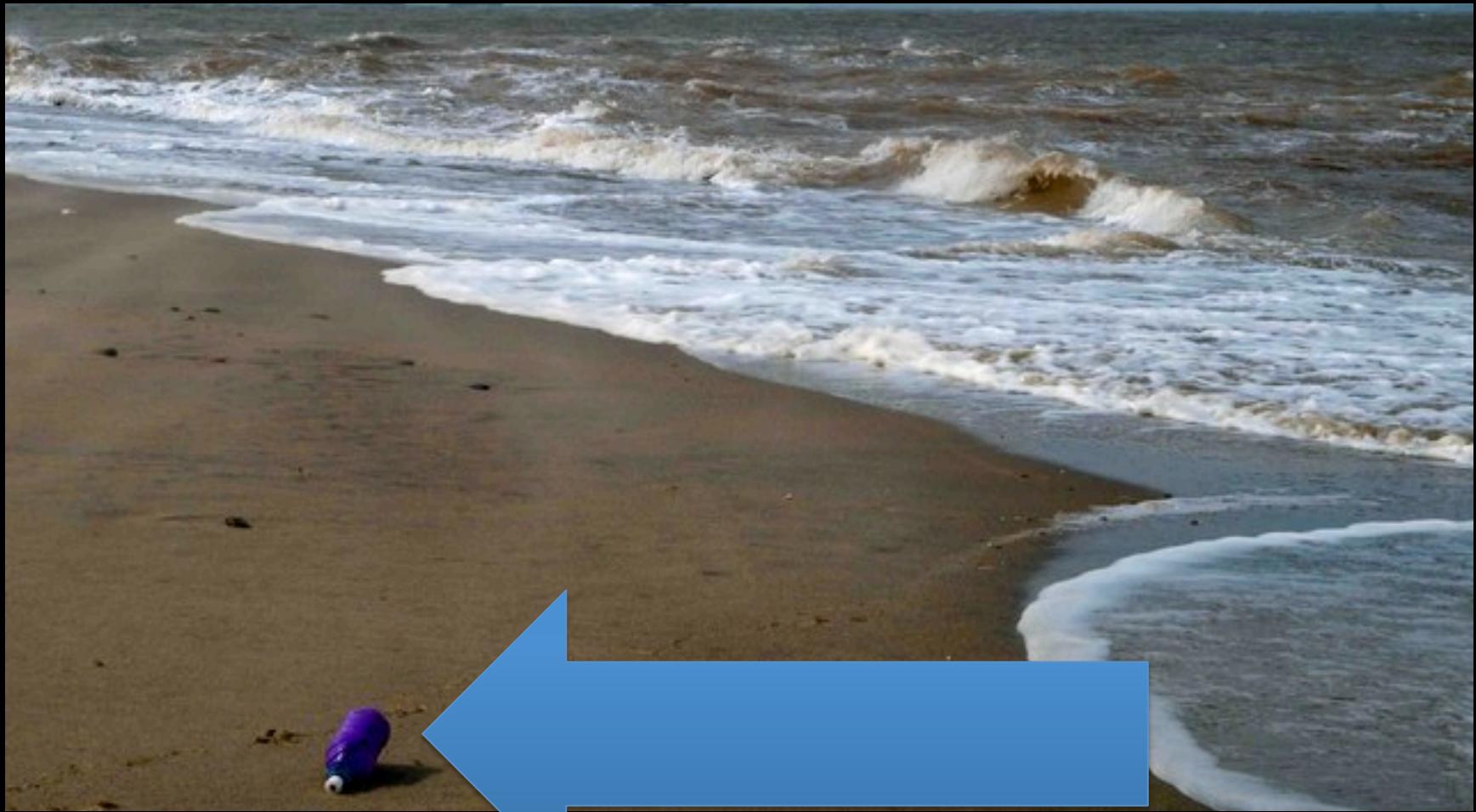
Water, water everywhere...

```
2016-05-03 23:20:03.186 INFO 46126 --- [      Thread-1] c.c.p.component.thing.ComplicatedWidget : Finished widget method.
2016-05-03 23:20:03.186 WARN 46126 --- [      Thread-2] c.c.place.OtherThingThatHasALargerName : Data seems weird...
2016-05-03 23:20:03.186 INFO 46126 --- [      Thread-1] c.c.p.component.thing.ComplicatedWidget : RunningWidget
2016-05-03 23:20:03.186 WARN 46126 --- [      Thread-2] c.c.place.OtherThingThatHasALargerName : [{"_id": "57296274e558bbfa022bb
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riatur officia nulla exercitation minim quis. Nisi officia mollit magna mollit Lorem officia occaecat velit tempor enim velit. Occa
```

That's it!?!

```
2016-05-04 14:48:12.891  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
umberConverter : Value: a1099867 was interpreted as a hex value.  
2016-05-04 14:48:16.894  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
umberConverter : Value: 83803c5c was interpreted as a hex value.  
2016-05-04 14:48:20.898  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
umberConverter : Value: e2cf4a49 was interpreted as a hex value.  
2016-05-04 14:48:24.901  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
umberConverter : Value: c52e728a was interpreted as a hex value.  
2016-05-04 14:48:28.903  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
umberConverter : Value: 36f95e55 was interpreted as a hex value.  
2016-05-04 14:48:32.908  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
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2016-05-04 14:48:36.912  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
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2016-05-04 14:48:40.915  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
umberConverter : Value: 5ca1b18b was interpreted as a hex value.  
2016-05-04 14:48:44.917  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
umberConverter : Value: b6c1f254 was interpreted as a hex value.  
2016-05-04 14:48:48.922  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
umberConverter : Value: 9f234109 was interpreted as a hex value.  
2016-05-04 14:48:52.927  WARN 54279 --- [      Thread-1] c.c.p.component.thin.N  
umberConverter : Value: 10c51459 was interpreted as a hex value.
```

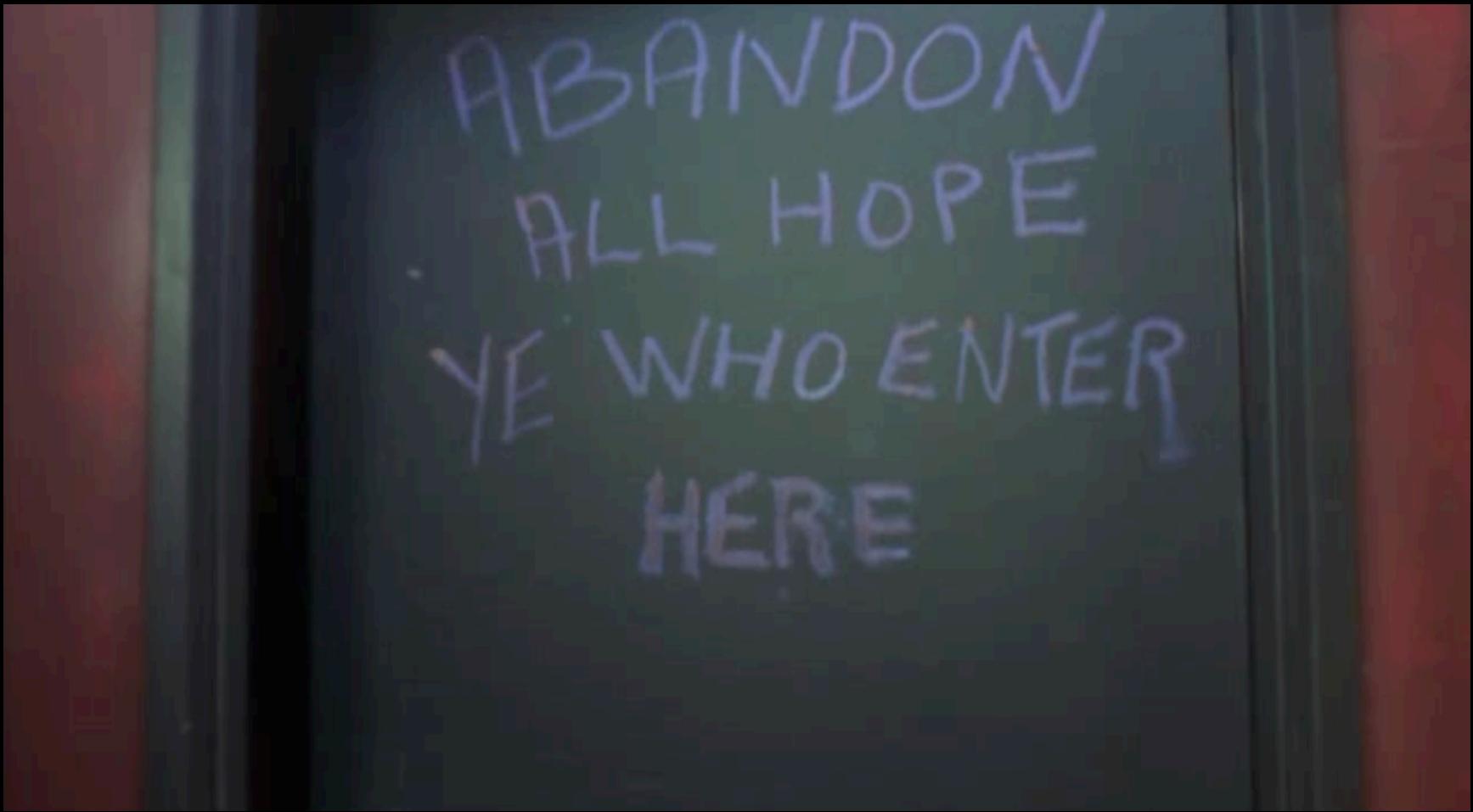
Step 3: You found a message!



Step 3: You found a message!

- Not enough for a diagnosis!
- Problems:
 - A client session is more than one call
 - Downstream systems
 - More than one box

Should we despair?



maybe....

You need the right tool for the
problem.

What should a solution do?

- Centralize diagnostics
- Separate from application
- Real-time (or close)
- Visualizations
- Drill-down capability
- Alerting

Common terms in this space

- APM
 - (Application Performance Management)
- Synthetic Monitoring
- EUM or RUM
 - (“End User” or “Real User” Monitoring)
- Correlation ID

Commercial Solutions (some)

- APM
 - New Relic
 - AppDynamics
 - Dynatrace

Pros

- Fast to integrate
- Nice user interfaces
- Works with crappy logging
- Standardized data collection

Cons

- Cost
 - Cost is per instance
- “If we ain’t got it, you don’t need it”
- Gets “wonky” with async.
- Most do sampling.

Commercial Solutions (some more)

Logging

- Splunk
- Sumo Logic
- Loggly

Pros

- Nice user interfaces
- You can make your data analysis as fine grained as you want

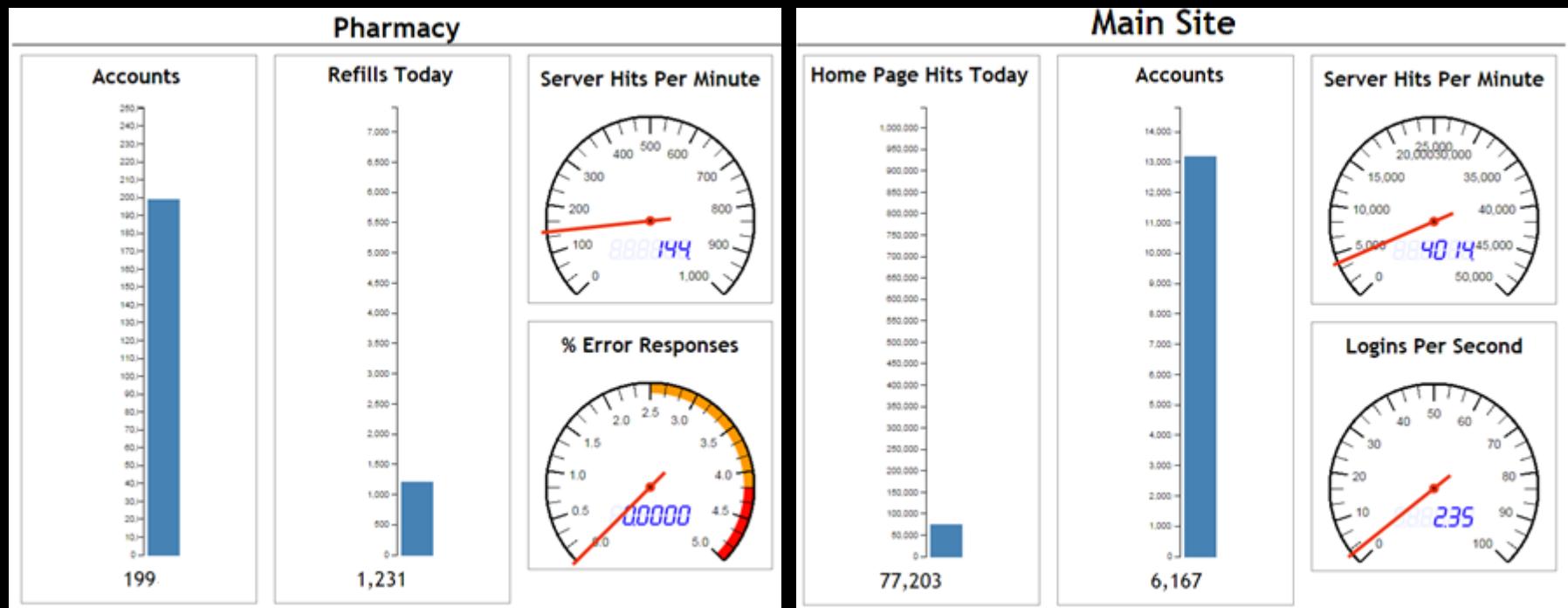
Cons

- You do the integration with logging
- Cost
 - Cost model encourages you to not log!
- Hap-hazard data formats

What we did at Kroger.

- Started with AppDynamics
- Built our own dashboards

Our First Visualization



That Looks Better

Team News

Banner

Pharmacy

List



Banner Accounts

348

Target: 700



Server Hits Per Minute

5,300



Login

Hits per second
2.73

Response Time

230 ms

Error Rate

0.000%

Coupon

Hits per second
2.17

Response Time

102 ms

Error Rate

0.000%

Weekly Ad

Hits per second
0.63

Response Time

54 ms

Error Rate

0.000%

Home Page Hits

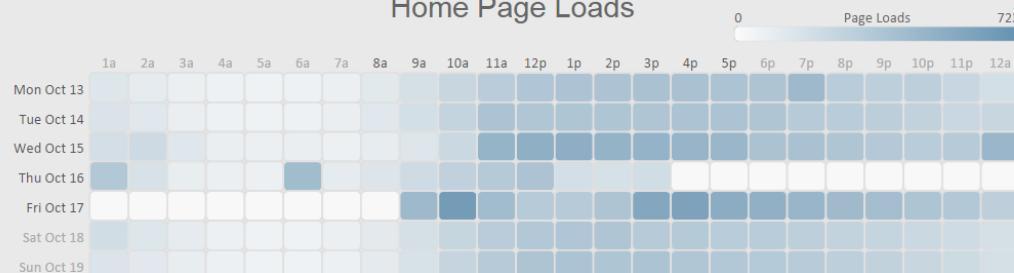
Today

113,875

Past 24 Hours



Home Page Loads



Take it Plaid!

WE'RE GONNA NEED



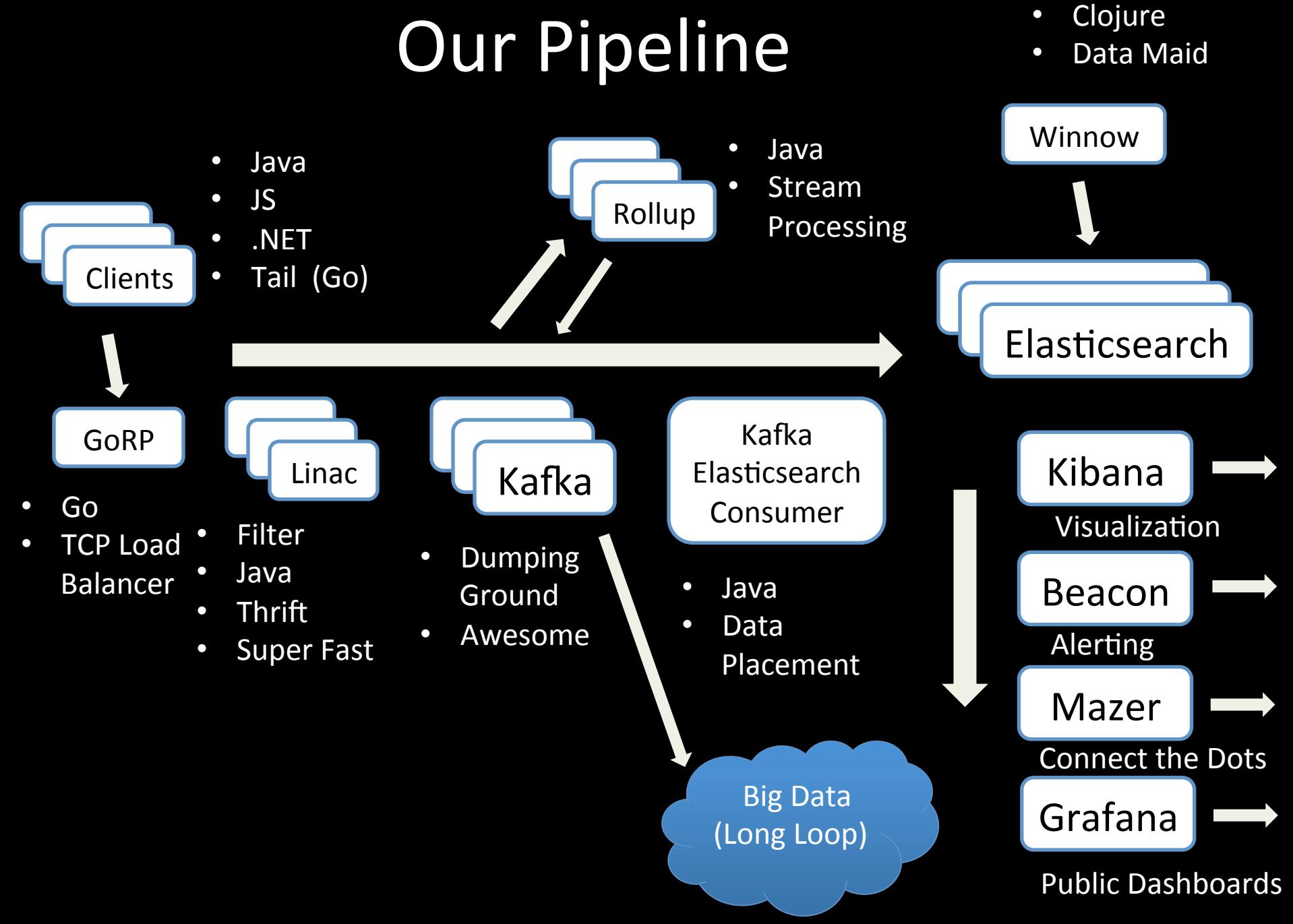
A BIGGER PIPE

memegenerator.net

What we did at Kroger.

- Needed fine grained info for all transactions
- Started with ELK
- Removed Logstash
 - Moved HTTP -> Thrift
 - Added filtering
 - Added Kafka
 - Moving to three tiered visualizations

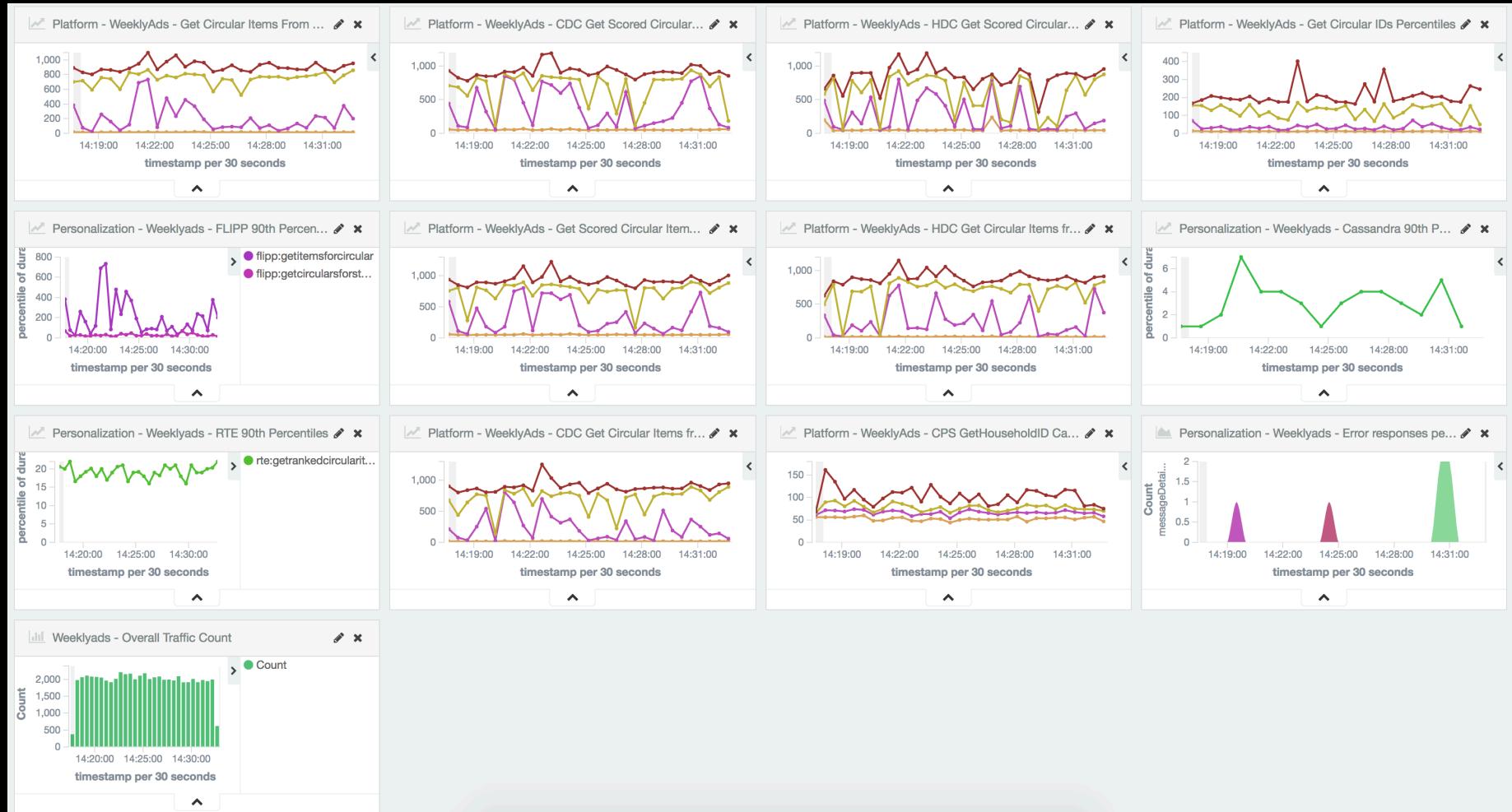
Our Pipeline



Oooh... Pretty.



Graphs Make it Legit.



What we do now.

- We collect > 1TB of data per day
- Collect data from:
 - Apache
 - Nginx
 - Java
 - NodeJS
 - .NET
- Hold data for 10 days
 - Some data held longer

What can we do

- 2 – 10s off real-time
- See a problem about 20 min before it happens.
 - We don't prevent all of our problems
 - Big problems trend
- We can trace down problems to specific users
- We see the problems that affect < 2%
- We see blips (GC)
- It makes us dive deeper

Where we can still struggle

- Consistent logging
- Logging relevant information
- Empowering teams to use their data
- What time is it?

Where to start?

- Push your logs somewhere
- Do simple aggregation
- Make a small visualization
- Try out a commercial vendor

Questions?

Thank You.

- stephen.shary@gmail.com
- github.com/STeveShary
- stevesmashcode.com
- linkedin.com/in/stephenshary