Azure DevOps

Testing in Production

How we fixed New Boards Hub performance in Azure DevOps

Dave Paquette
Principal Software Engineer - Microsoft

Microsoft

PRAIRIE DEV CON

WEB | DEV | CLOUD | AI

NORTHFIELD

Jg Johnston group

Lotlinx

online business systems

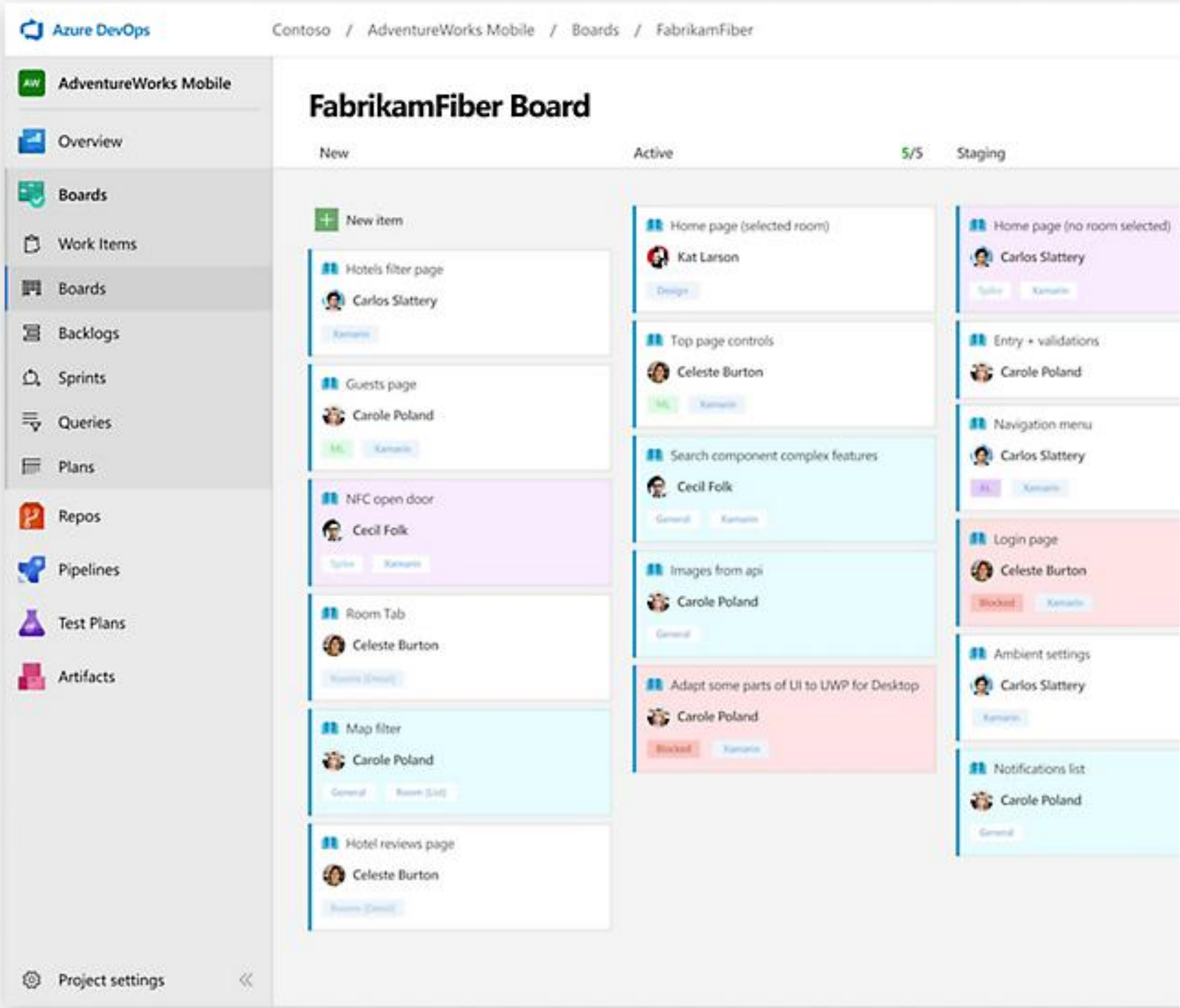
LAMBERT NEMEC GROUP

EXCELLENCE IN RECRUITMENT

CONQUEST

ATLASSIAN

What is Boards?



FabrikamFiber Board

New

- New item
- Hotels filter page, Carlos Slattery
- Guests page, Carole Poland
- NFC open door, Cecil Folk
- Room Tab, Celeste Burton
- Map filter, Carole Poland
- Hotel reviews page, Celeste Burton

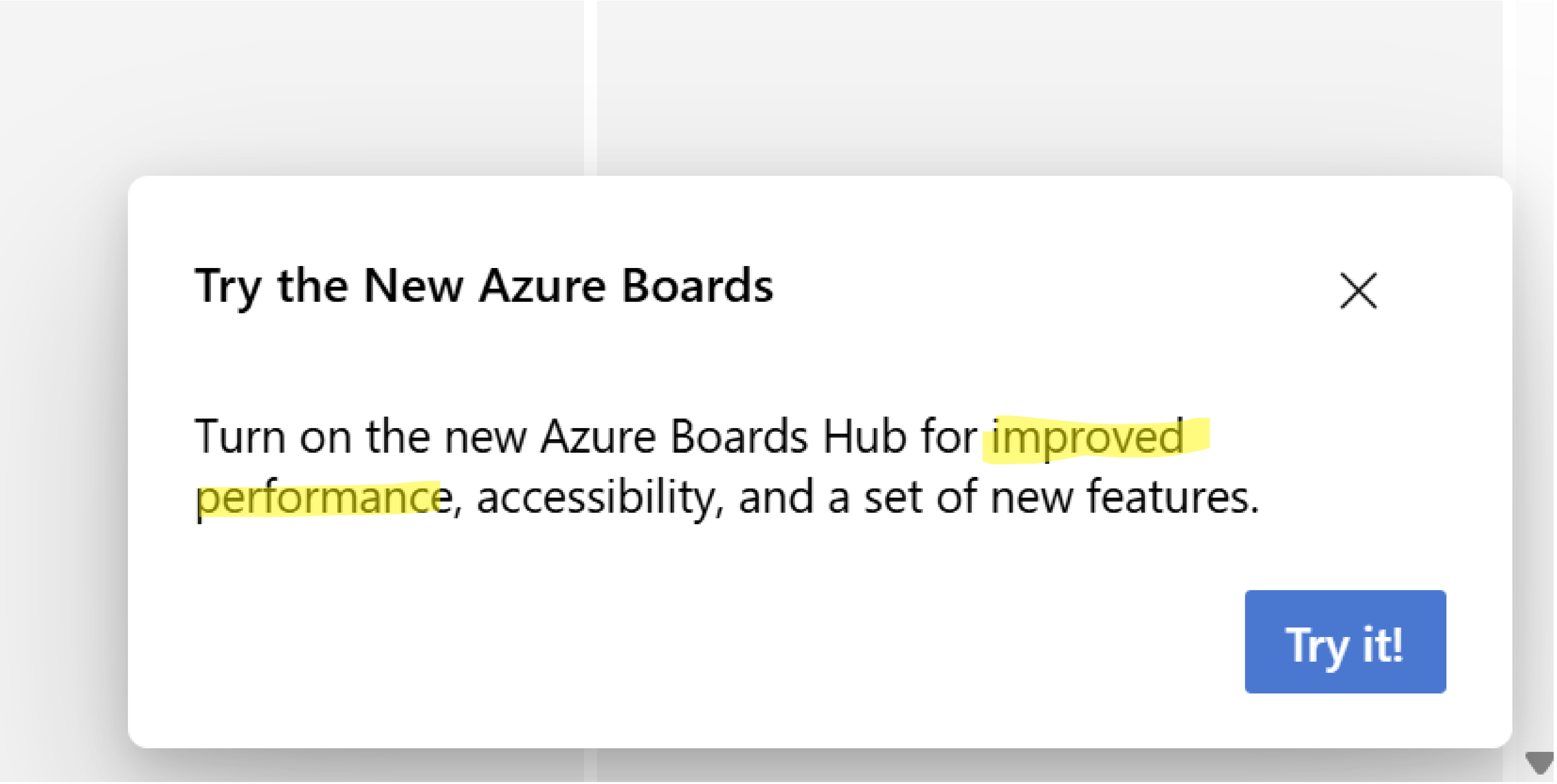
Active 5/5

- Home page (selected room), Kat Larson
- Top page controls, Celeste Burton
- Search component complex features, Cecil Folk
- Images from api, Carole Poland
- Adapt some parts of UI to UWP for Desktop, Carole Poland

Staging

- Home page (no room selected), Carlos Slattery
- Entry + validations, Carole Poland
- Navigation menu, Carlos Slattery
- Login page, Celeste Burton
- Ambient settings, Carlos Slattery
- Notifications list, Carole Poland

Why did New Boards need fixing?



Try the New Azure Boards

Turn on the new Azure Boards Hub for improved performance, accessibility, and a set of new features.

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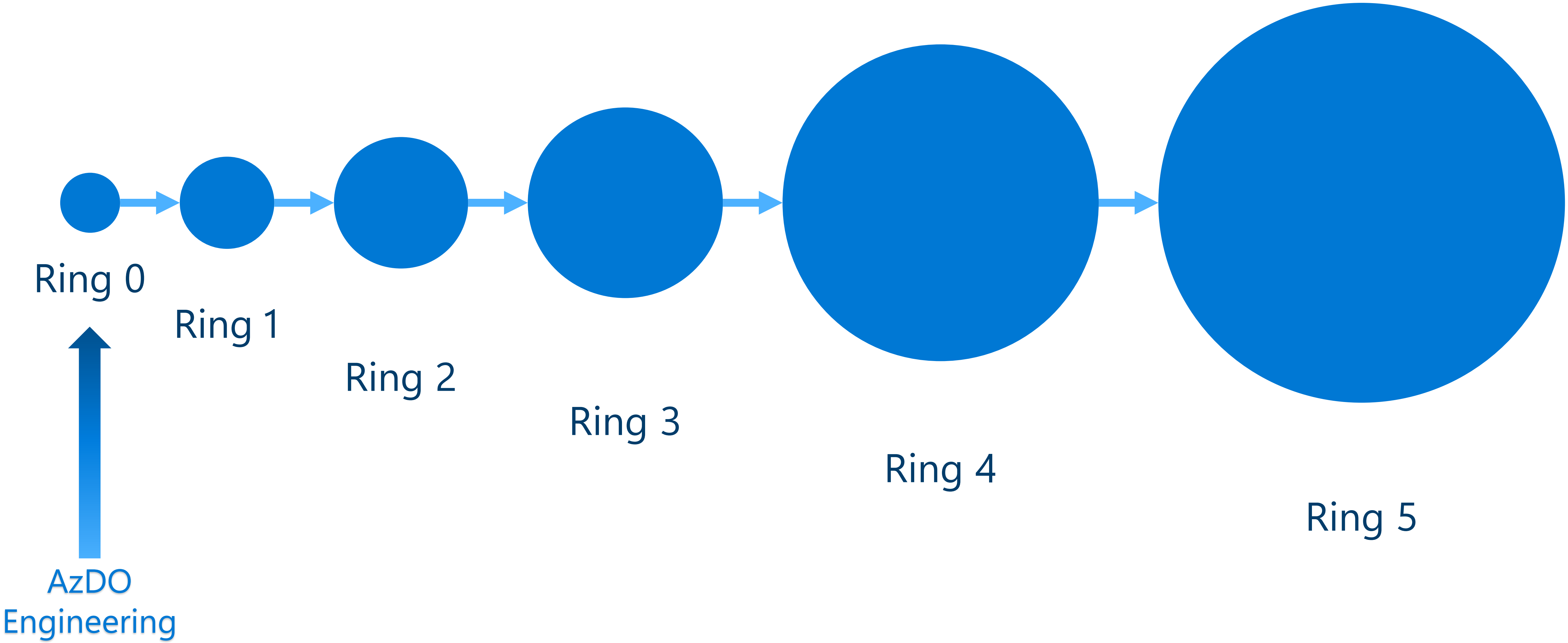
Safe Deployment Practices

- **Safe Deployment through rings**
- Feature Flags
- User Opt-In
- Care about Quality Signals
- Deploy Often (and during work hours)

https://learn.microsoft.com/en-us/devops/operate/safe-deployment-practices

Azure DevOps Deployment Rings



Safe Deployment Practices

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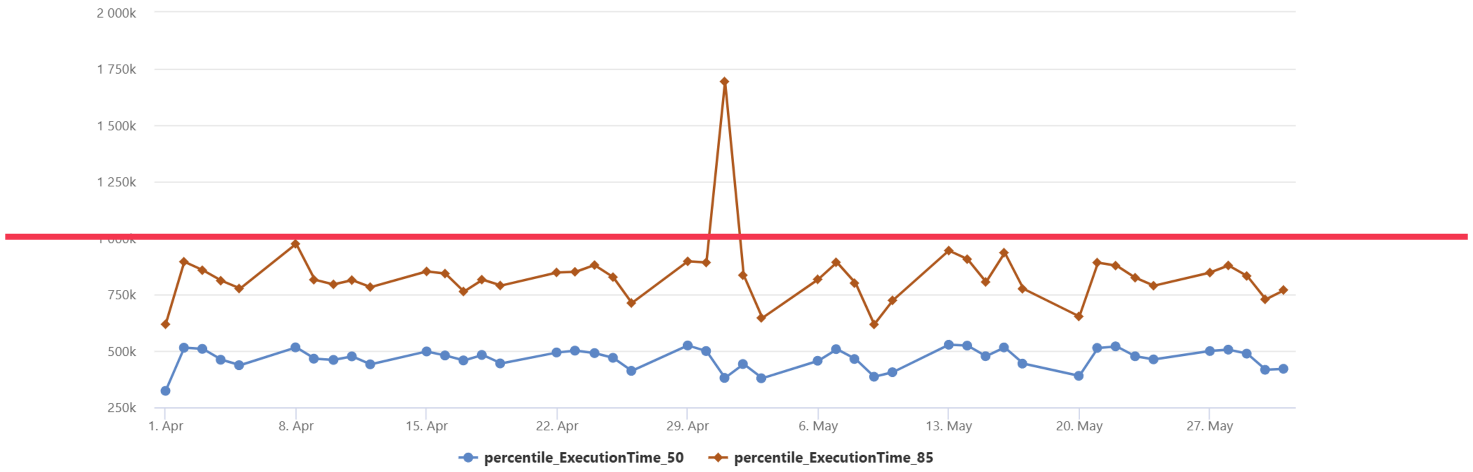
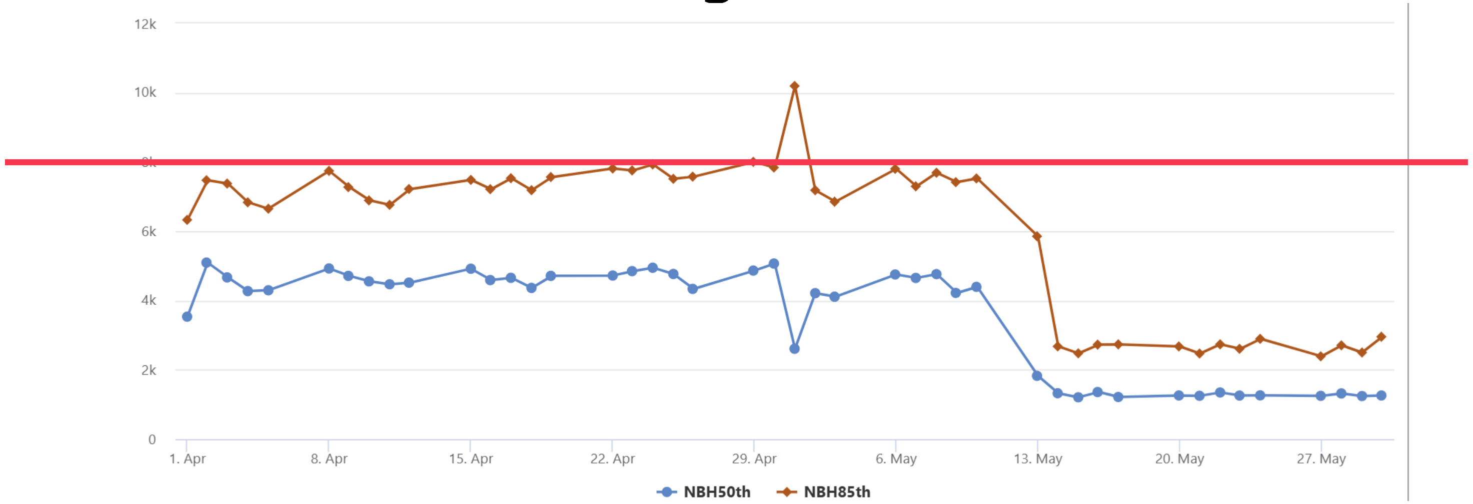
How do we measure performance?

Server Response Time



1 second

Real User Monitoring (RUM)



8 seconds

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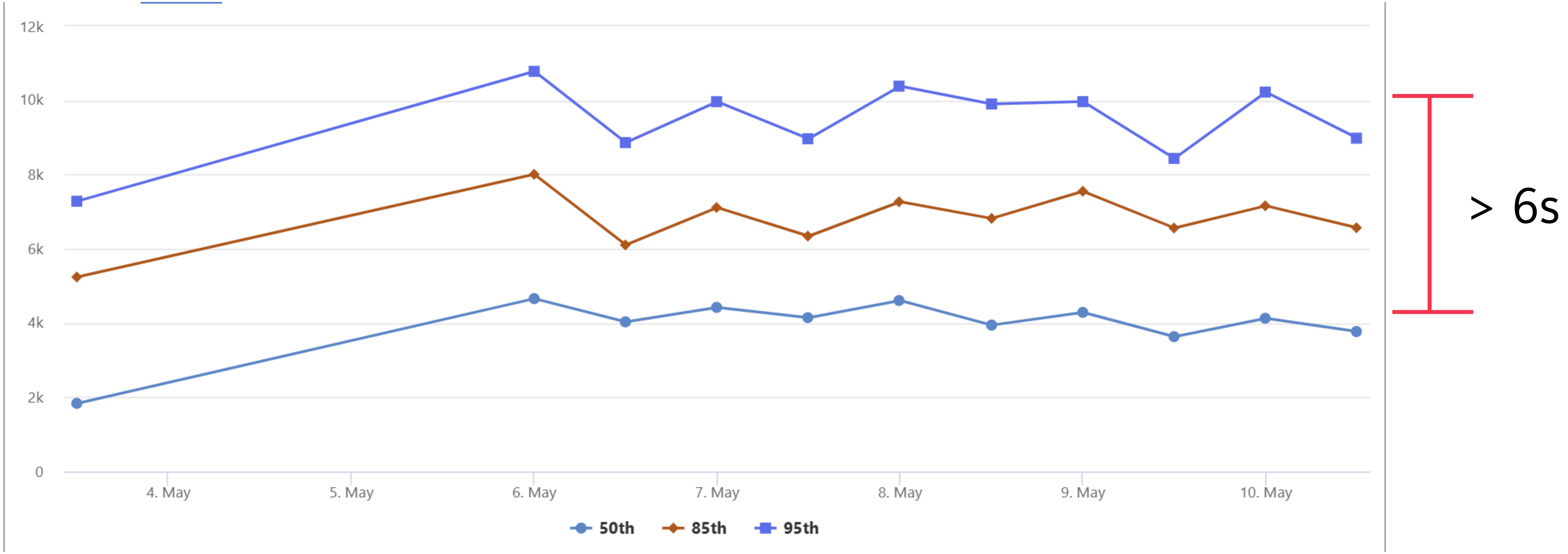
Time to Interactive

But TTI can vary



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Apdex

3 Buckets

- 😍 Satisfied < 1s
- 🙄 Tolerating 1s – 4s
- 😡 Frustrated > 4s

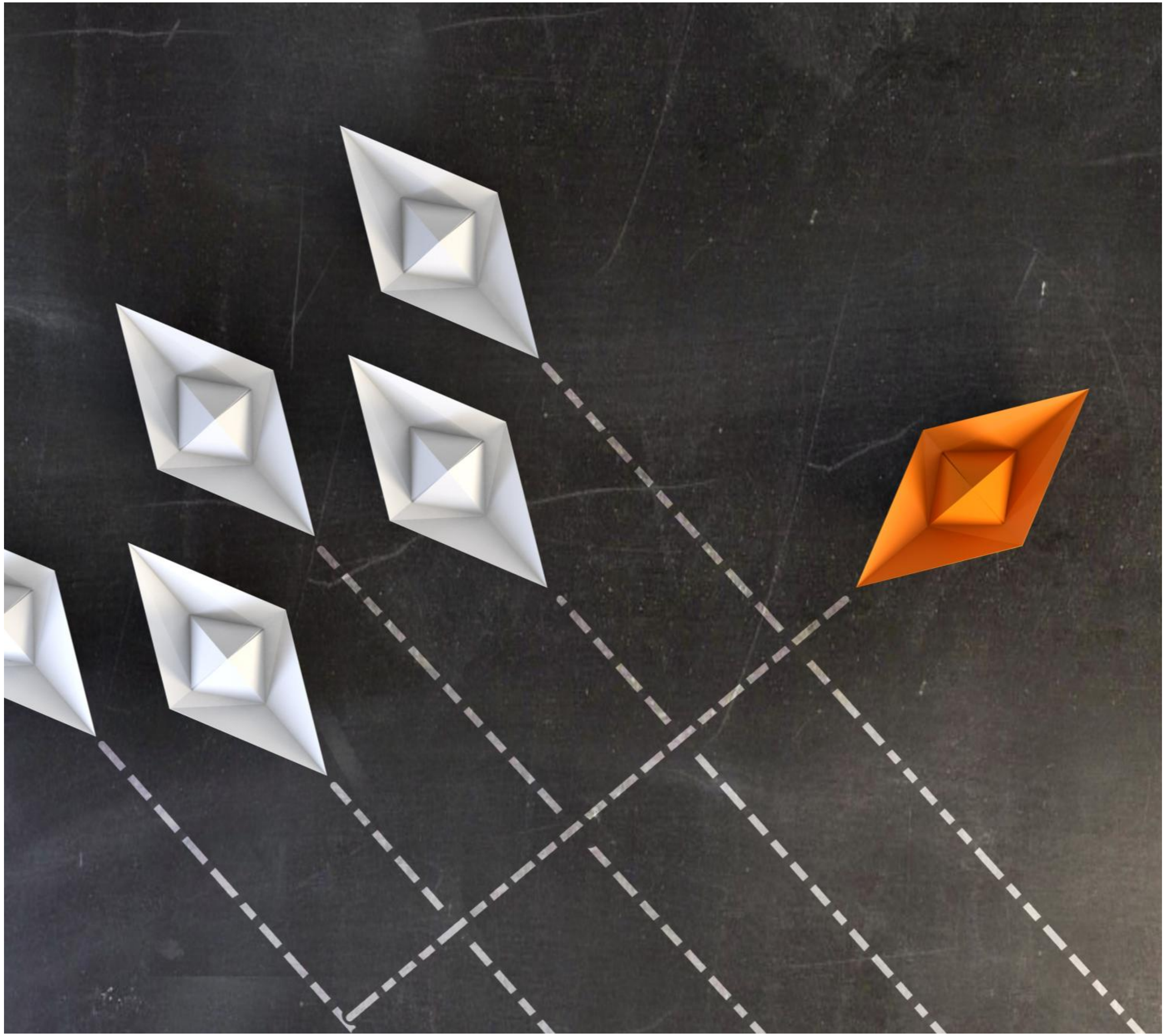
$$Apdex = \frac{😍 + \frac{🙄}{2}}{TotalSamples}$$

What Happened with New Boards?

- Misleading telemetry
- Huge variance depending on data shape
  - Larger customers with biggest perf problems were in later rings
- Works on my machine
- Client-side memory usage was not an area we were considering

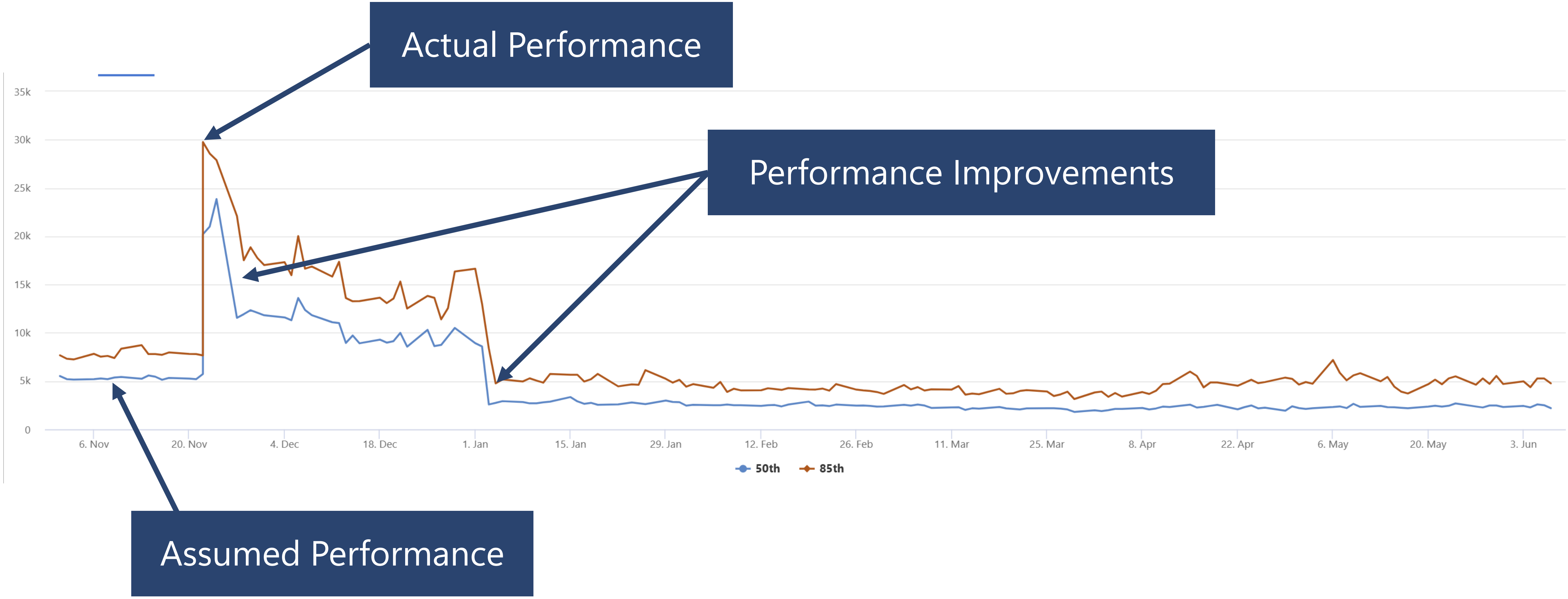
How can we fix this?

Our Strategy



Step 1 – Fix Telemetry and Build Dashboards

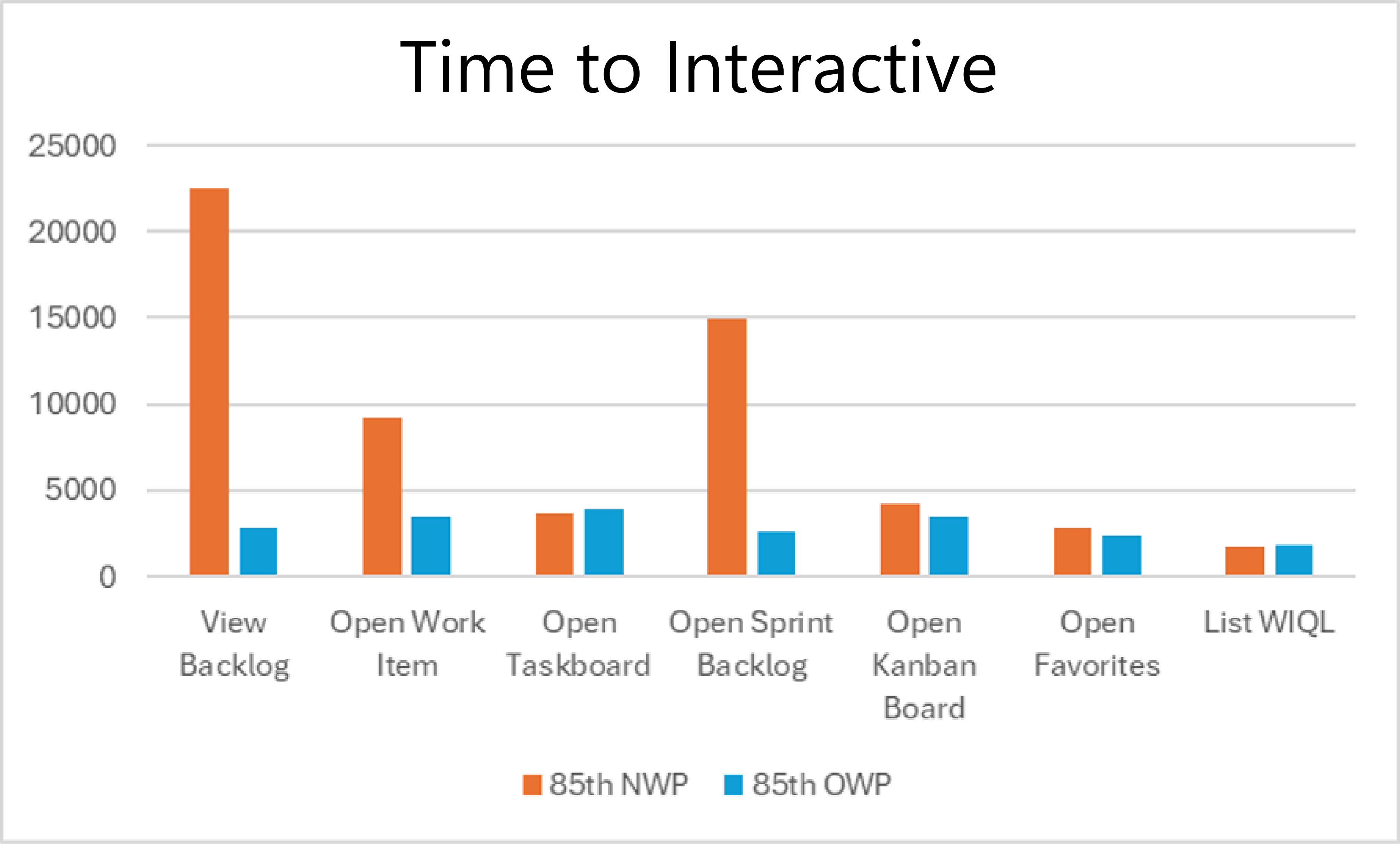
Reviewing TTI markers



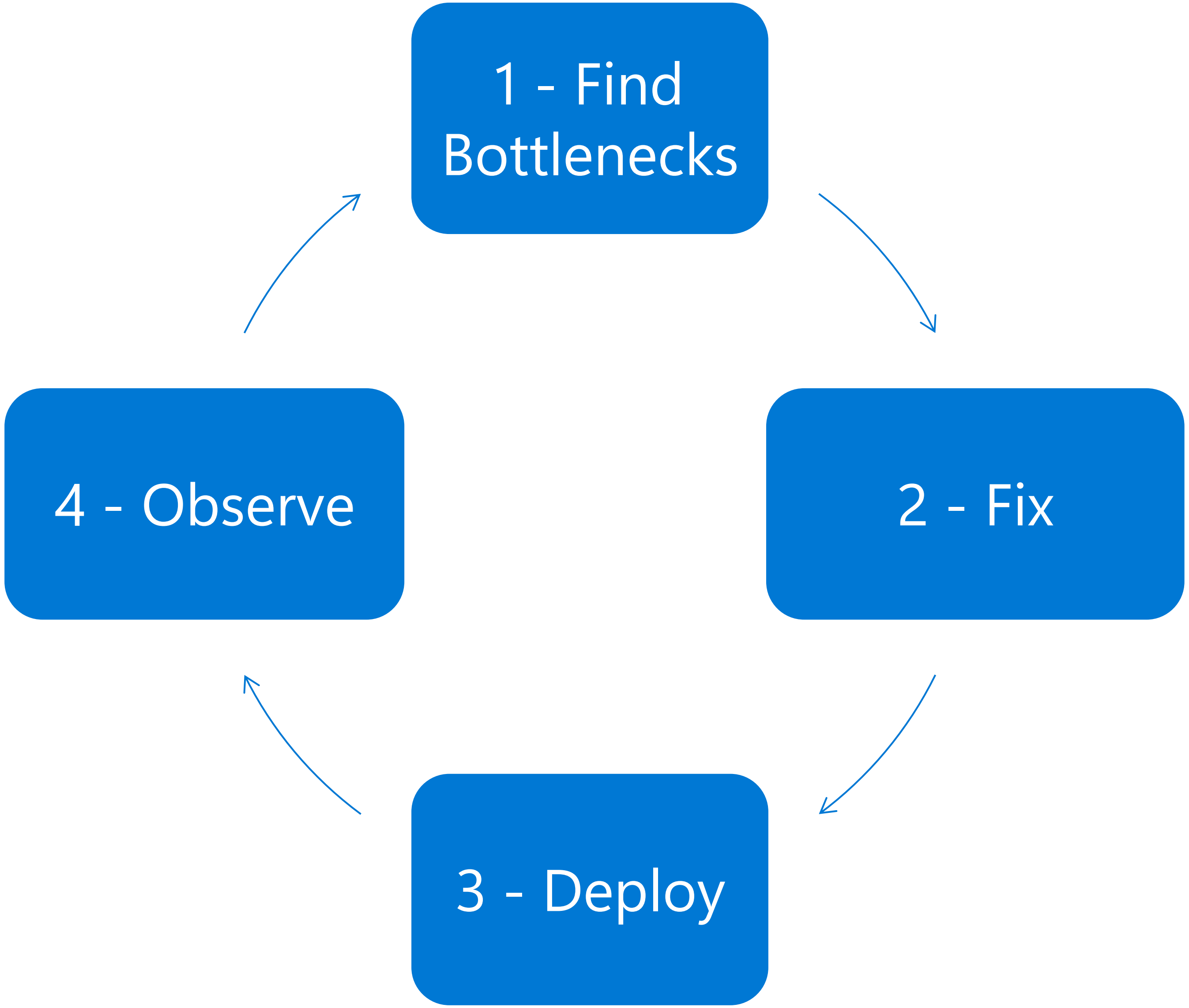
Actual Performance

Performance Improvements

Assumed Performance


Time to Interactive
25000
20000
15000
10000
5000
0
View Backlog
Open Work Item
Open Taskboard
Open Sprint Backlog
Open Kanban Board
Open Favorites
List WIQL
85th NWP
85th OWP

Step 2
Iterative Data Driven Improvements



1 - Find Bottlenecks

2 - Fix

3 - Deploy

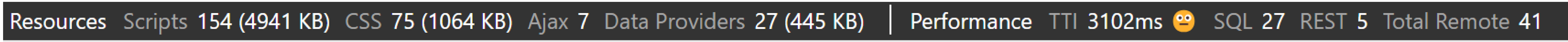
4 - Observe

Finding Bottlenecks

- Telemetry
- Performance Bar
- Browser Dev Tools
  - Network Tools
  - Memory Profiler
  - Performance Profiler

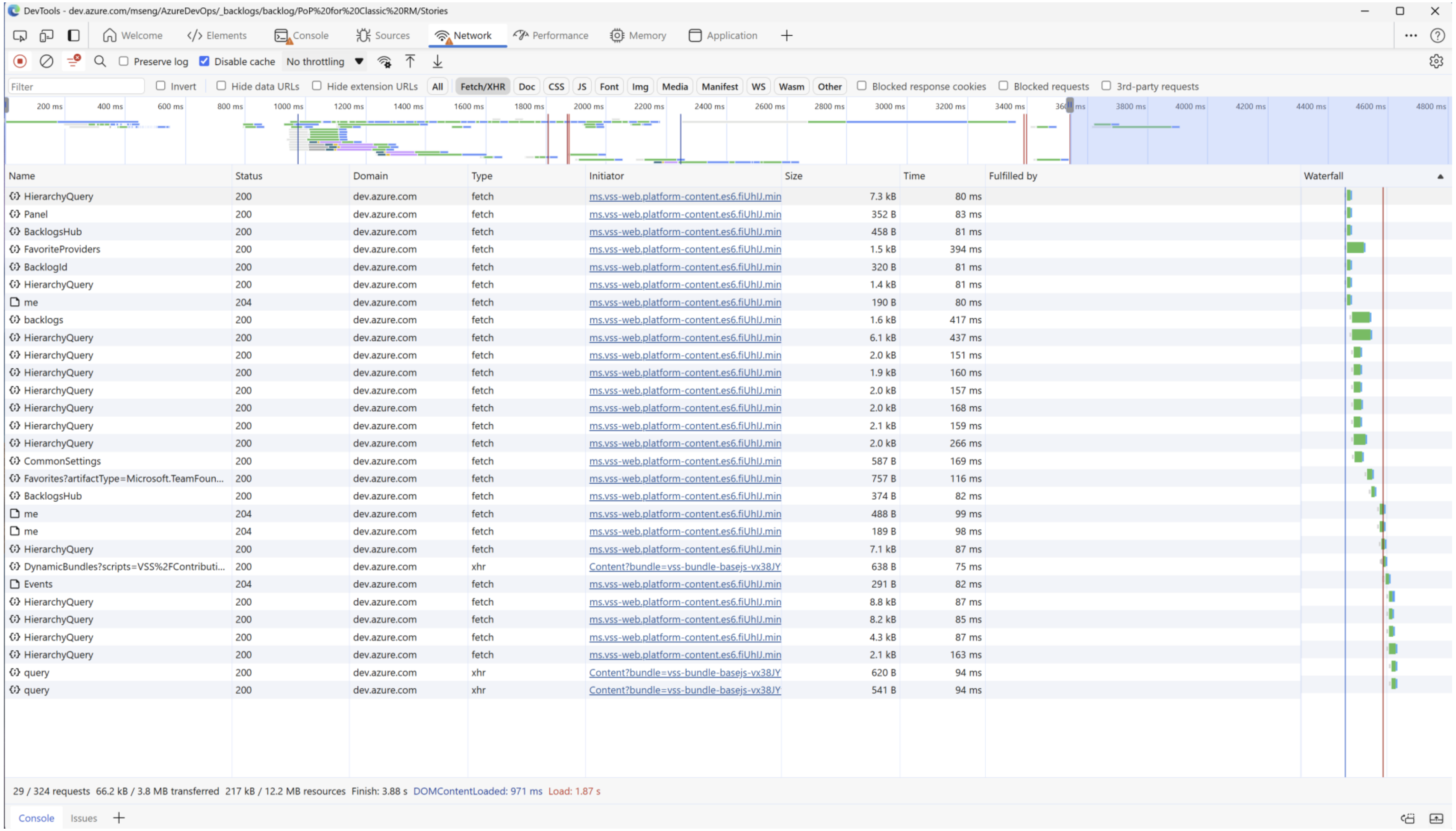
Telemetry

Performance Bar



Resources Scripts 154 (4941 KB) CSS 75 (1064 KB) Ajax 7 Data Providers 27 (445 KB) | Performance TTI 3102ms 😐 SQL 27 REST 5 Total Remote 41

Network Tools



DevTools - dev.azure.com/mseng/AzureDevOps/_backlogs/backlog/PoP%20for%20Classic%20RM/Stories

□ Preserve log ☑ Disable cache No throttling

□ Invert □ Hide data URLs □ Hide extension URLs □ Blocked response cookies □ Blocked requests □ 3rd-party requests

Name	Status	Domain	Type	Initiator	Size	Time	Fulfilled by	Waterfall
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	7.3 kB	80 ms		
Panel	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	352 B	83 ms		
BacklogsHub	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	458 B	81 ms		
FavoriteProviders	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	1.5 kB	394 ms		
BacklogId	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	320 B	81 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	1.4 kB	81 ms		
me	204	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	190 B	80 ms		
backlogs	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	1.6 kB	417 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	6.1 kB	437 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	2.0 kB	151 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	1.9 kB	160 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	2.0 kB	157 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	2.0 kB	168 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	2.1 kB	159 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	2.0 kB	266 ms		
CommonSettings	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	587 B	169 ms		
Favorites?artifactType=Microsoft.TeamFoun...	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	757 B	116 ms		
BacklogsHub	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	374 B	82 ms		
me	204	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	488 B	99 ms		
me	204	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	189 B	98 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	7.1 kB	87 ms		
DynamicBundles?scripts=VSS%2FContributi...	200	dev.azure.com	xhr	Content?bundle=vss-bundle-basejs-vx38JY	638 B	75 ms		
Events	204	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	291 B	82 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	8.8 kB	87 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	8.2 kB	85 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	4.3 kB	87 ms		
HierarchyQuery	200	dev.azure.com	fetch	ms.vss-web.platform-content.es6.fiUhIJ.min	2.1 kB	163 ms		
query	200	dev.azure.com	xhr	Content?bundle=vss-bundle-basejs-vx38JY	620 B	94 ms		
query	200	dev.azure.com	xhr	Content?bundle=vss-bundle-basejs-vx38JY	541 B	94 ms		

29 / 324 requests 66.2 kB / 3.8 MB transferred 217 kB / 12.2 MB resources Finish: 3.88 s DOMContentLoaded: 971 ms Load: 1.87 s

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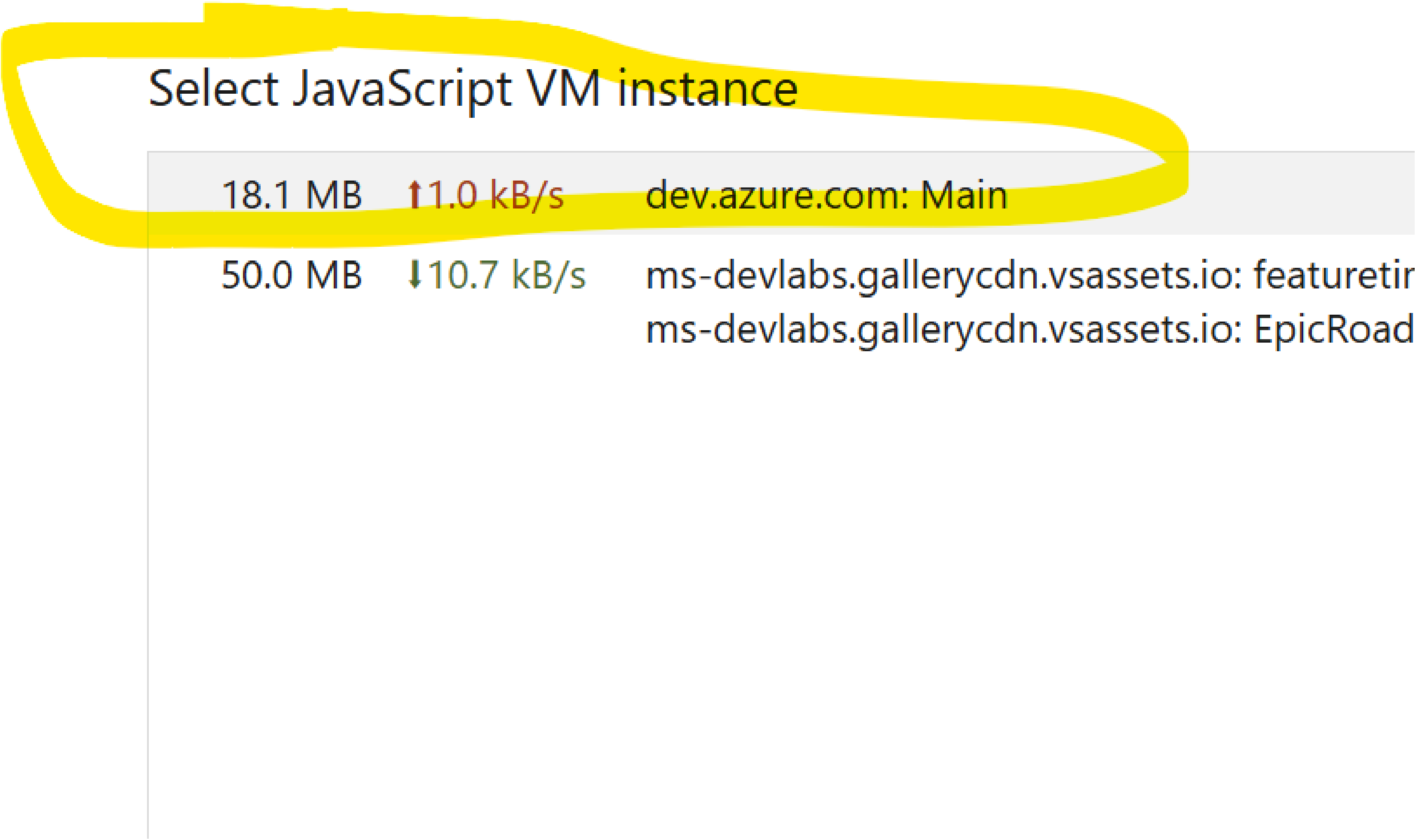
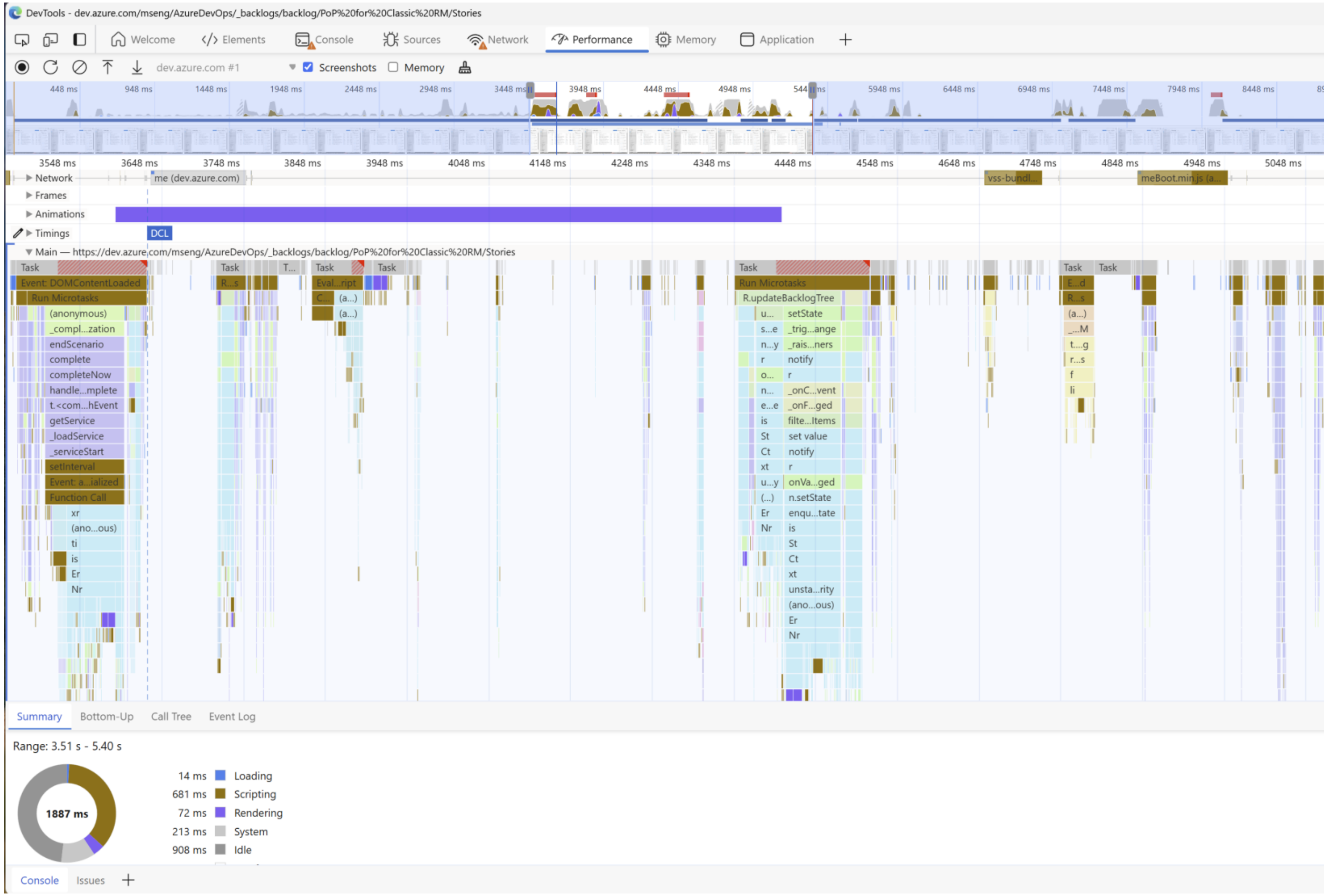
Memory Profiler



Select JavaScript VM instance

18.1 MB	↑1.0 kB/s	dev.azure.com: Main
50.0 MB	↓10.7 kB/s	ms-devlabs.gallerycdn.vsassets.io: featuretir ms-devlabs.gallerycdn.vsassets.io: EpicRoad

Performance Profiler



DevTools - dev.azure.com/mseng/AzureDevOps/_backlogs/backlog/PoP%20for%20Classic%20RM/Stories

Main — https://dev.azure.com/mseng/AzureDevOps/_backlogs/backlog/PoP%20for%20Classic%20RM/Stories

Range: 3.51 s - 5.40 s

14 ms	🟦	Loading
681 ms	🟨	Scripting
72 ms	🟪	Rendering
213 ms	⬜	System
908 ms	⬜	Idle

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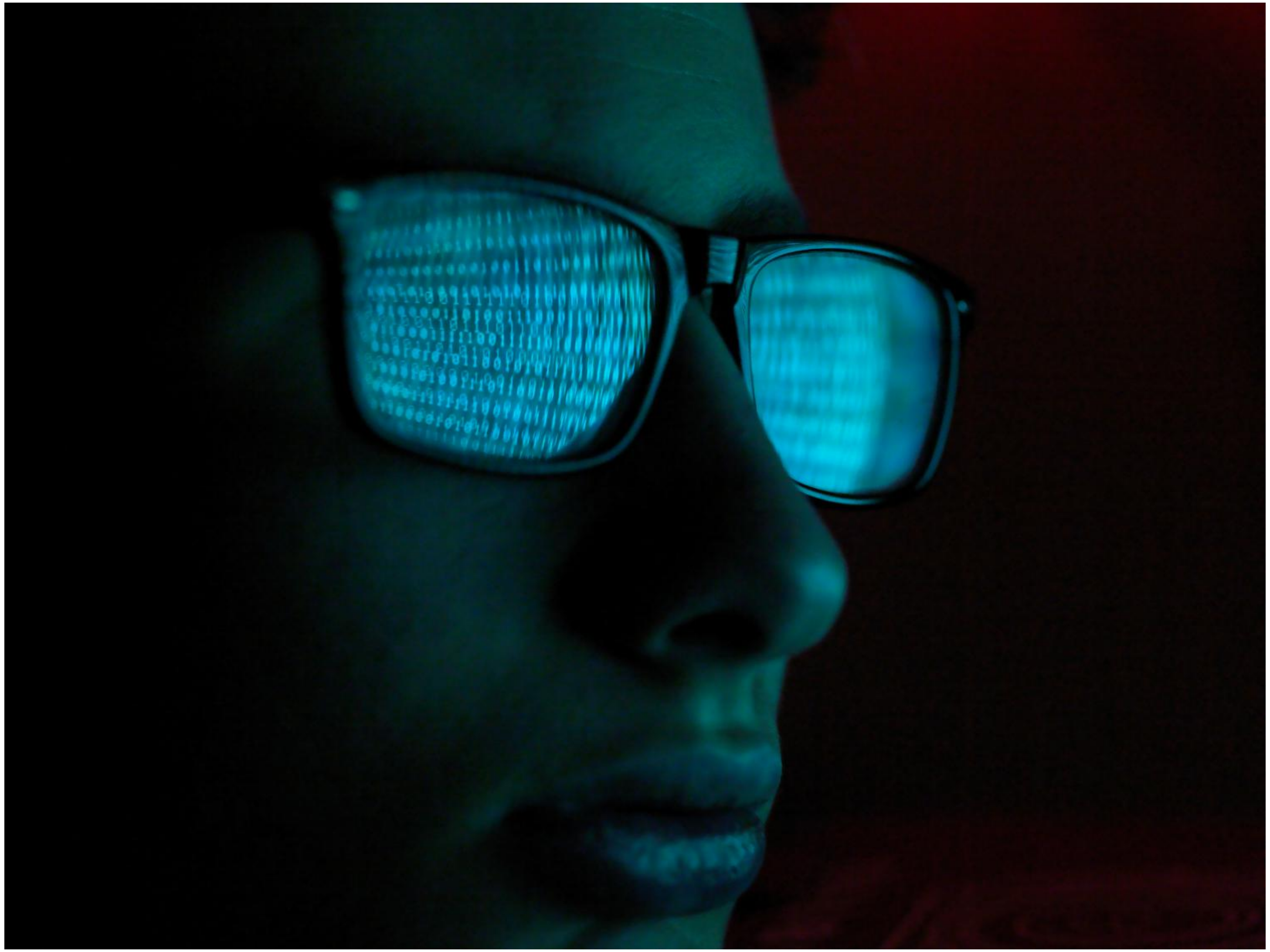
Types of Bottlenecks

- Inefficient client-side code
- Inefficient server-side code
- Loading too much data
- Loading data too early
- Loading data too often

Fix

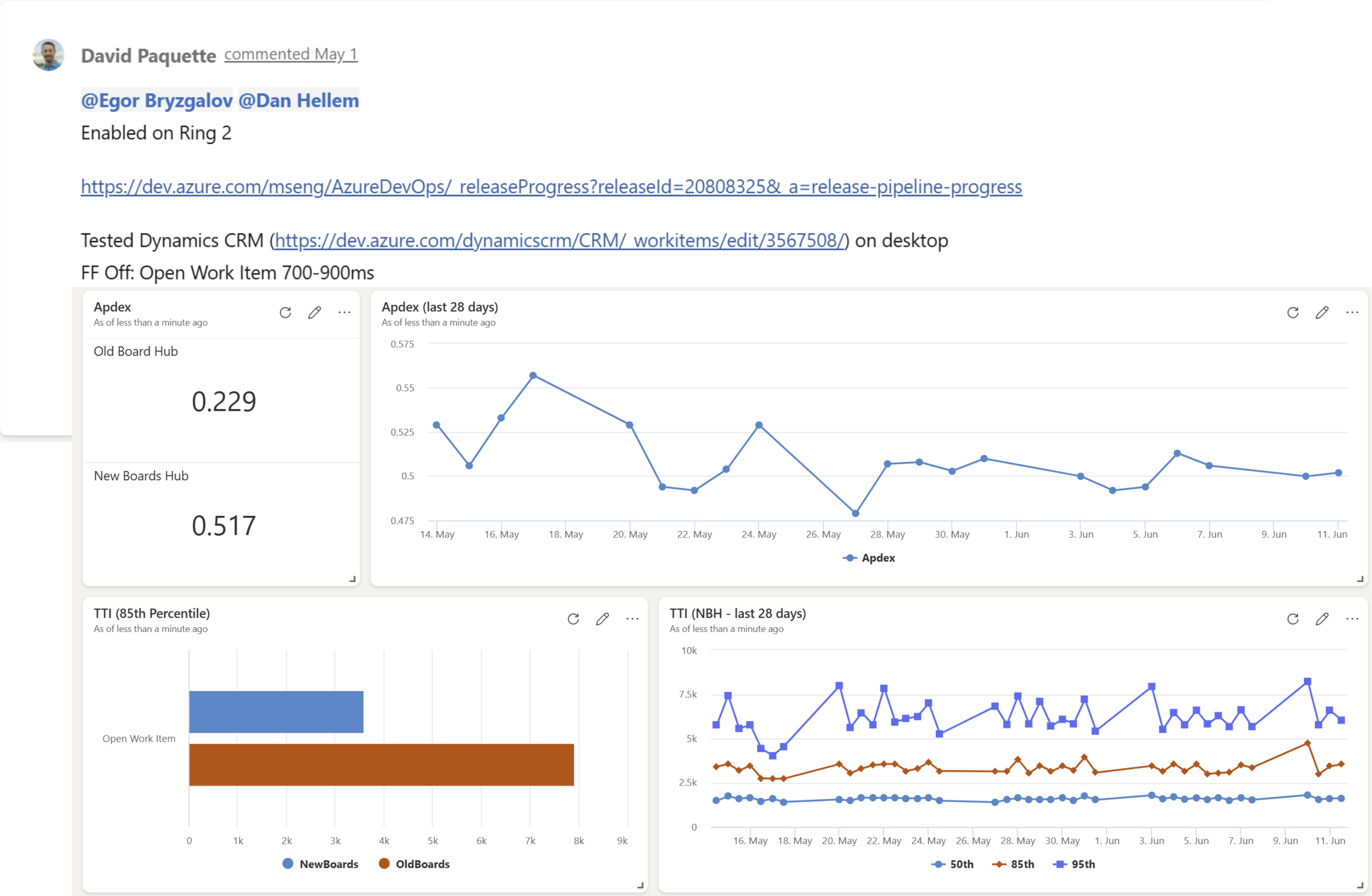


Deploy

- Feature Flag EVERYTHING
- Aggressively back-ported
  - FF Off by default

I DON'T ALWAYS TEST MY CODE
BUT WHEN I DO, I DO IT IN PRODUCTION

Observe



David Paquette commented May 1

@Egor Bryzgalov @Dan Hellem

Enabled on Ring 2

https://dev.azure.com/mseng/AzureDevOps/_releaseProgress?releaseId=20808325&_a=release-pipeline-progress

Tested Dynamics CRM (https://dev.azure.com/dynamicscrm/CRM/_workitems/edit/3567508/) on desktop

FF Off: Open Work Item 700-900ms

Apdex

As of less than a minute ago

Old Board Hub

0.229

New Boards Hub

0.517

Apdex (last 28 days)

As of less than a minute ago

TTI (85th Percentile)

As of less than a minute ago

TTI (NBH - last 28 days)

As of less than a minute ago

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Secret Weapon - Internal Orgs

Ring 1: SQL

Ring 2: Dynamics

Ring 3: Office or Onedrive

Ring 4: Azure

Ring 5: Microsoft

Example 1: Memory Improvements in Backlog View

Categories

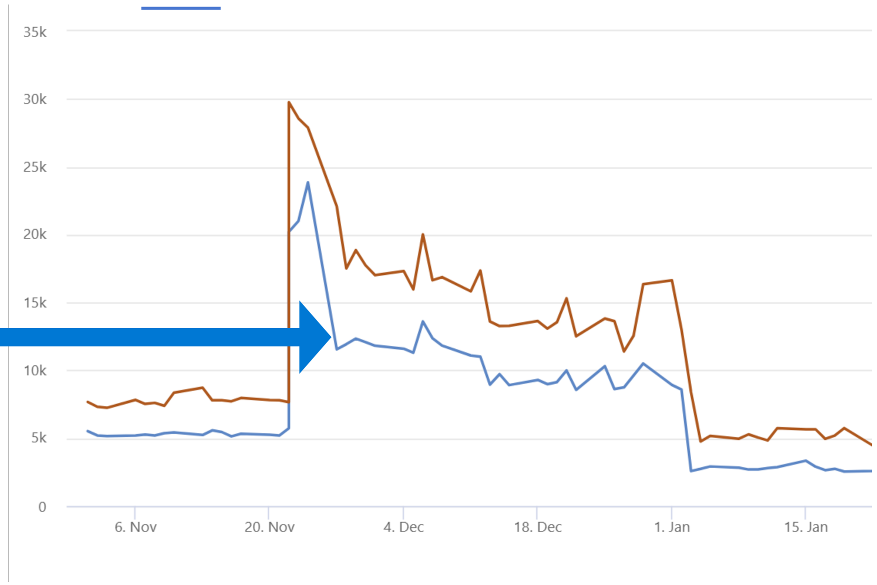
- Inefficient client-side code
- Loading too much data

Fix

- Optimize client-side code
- Deferred the too much data part to later

Results (Azure)

- Memory usage down from 1.3GB to 100MB
- Page load down from ~25s to ~12s



Example 2: Classification Nodes Meta Data Cache

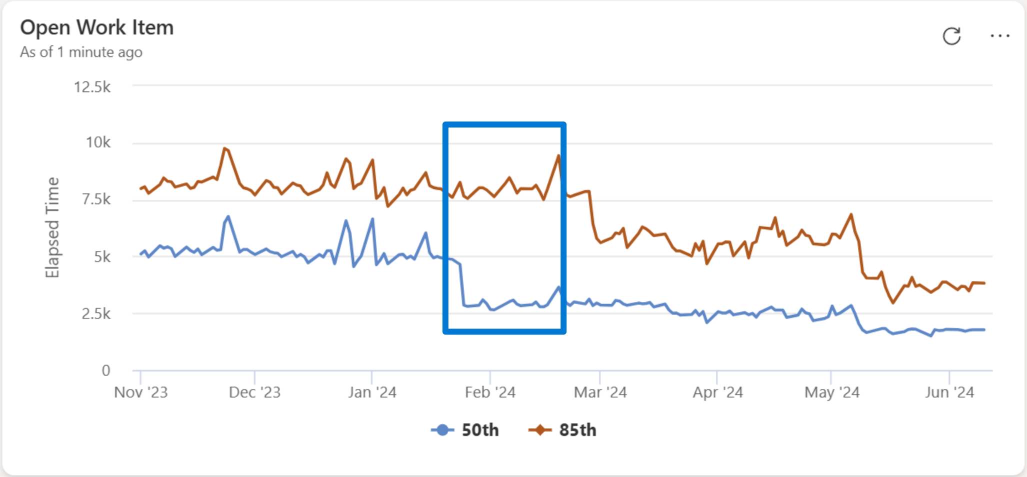
Categories

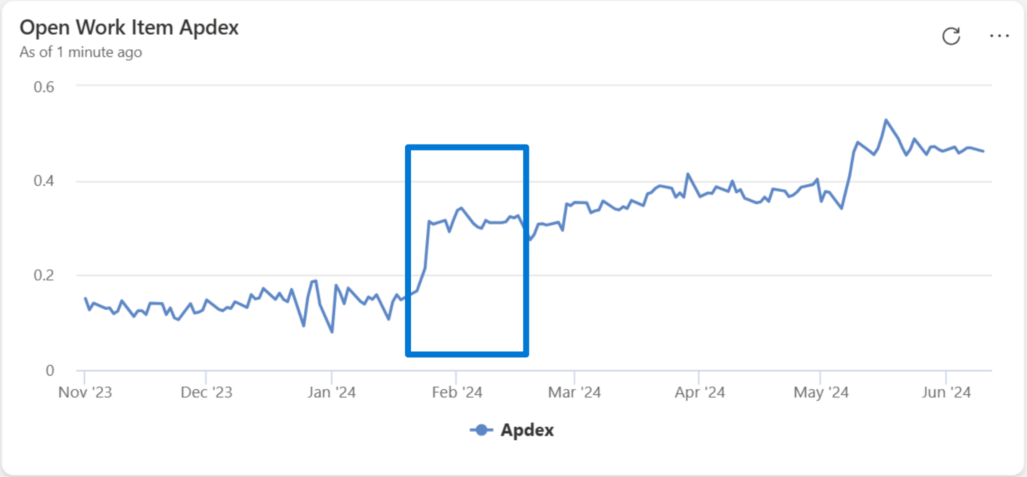
- Load data too often
- Loading too much data

Fix

- Leverage Meta Data Cache
- Deferred loading too much data

Results (Azure)





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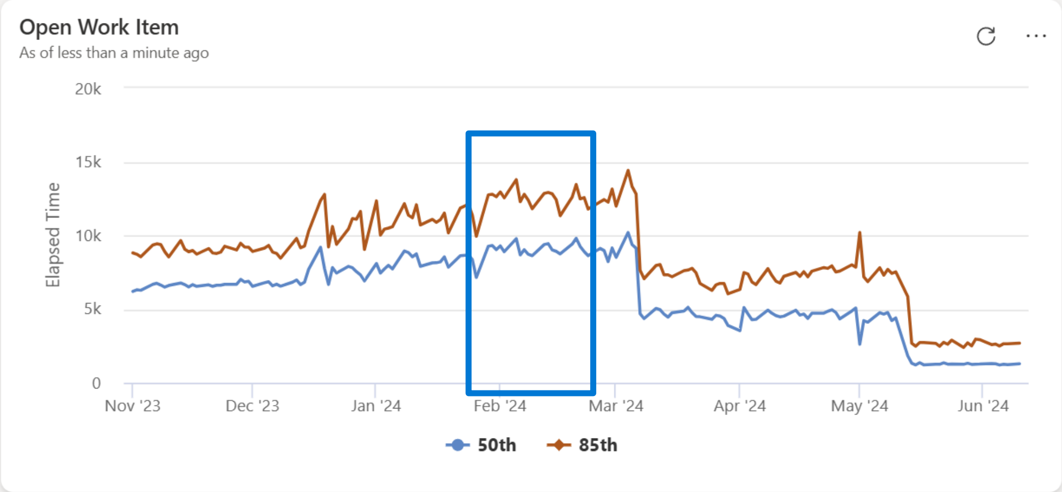
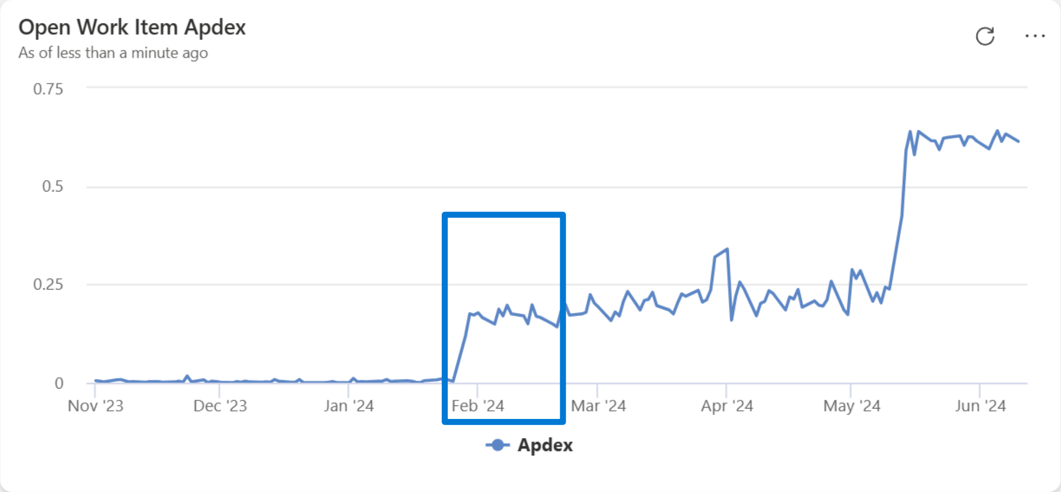
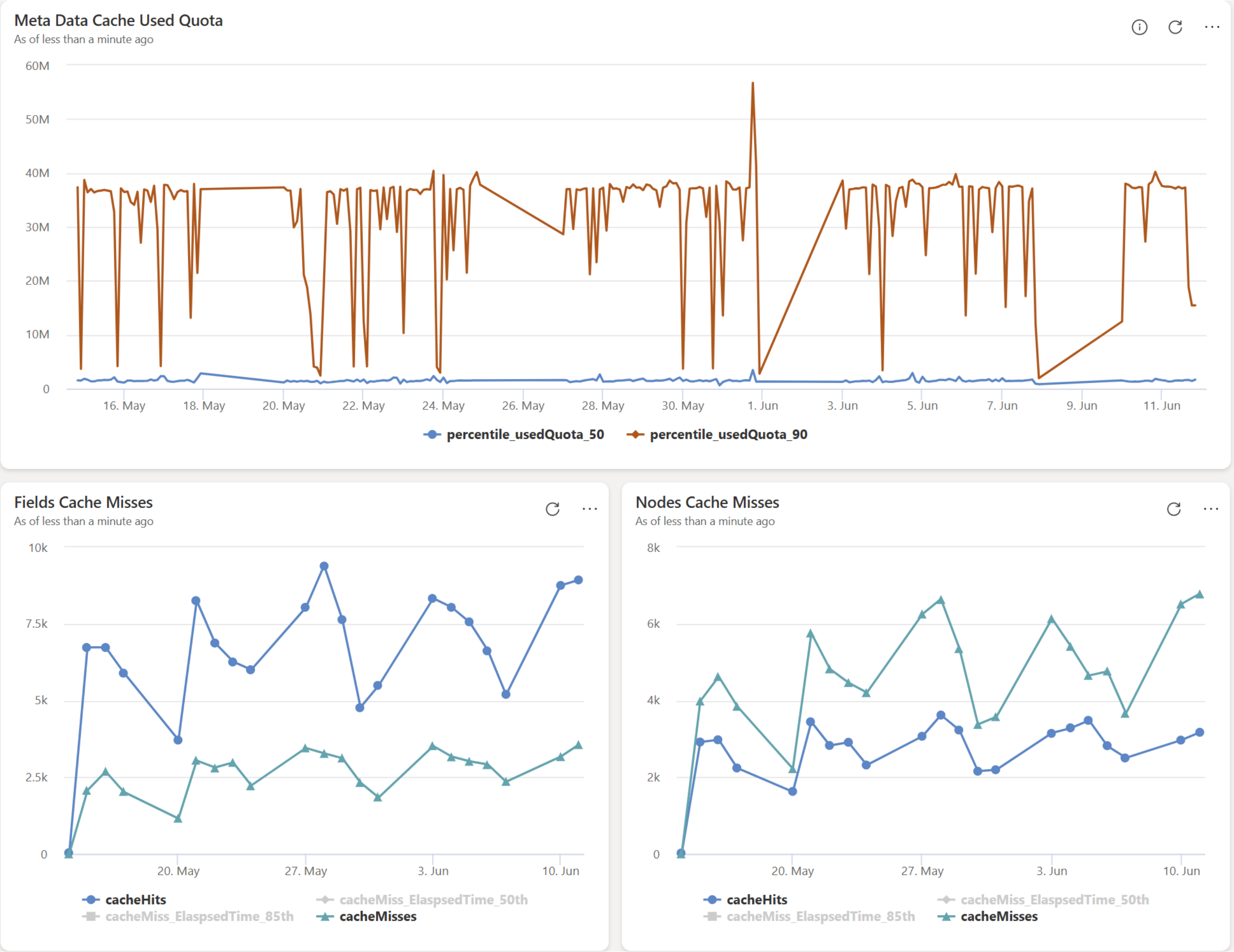
Example 2: Classification Nodes Meta Data Cache

Results (BigBankCo)





Example 2: Classification Nodes Meta Data Cache



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Example 3: Classification Nodes Data Reduction

Categories

- Loading too much data

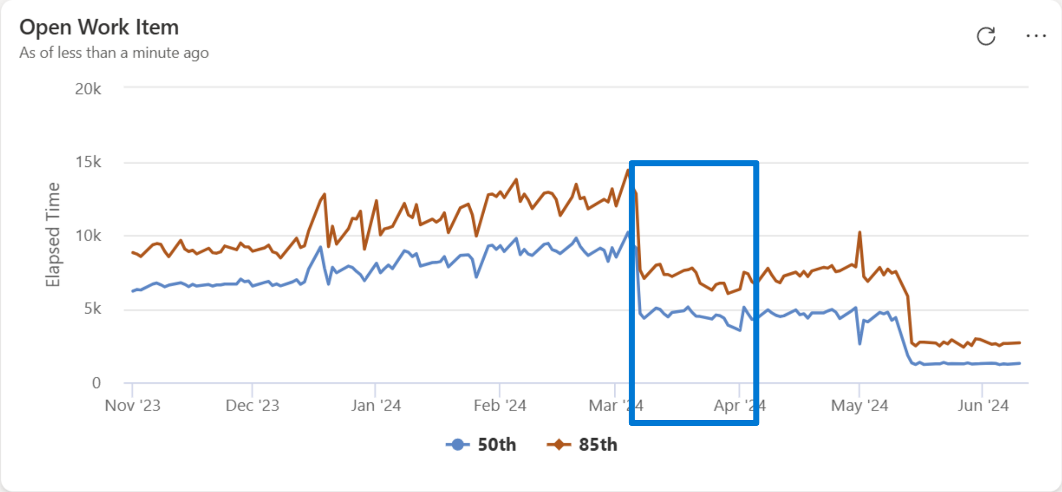
Fix

- Server was returning properties that were not used

Results (Azure)

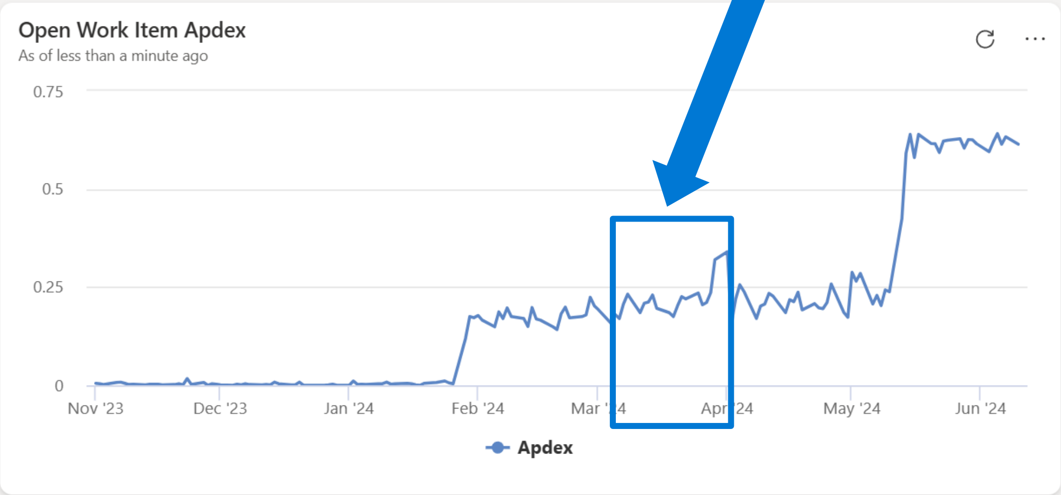
- Uncompressed payload size reduced by almost 1/2
- Reduction in server load

Results (BigBankCo)



Open Work Item

As of less than a minute ago



Open Work Item Apdex

As of less than a minute ago

Example 4: Work Item Model Refactoring

Categories

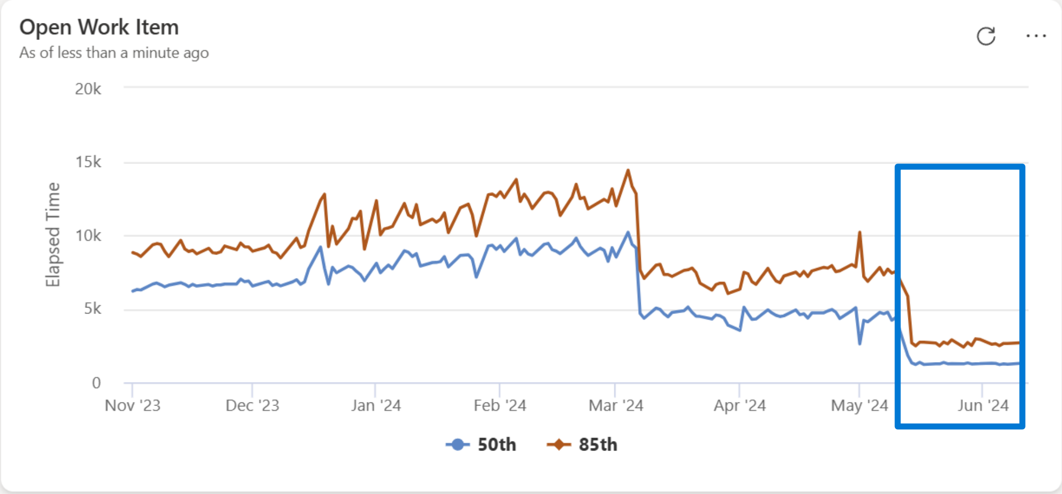
- Inefficient client-side code
- Loading data too early

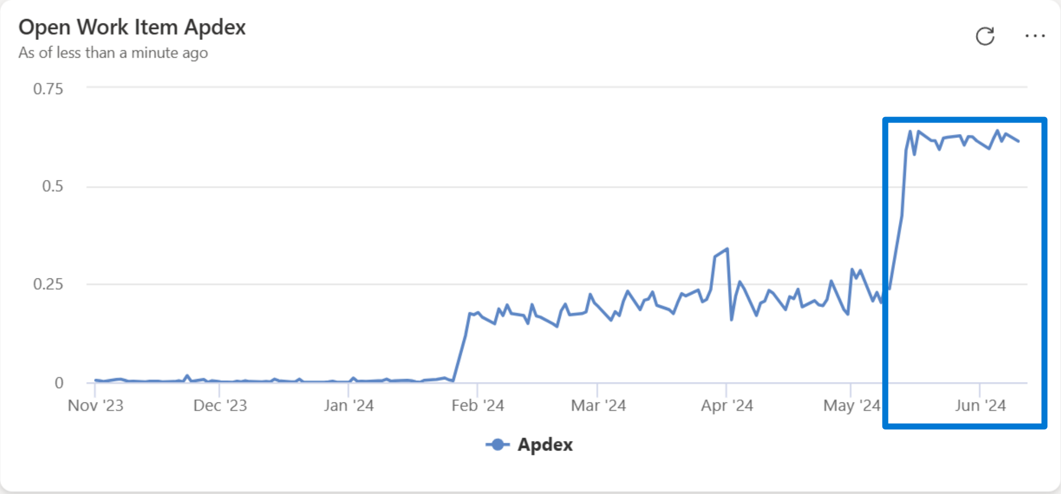
Fix

- Refactor client side WorkItem class
- Refactor data loading so it doesn’t block UI rendering

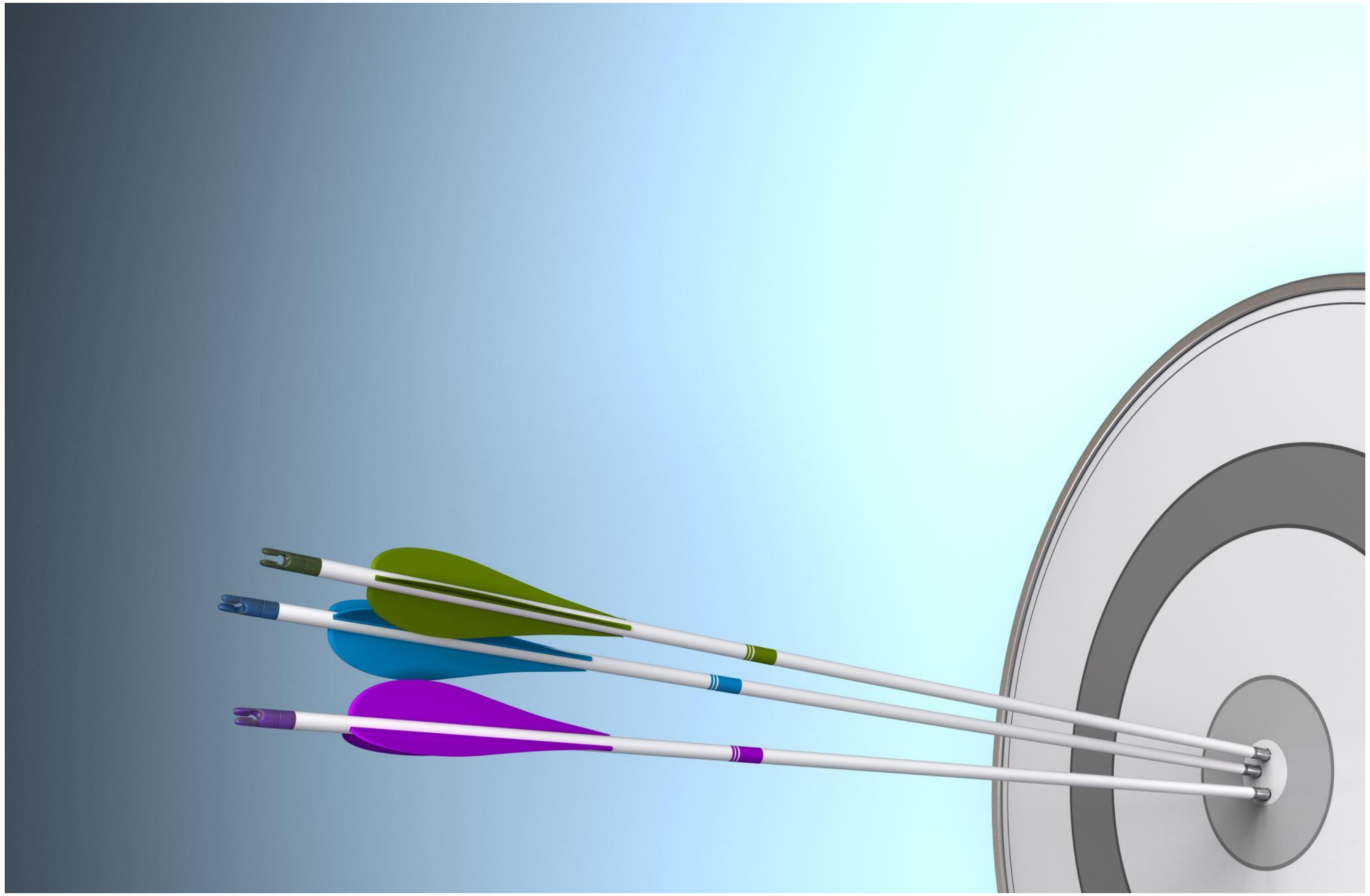
Results (BigBankCo)

- Finally faster than Old Boards!

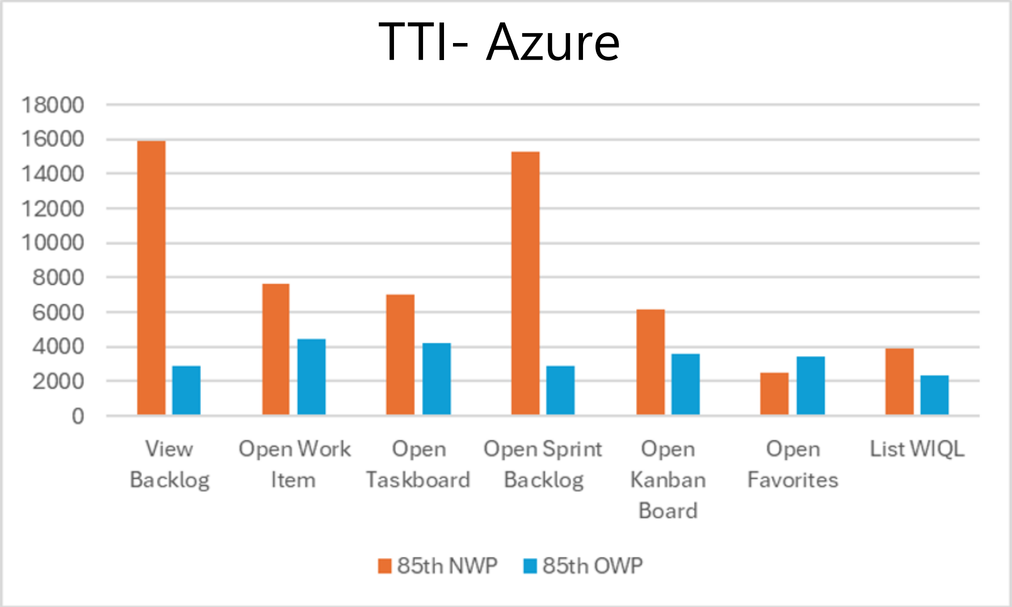


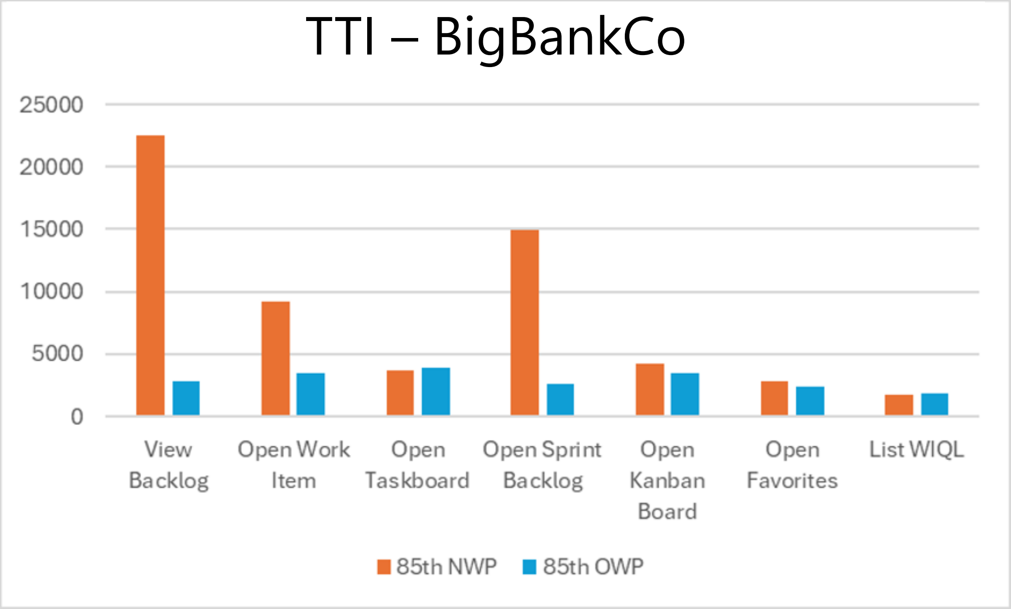


Results

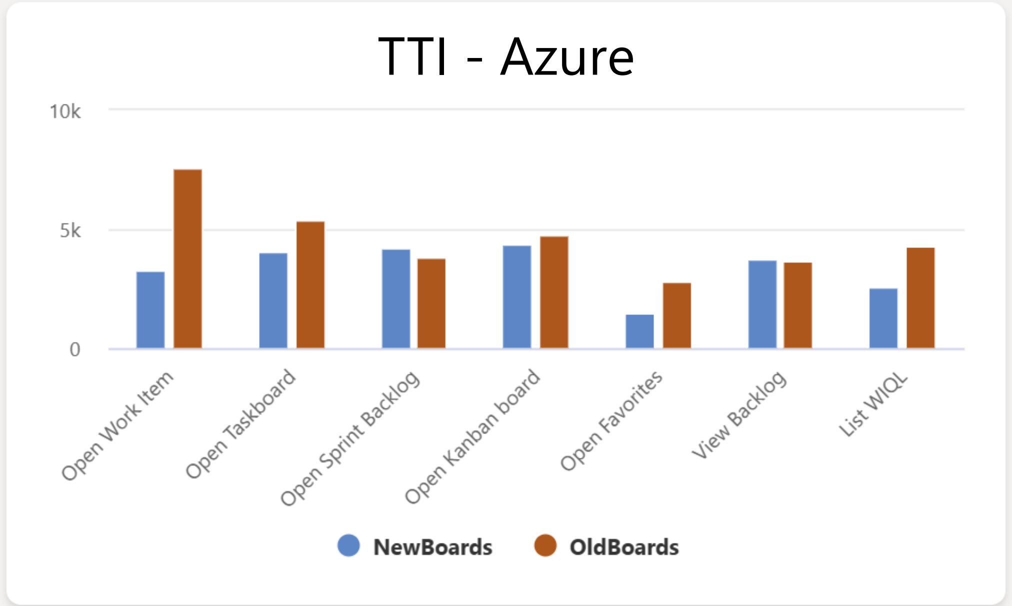


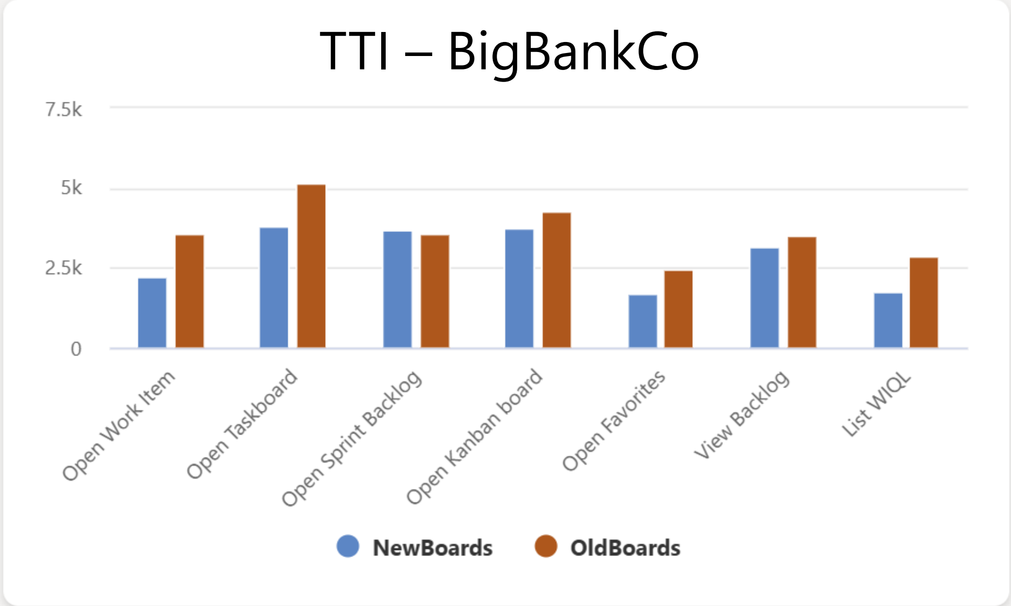
BEFORE





AFTER





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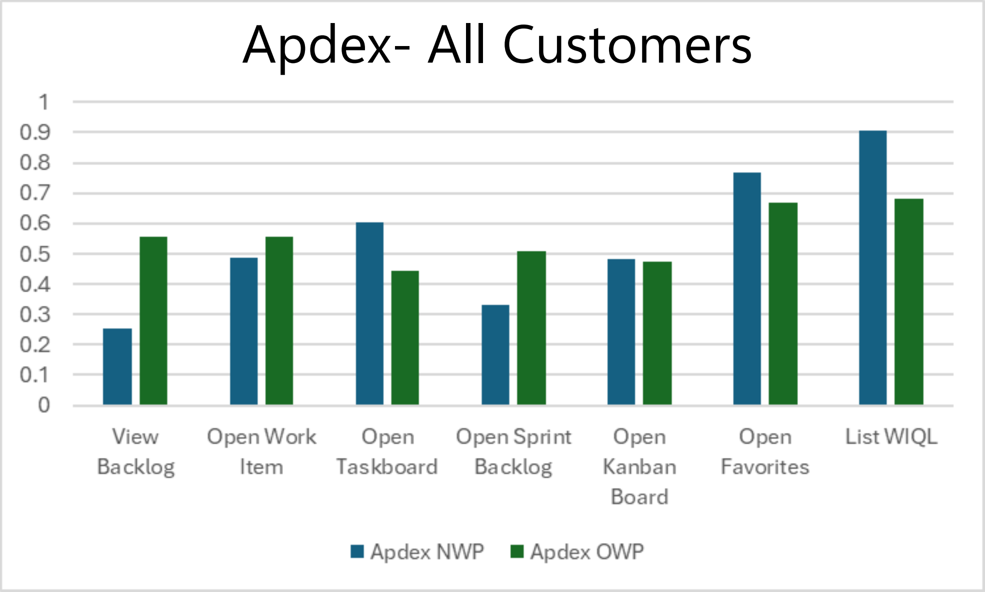
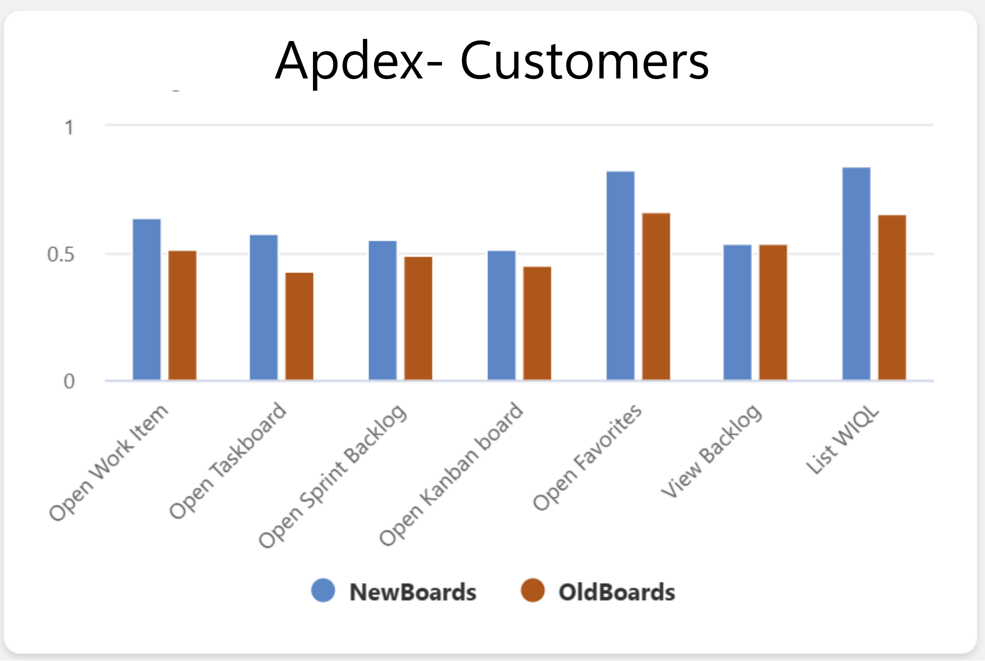
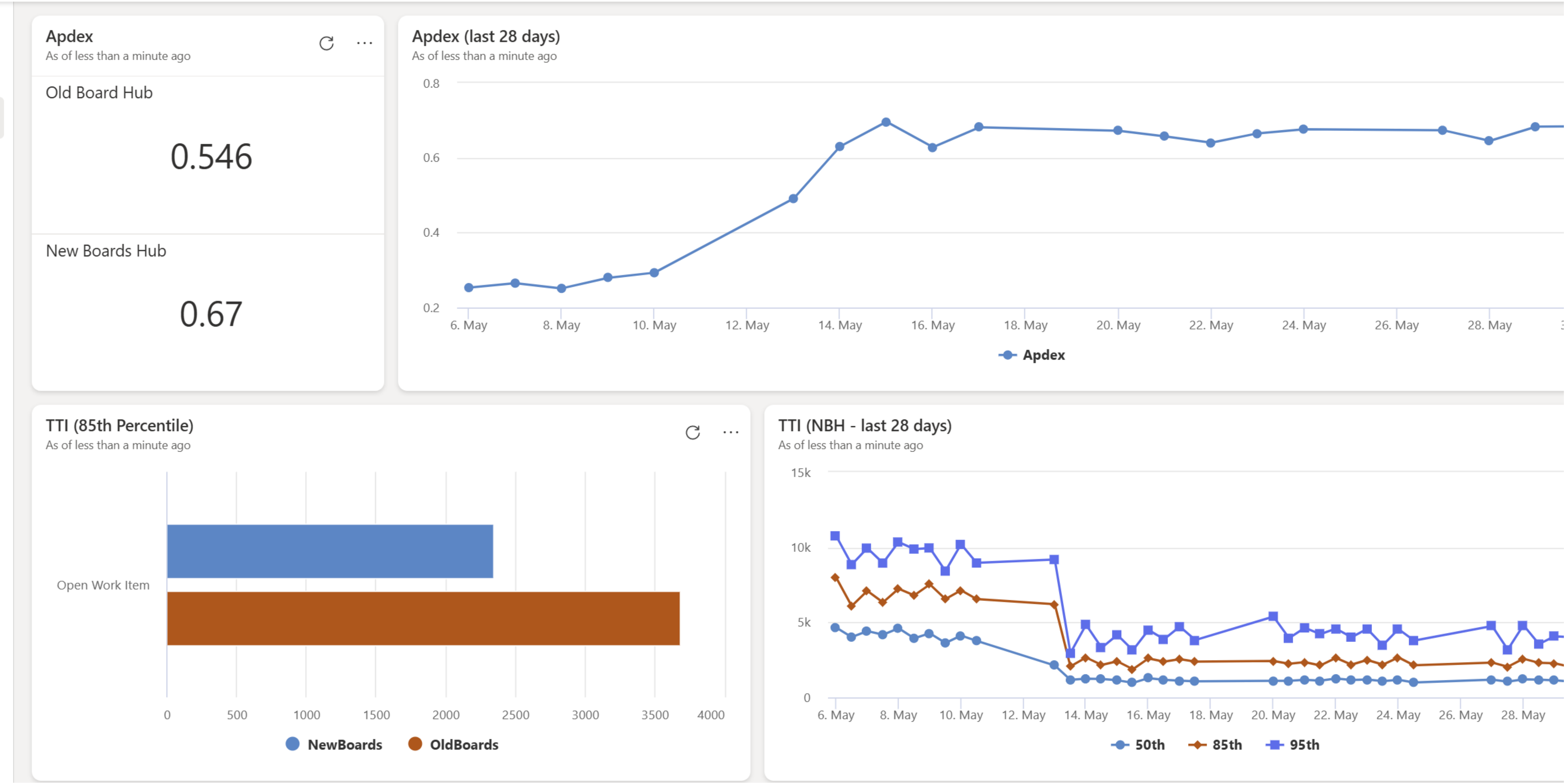
BEFORE



AFTER





Apdex
As of less than a minute ago

Old Board Hub

0.546

New Boards Hub

0.67

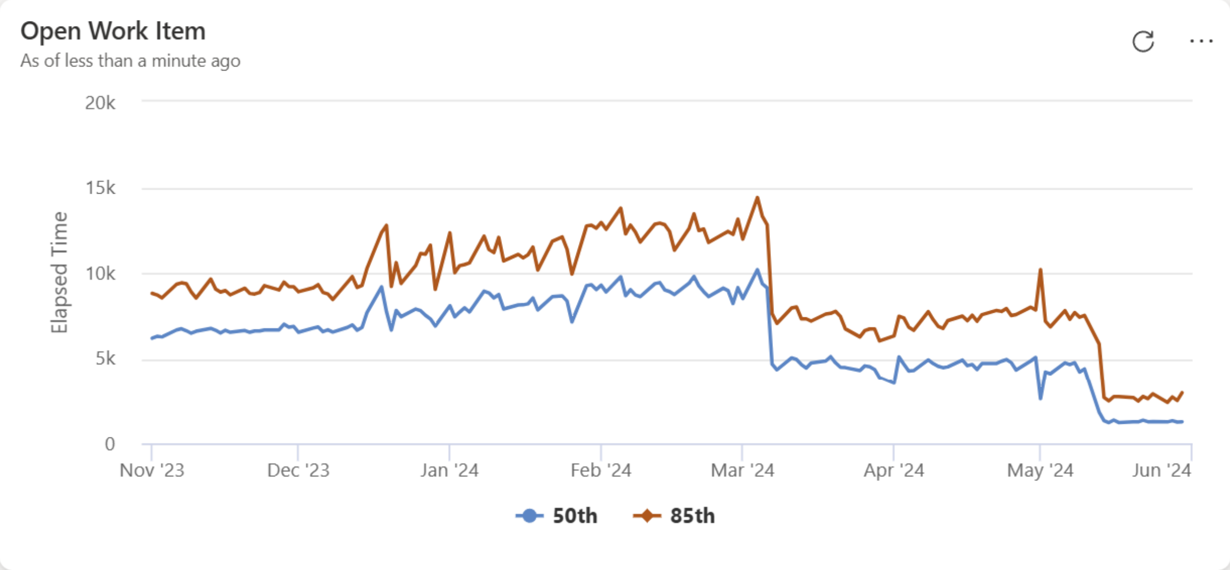
Apdex (last 28 days)
As of less than a minute ago

TTI (85th Percentile)
As of less than a minute ago

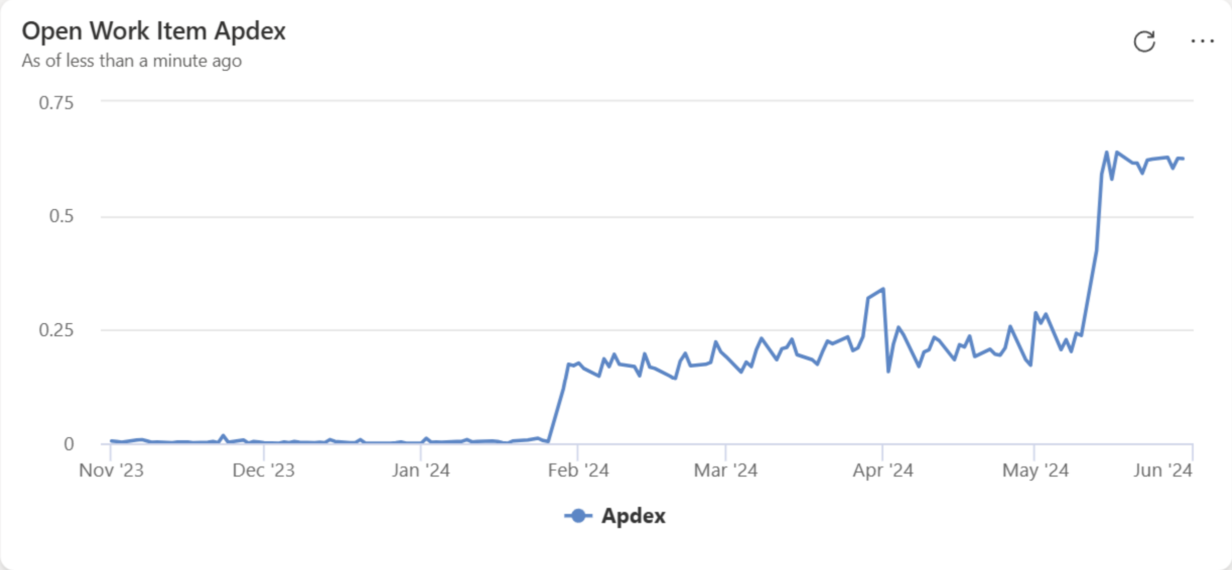
TTI (NBH - last 28 days)
As of less than a minute ago

Azure DevOps

BigBankCo

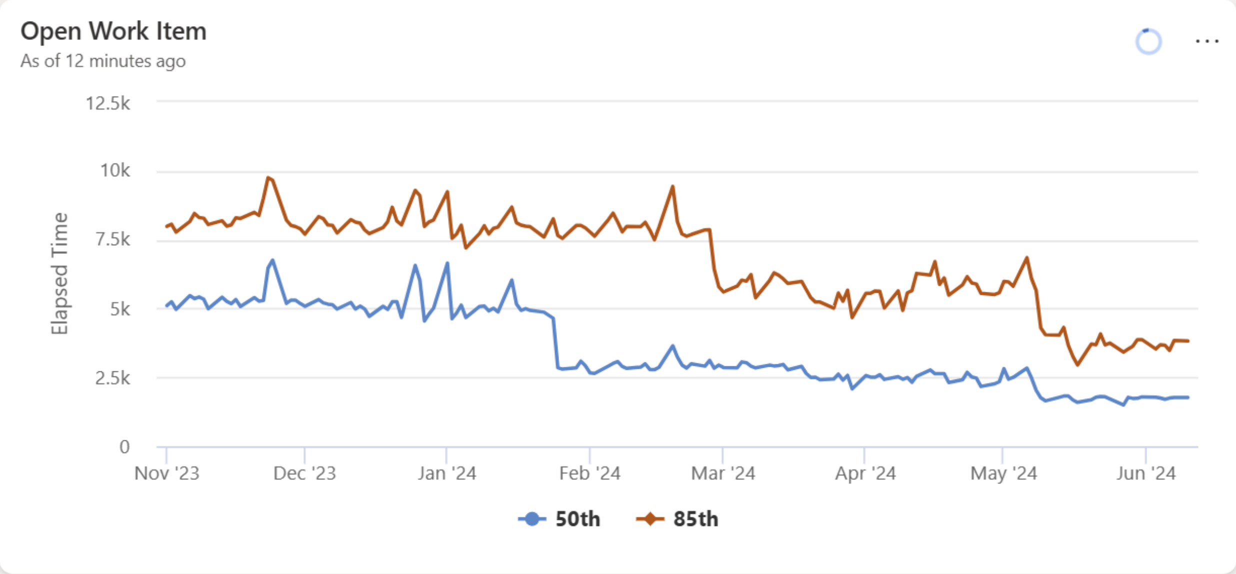


Open Work Item
As of less than a minute ago

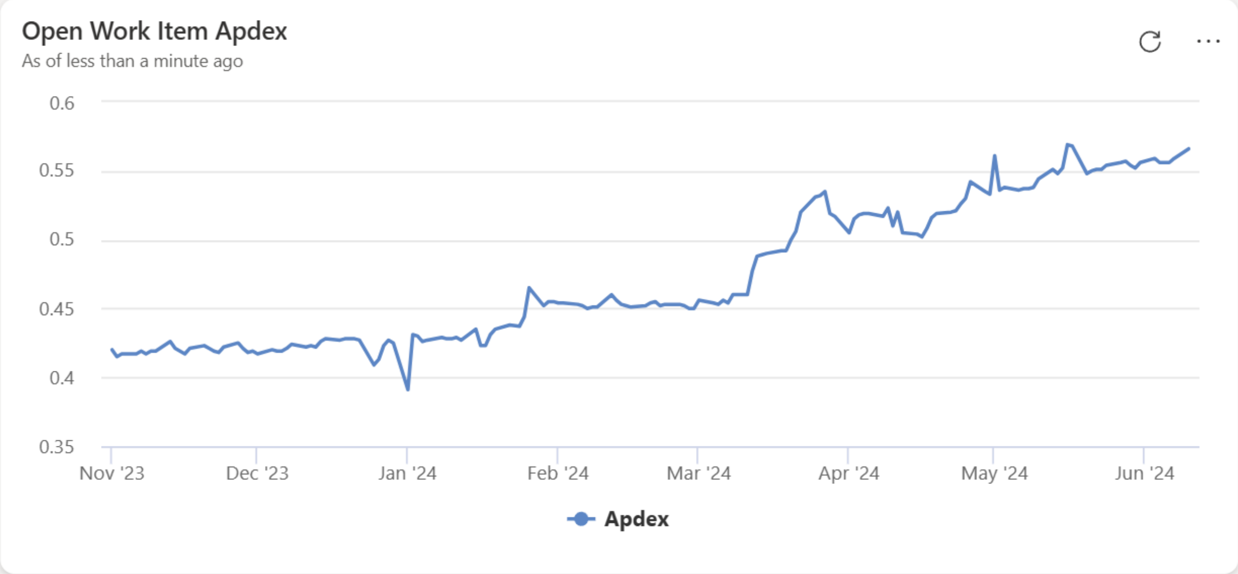


Open Work Item Apdex
As of less than a minute ago

All Customers



Open Work Item
As of 12 minutes ago



Open Work Item Apdex
As of less than a minute ago

What did we learn?

Load the smallest set of data needed to render the UI

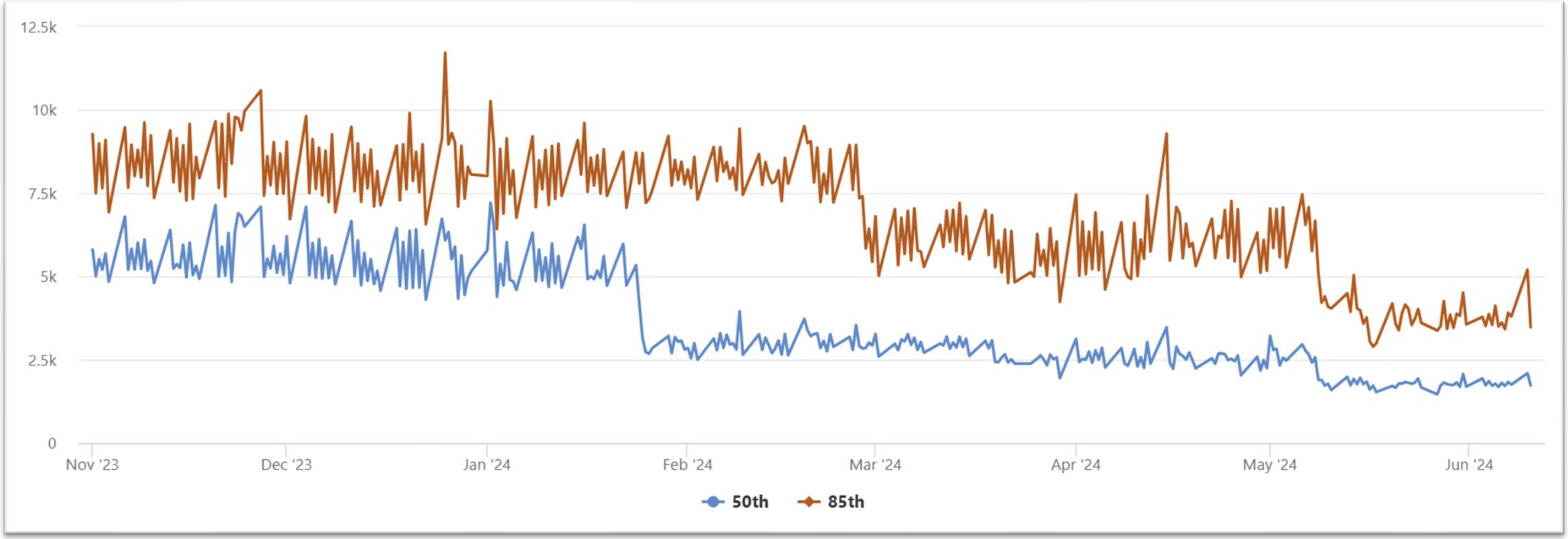
Delay loading large payloads

Check telemetry

Don’t rely only on local testing

What to watch for

- Don’t assume network calls are fast
  - Local != Production
  - AzureDevOps != Azure
  - North America != India --Try binning data by 12h instead of 1d



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Thank you

Dave Paquette
Principal Software Engineer - Microsoft

Microsoft