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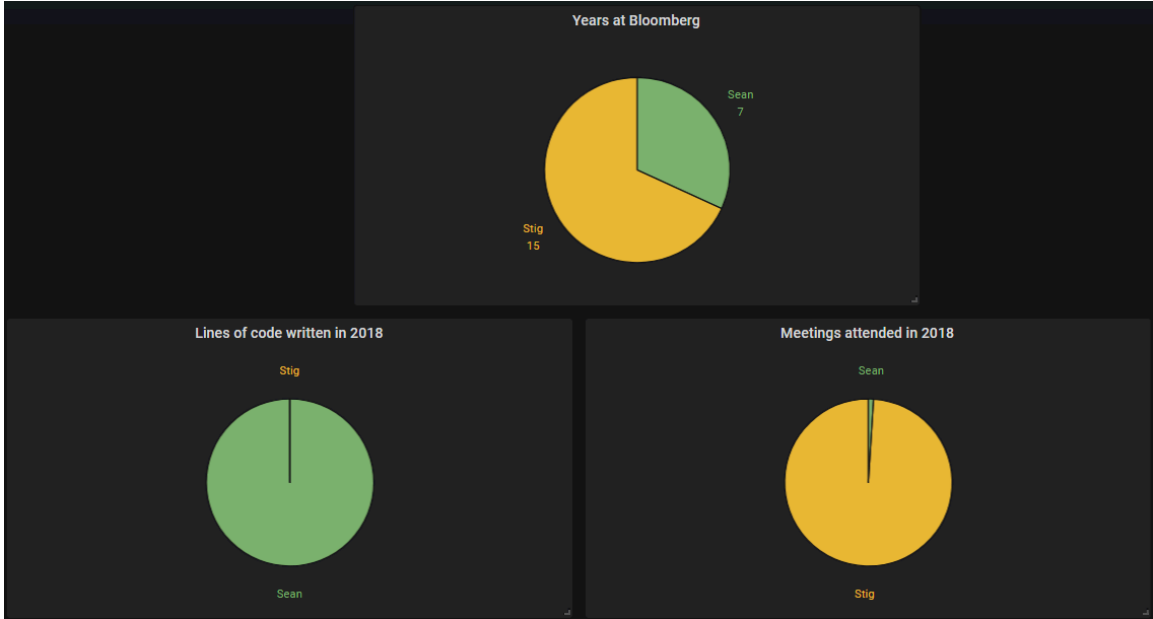
How a centralized Telemetry team drives value @ Bloomberg

GrafanaCon LA 2019
February 25, 2019

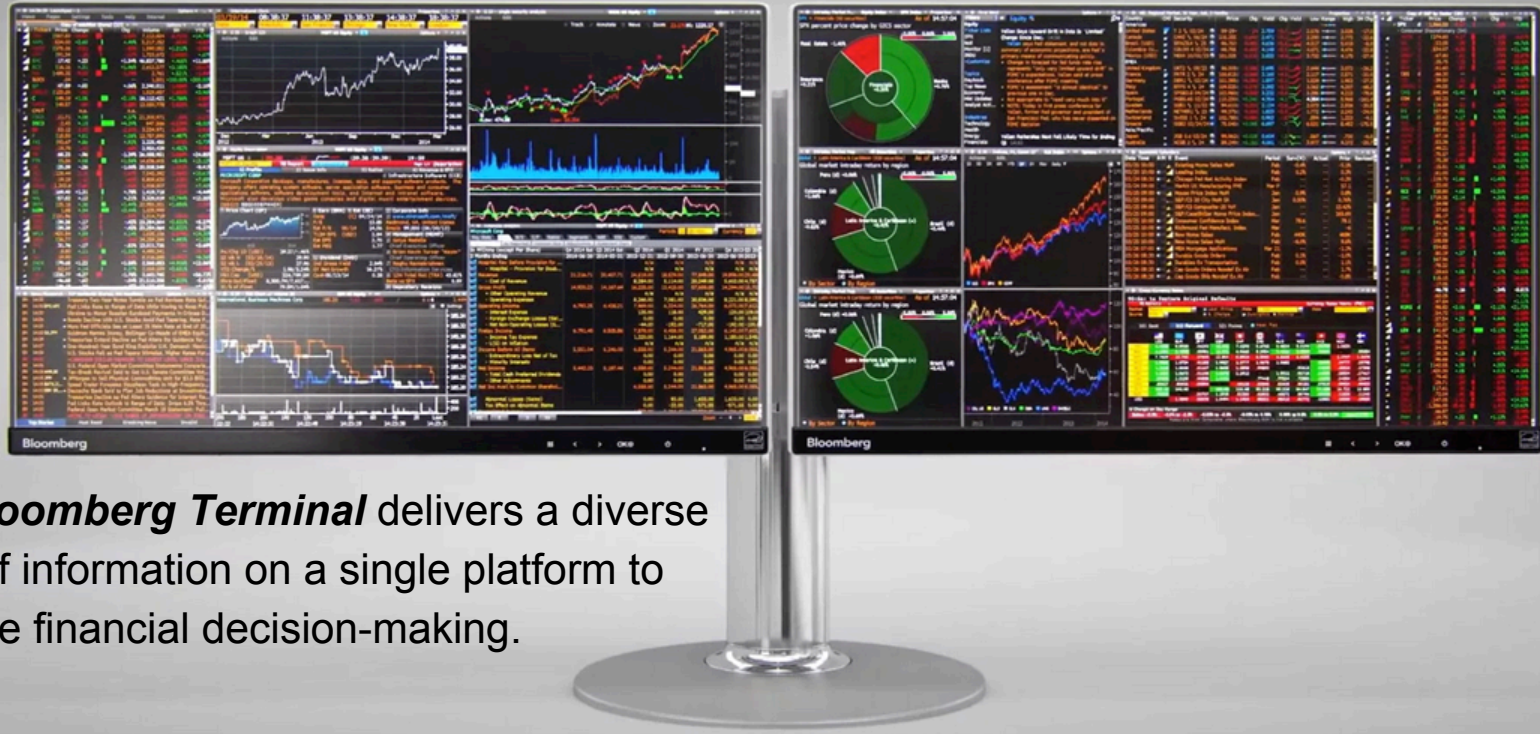
Sean Hanson, Software Developer
Stig Sorensen, Manager Production Visibility

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Sean Hanson and Stig Sorensen



Bloomberg in a Nutshell



The ***Bloomberg Terminal*** delivers a diverse array of information on a single platform to facilitate financial decision-making.

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Bloomberg by the Numbers

- Founded in **1981**
- **325,000+** subscribers in **170 countries**
- Over **19,000 employees** in 192 locations
- **More journalists** than *The New York Times* + *Washington Post* + *Chicago Tribune*

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Bloomberg Technology by the Numbers

- **5,000+** software engineers
- **150+** technologists and data scientists devoted to machine learning
- One of the largest private networks in the world
- **120 billion** pieces of data from the financial markets each day, with a peak of more than 10 million messages/second
- **2 million** news stories ingested / published each day (500+ news stories ingested/second)
- News content from **125K+ sources**
- Over **1 billion** messages and Instant Bloomberg (IB) chats handled daily

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People care when Bloomberg doesn't work



Owen Callan
@OwenCallan



Right now there's a very sad Bloomberg algo that wants to send out a *BLOOMBERG DOWN GLOBALLY* flash headline, but just can't get the irony



Philip O'Sullivan
@pdosullivan

Bloomberg being down has finally made me understand how teenagers feel when Facebook crashes.



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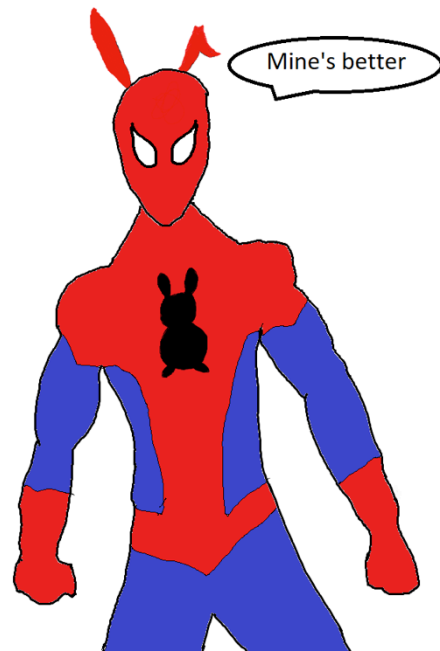
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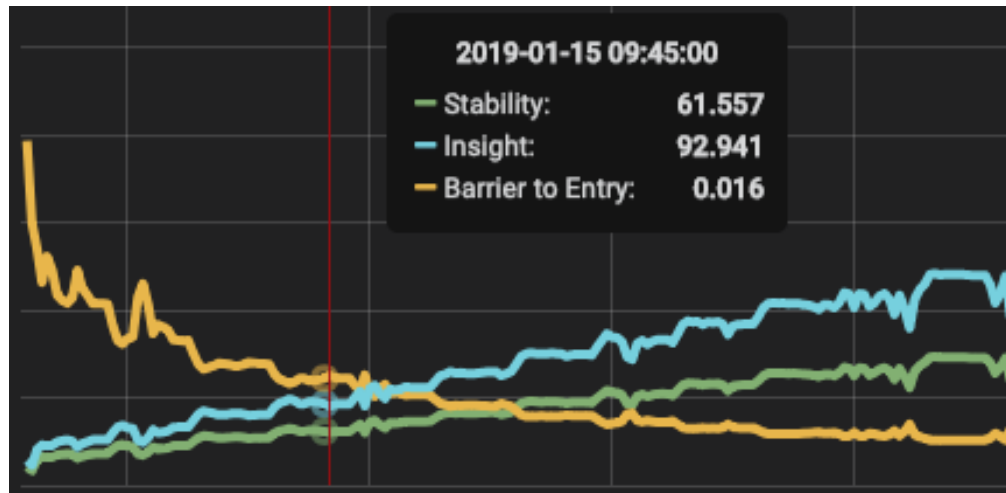
Origin Story

- Common circumstances behind outages
- Multiple teams receive (seemingly) unrelated alerts
- Each team consults different telemetry systems
- Lingers until multiple tickets escalate to “Major Outage”
- Post-mortems create *another* data source

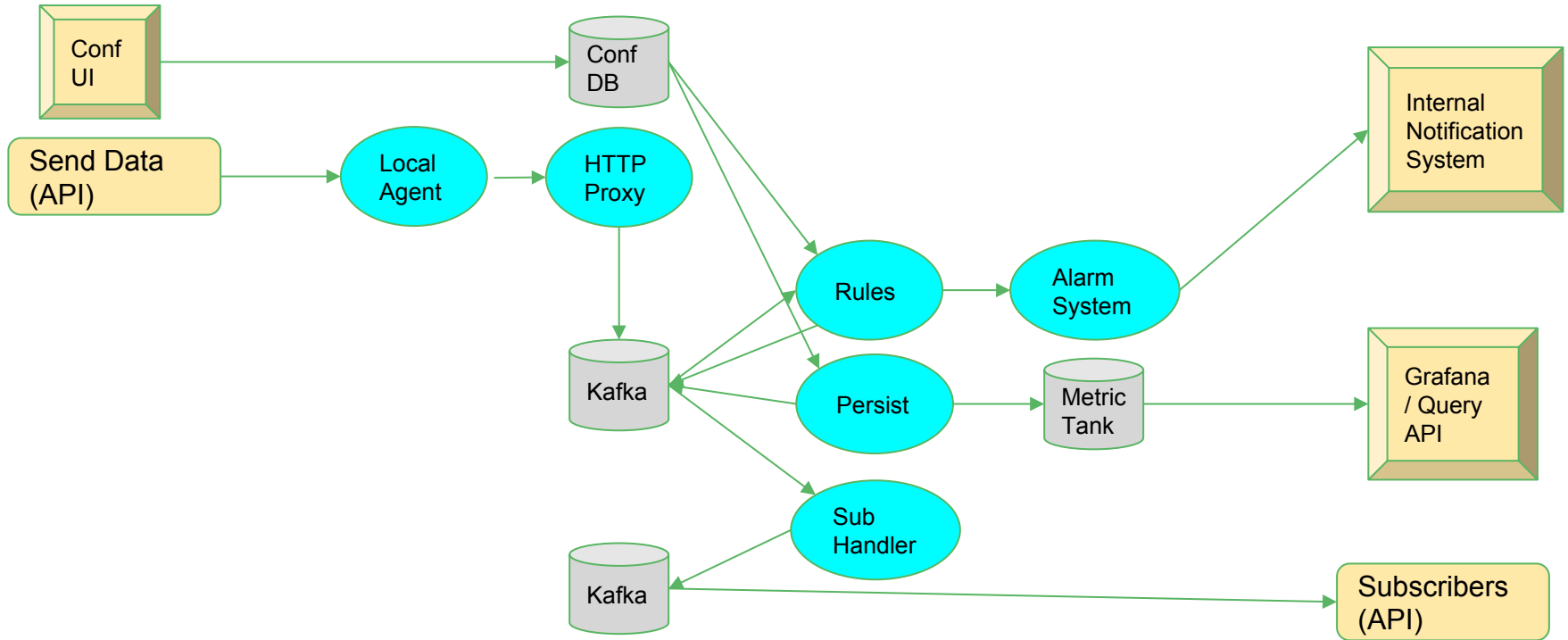


Telemetry team objectives

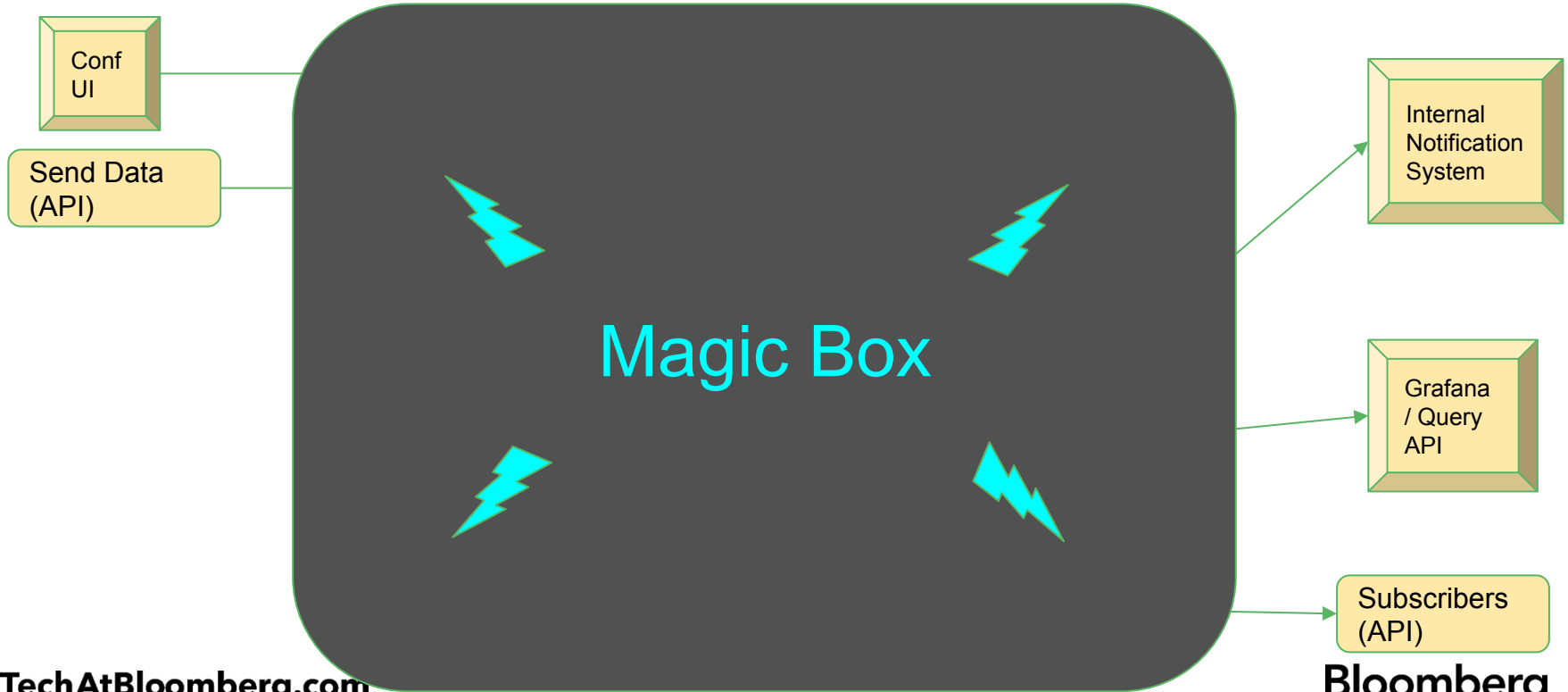
- Boost insights
- Improve stability
- Reduce barrier to entry
- Drive best practices



Internal Architecture (simplified)



Internal Architecture (simplified)



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Boost Insight

- Collect “free” metrics
 - OS metrics
 - Common frameworks / infrastructure
 - Entire process table
- Generic dashboards for these metrics
- High-level system health dashboards
 - Great for project owners and managers
 - Drilldowns for SREs / Devs
- Query API
 - Let users extract their own insights

Improve Stability

- Machines monitored from creation
 - Even the machine creation process can publish metrics!
- Alert on well-known metrics by default
- Common frameworks and infrastructure
 - e.g., Alert on services that *always* have outstanding requests
- Alerts on processes using significant resources
- Unified Alert system
 - One source for configurations
 - Easier to find related alerts
 - Faster root cause analysis

Drive Best Practices

- APIs enforce consistency, while documentation explains
 - When and how to use tags
 - Aggregation vs. sampling
 - Data rollups
- Meet with other teams regularly
 - Really listen to what they need
 - Guide them to solutions
 - Fill in infrastructure gaps where needed

Reduce Barrier to entry

- One source for visualizations
 - Application / System / Infrastructure dashboards all live together
 - Templates for custom dashboards
 - Queries are the same as the programmatic interface
- Simple API for publishing
- Single place for configuring...everything
- Alerts have a consistent look and feel
 - Allows for “reflex” building

Telemetry Status

- Metrics
 - 30K+ monitored machines
 - 5M data points/sec
 - Doubled in 9 months
 - 200M active time series
 - 2,500 metrics rules
- Logs
 - 7M lines/sec (2.5GB/s)
 - 21,000 Log Rules
 - 100 Million regex/sec
 - 40 TB/day persisted
 - Multiple stores
- Grafana
 - 2,000+ unique users a week
 - 3,500+ dashboards in 500+ folders
 - 75 queries/sec

The Cost of “Free”

- Growing dimensionality
- Scaling pains
- Discoverability

Growing Dimensionality

- Users want increased ability to drilldown
- Various frameworks cause “series churn”
 - Kubernetes
 - Hbase
 - Elastic scaling
- More time-series == more RAM

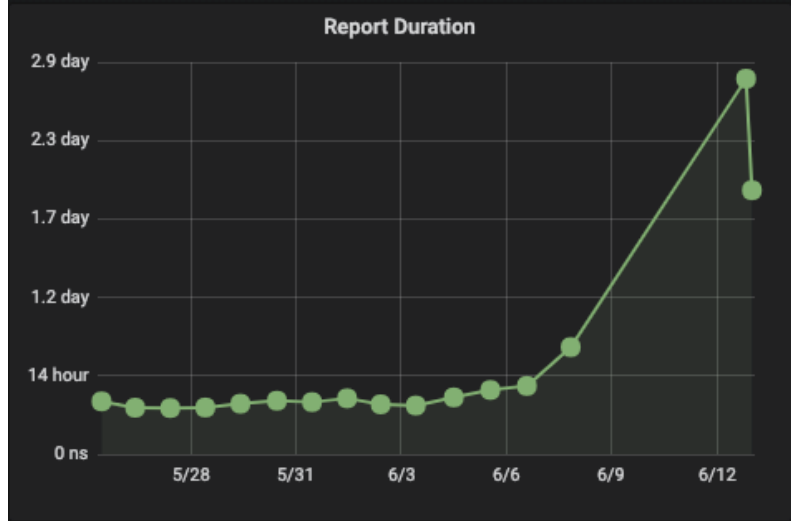
Growing Dimensionality - Solution

- MetricTank allows pattern based retention and pruning rules
- Users pick their flavor
 - Short lived - store more time-series for shorter time
 - Long lived - store fewer time-series for longer time
 - Default - somewhere in between
- Automatically tag data with a policy
 - MetricTank does the rest

Metrics Namespace: bachHbaseRegion	
<div>Create Metric Rule</div> <div>Create Monitored Process Configuration</div> <div>Edit</div> <div>Delete</div>	
Description	HBase Region Metrics
Machines	705
Time Series	7,940,340
Maximum Time Series	12,000,000
Retention Policy ?	<u>Short-lived</u>
Tags	N.A.

Scaling Pains

- MetricTank slowness
- Autocomplete noticeably slow
- Releasing Query API really exposed it
 - Got worse with volume
 - Programs are more sensitive to latency than humans
- One report went from 9 hour runtime to 2 days
 - Oh, and it was a daily report `¯_ (ツ) _/`



Scaling Pains - Solution

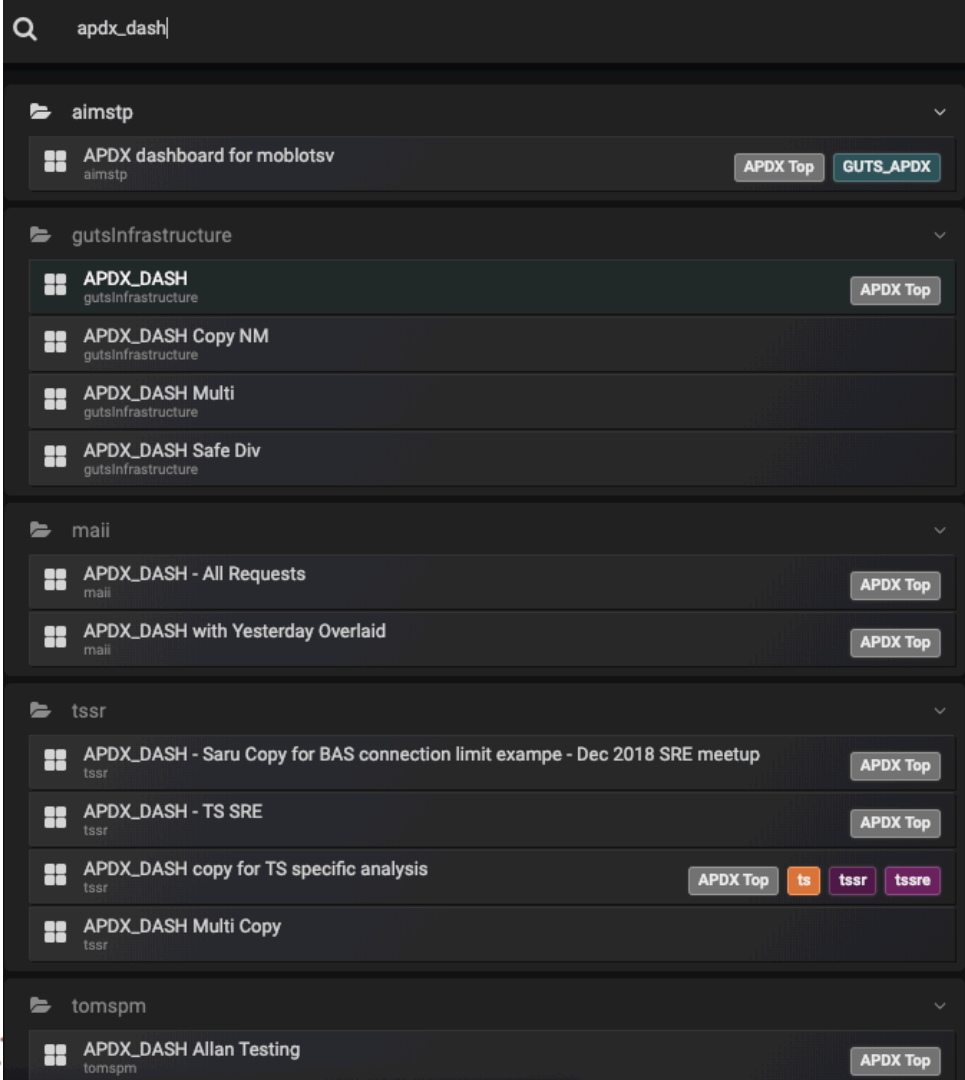
- GC pauses exacerbating a “slowest member” problem
 - We run 120 shard groups with 2 replicas
 - Each render request needed to talk to 119 peers
- Implemented “Speculative Querying”
 - When a slow peer is detected, issue a duplicate query to a replica peer
 - Take the first to respond
 - “Win” rate of 65-75% under normal load
 - P90 render latencies 290ms -> 12ms
- Implemented Graphite functions natively
 - 3x-13x faster than when proxied through Graphite-web
- All users benefit from these enhancements

Discoverability

- 1000s of dashboards from 100s of teams
- Infrastructure dashboards are frequently copied
- The more popular the dashboard, the more copies exist
- Hard to determine if a dashboard already exists
- Coarse permissioning leads to chaos
 - Users overwriting each others' dashboards
 - Almost impossible to control

Discoverability - Solution?

- Folders
 - Folder per team
 - Permissions per folder
- Users can still copy dashboards to their folder
 - Except now, names can be exactly the same :/
- Generic dashboard owners complaining
 - Users are finding the wrong dashboards and complaining

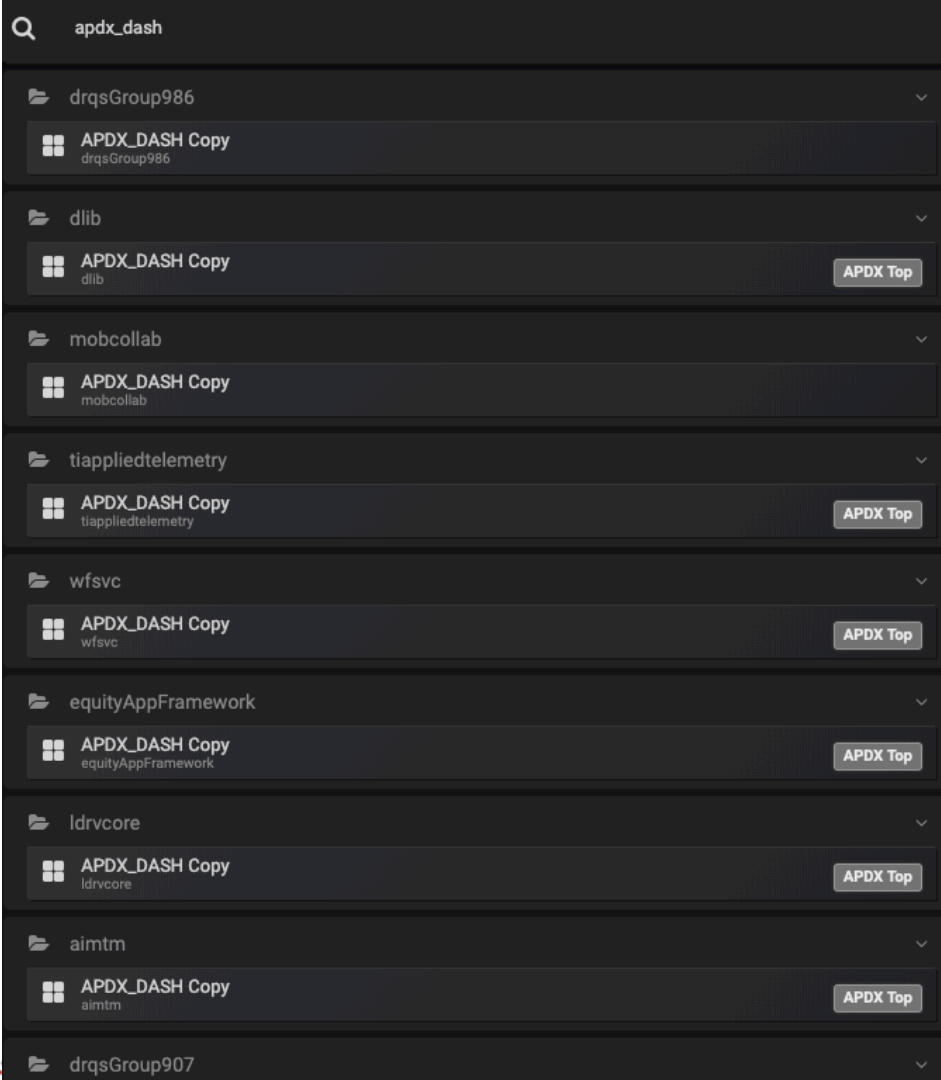


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drqsGroup907

APDX_DASH Copy

drqsGroup907

APDX Top

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amos

APDX_DASH PROSSVC

amos

APDX Top

tscashdb

Casino APDX_DASH Copy

tscashdb

APDX Top

MavCash APDX_DASH Copy

tscashdb

APDX Top

drqsGroup1863

dmuthu POC APDX_DASH Multi Copy

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Discoverability - Possible Solutions

- Enhanced Autocomplete
 - Search for keywords and description
- Non-copyable flags / tags
- Ability to mark a dashboard as “Official”
- Mark a dashboard as “Experimental” too

Summary

- Unifying telemetry across 5K+ engineers is hard
- APIs should guide users to best practices
- Some users love telemetry (too much!)
- Many others see telemetry as a “nice to have”
 - Make it easy to have
 - Better yet, make it free!
- Having the right tools makes things much easier
 - Grafana
 - MetricTank
- Don't be afraid to get your hands dirty!
- Investing in telemetry pays dividends ~(~▼~)

The end...

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