



Memfault

Managing **Android Devices** at Scale with Memfault AOSP SDK Bort 4.0

Heiko Behrens, Head of Product
Webinar | March 24, 2022

Heiko Behrens

Head of Product, Memfault

- ◇ Enjoys: Faster iteration
- ◇ Challenges: Status quo
- ◇ Previously: Software Engineer @ Pebble, Intel, Oculus
- ◇ Based in Memfault Berlin – [we're hiring!](#)



pebble®

intel®

oculus

 Memfault

Device & Fleet as key concept



Managing **Android Devices at Scale
with Memfault AOSP SDK Bort 4.0**


What is Memfault?



What is new?



AOSP SDK Bort 4.0



AOSP SDK Bort 4.0

AOSP **Android Open-Source Project**
SDK **Software Development Kit**
Bort **Bug Report**
4.0 **very mature**

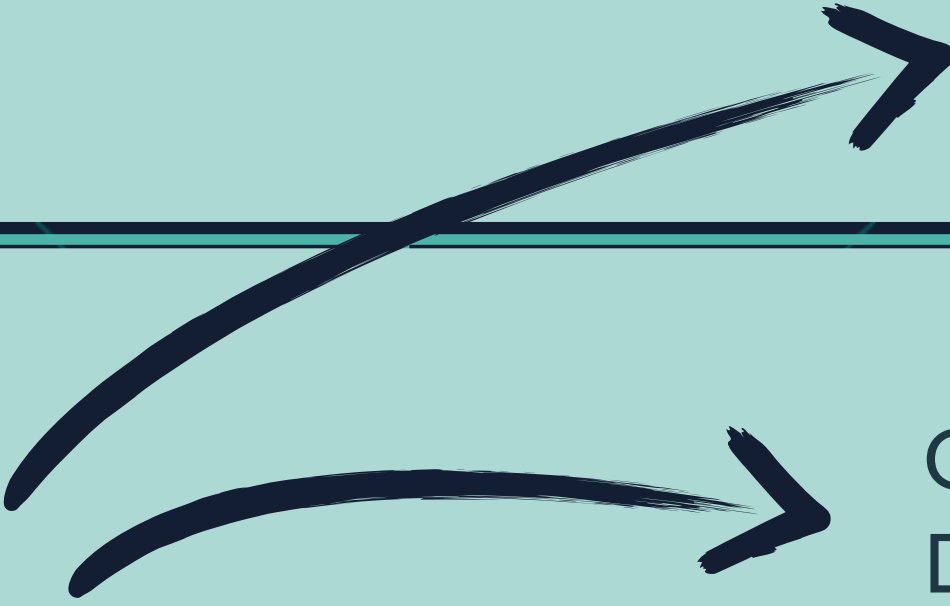
Recap: Our Recent Android Webinar

Monitoring, Debugging and Updating

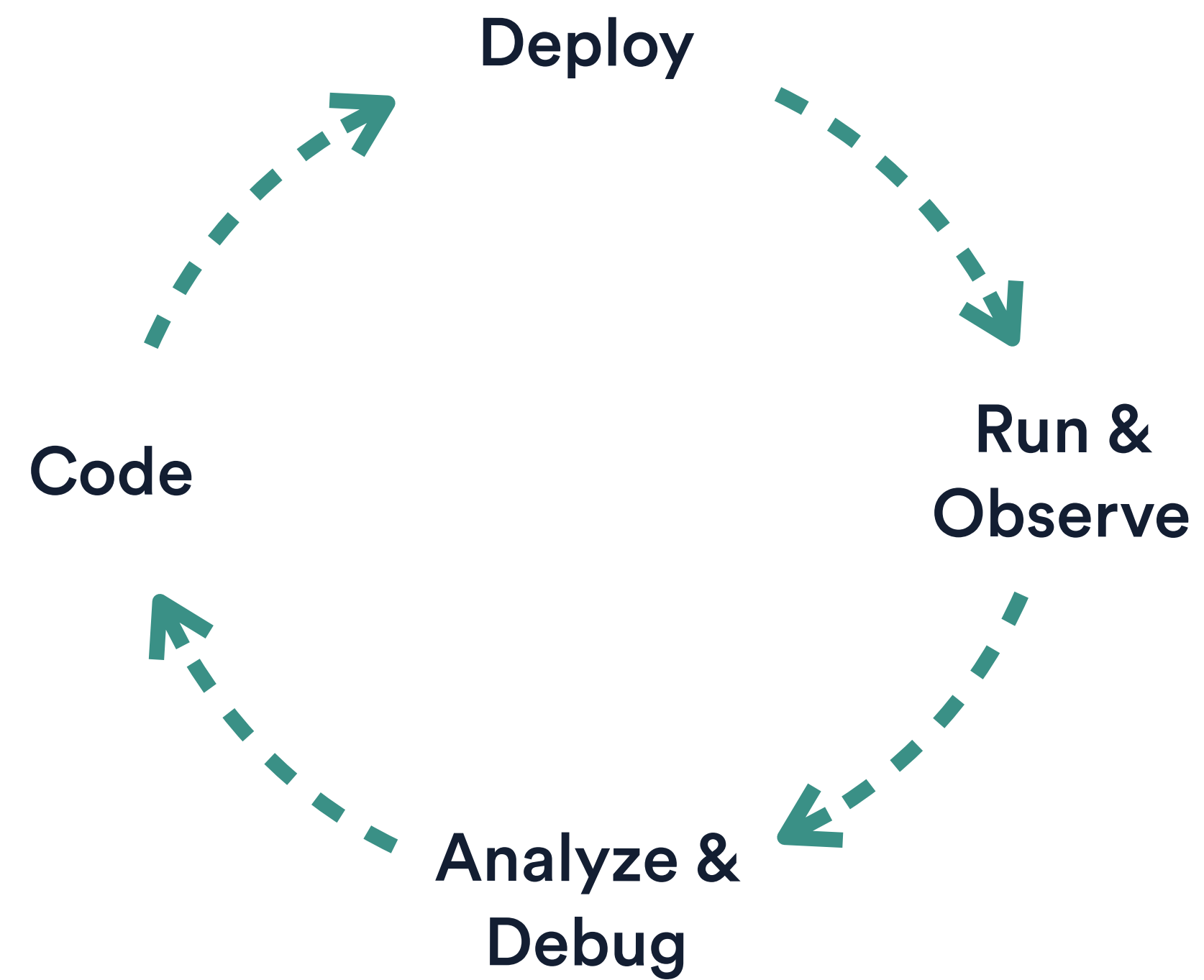
	Monitoring (Metrics)	Debugging (Logs)	Debugging (Crashes)	Updates (System Updates)
AOSP				
Agent				
Backend				
Dashboard				

Recap: Our Recent Android Webinar

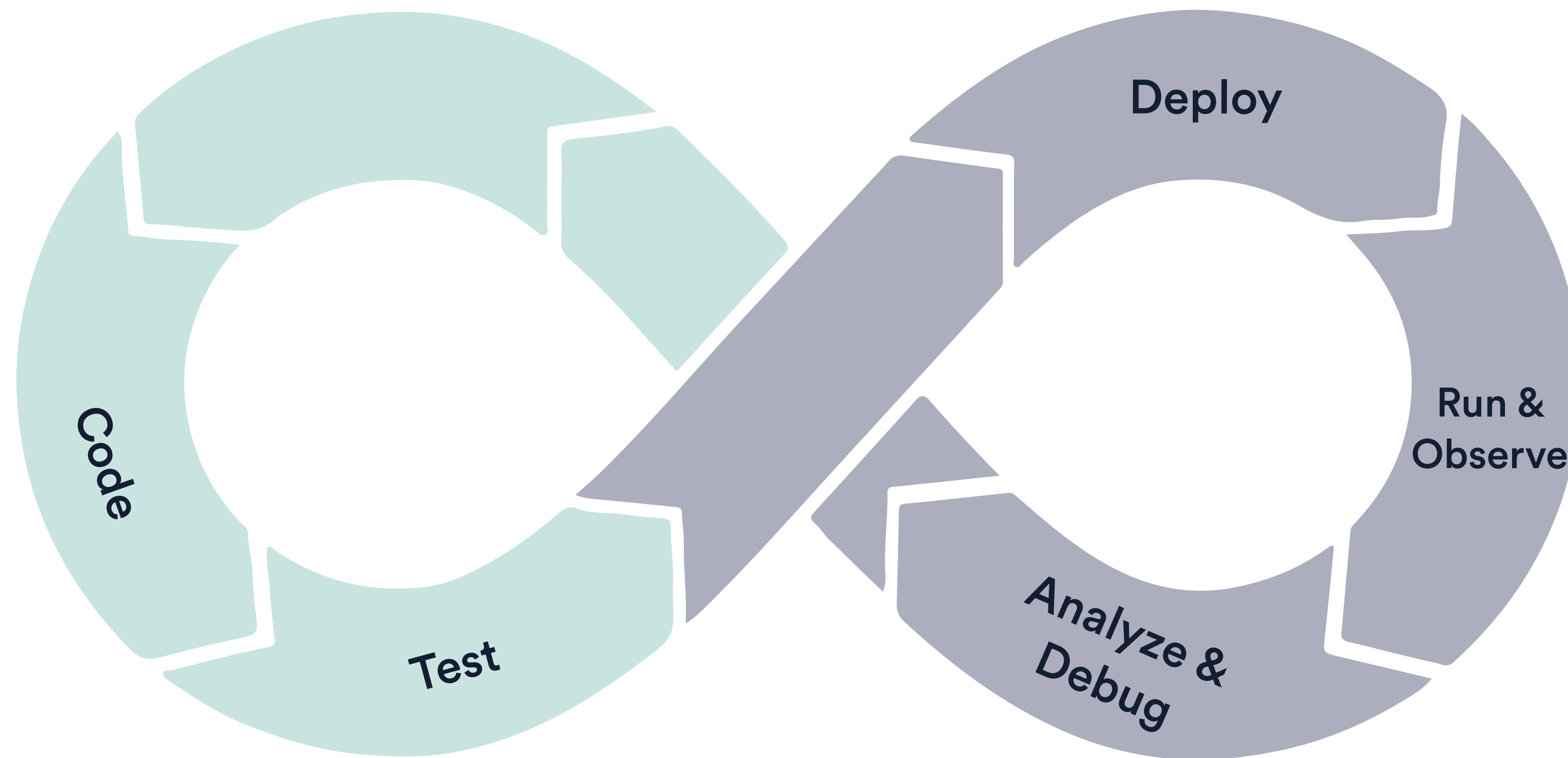
★ ...and what is new since Bort 4.0

	Monitoring (Metrics)	Debugging (Logs)	Debugging (Crashes)	Updates (System Updates)
AOSP	Android 12 ★			Incremental Updates ★
Agent	Bort 4.0 ★			
Backend	 <div>today's outline</div> <div>OTA Management Device Attributes Time Series Metrics Linked Devices</div>			
Dashboard				

Local AOSP Development Process

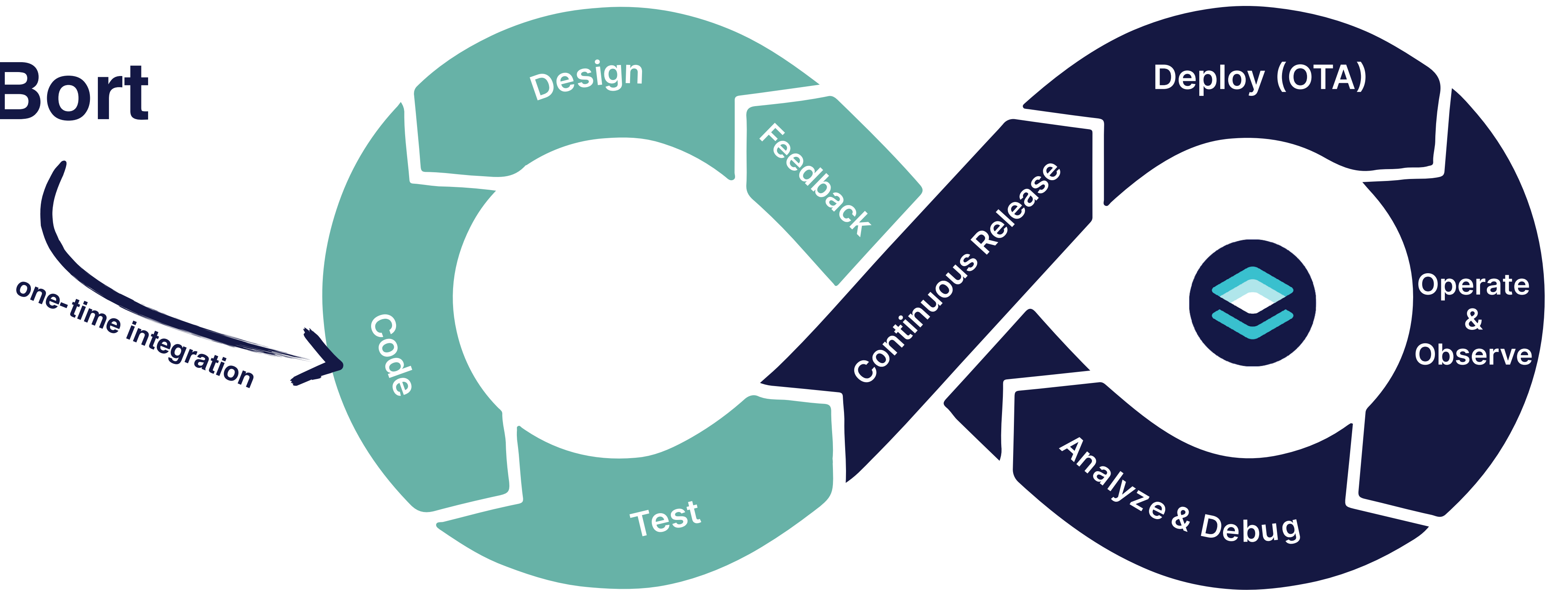


Deploying AOSP to Production Fleets



Applying DevOps Thinking

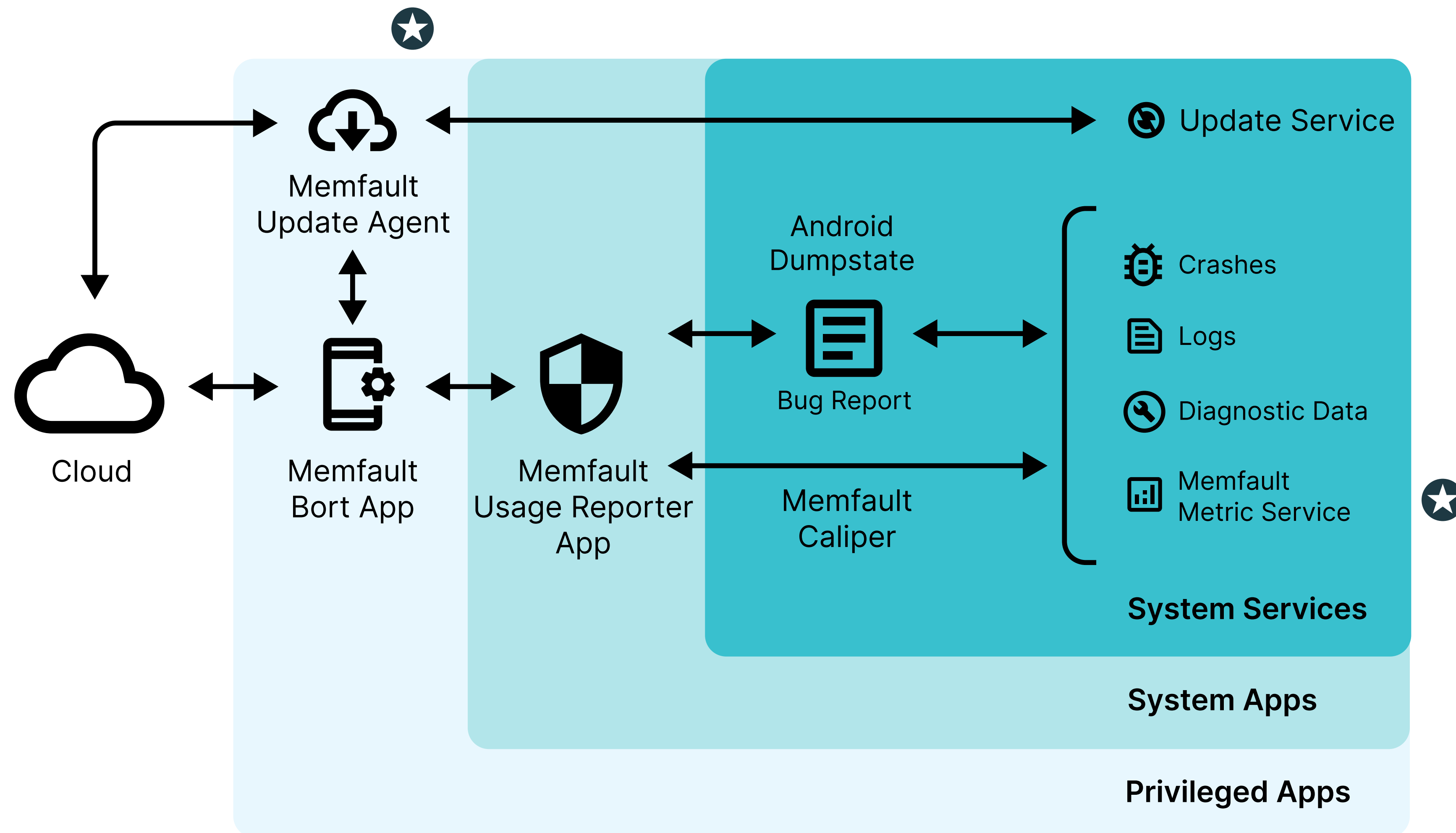
Bort



Development Process

Fleet Management & Observability

Inside Bort, the Memfault AOSP SDK?



Poll #1

Do you collect
bug reports from
production units?

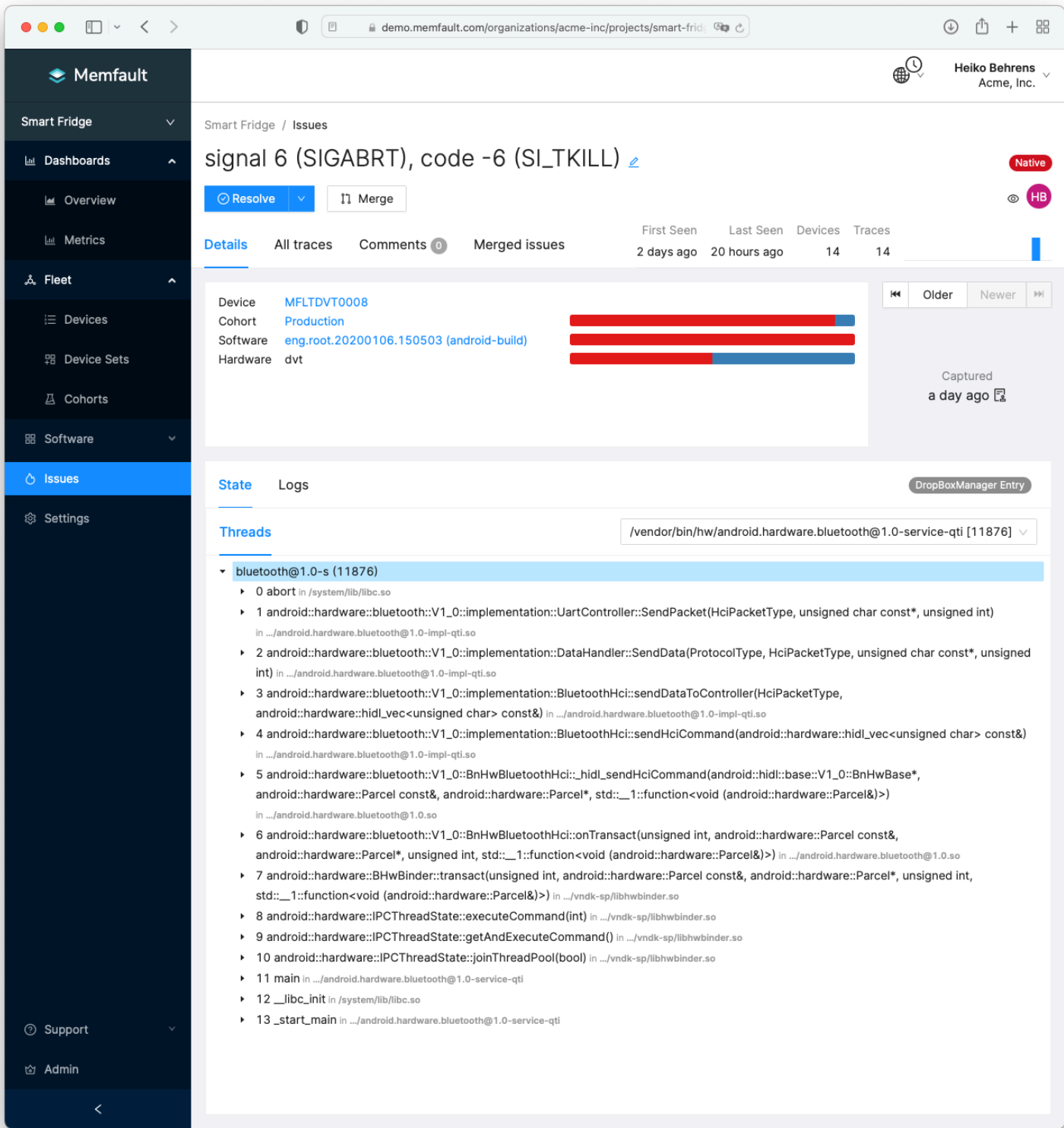
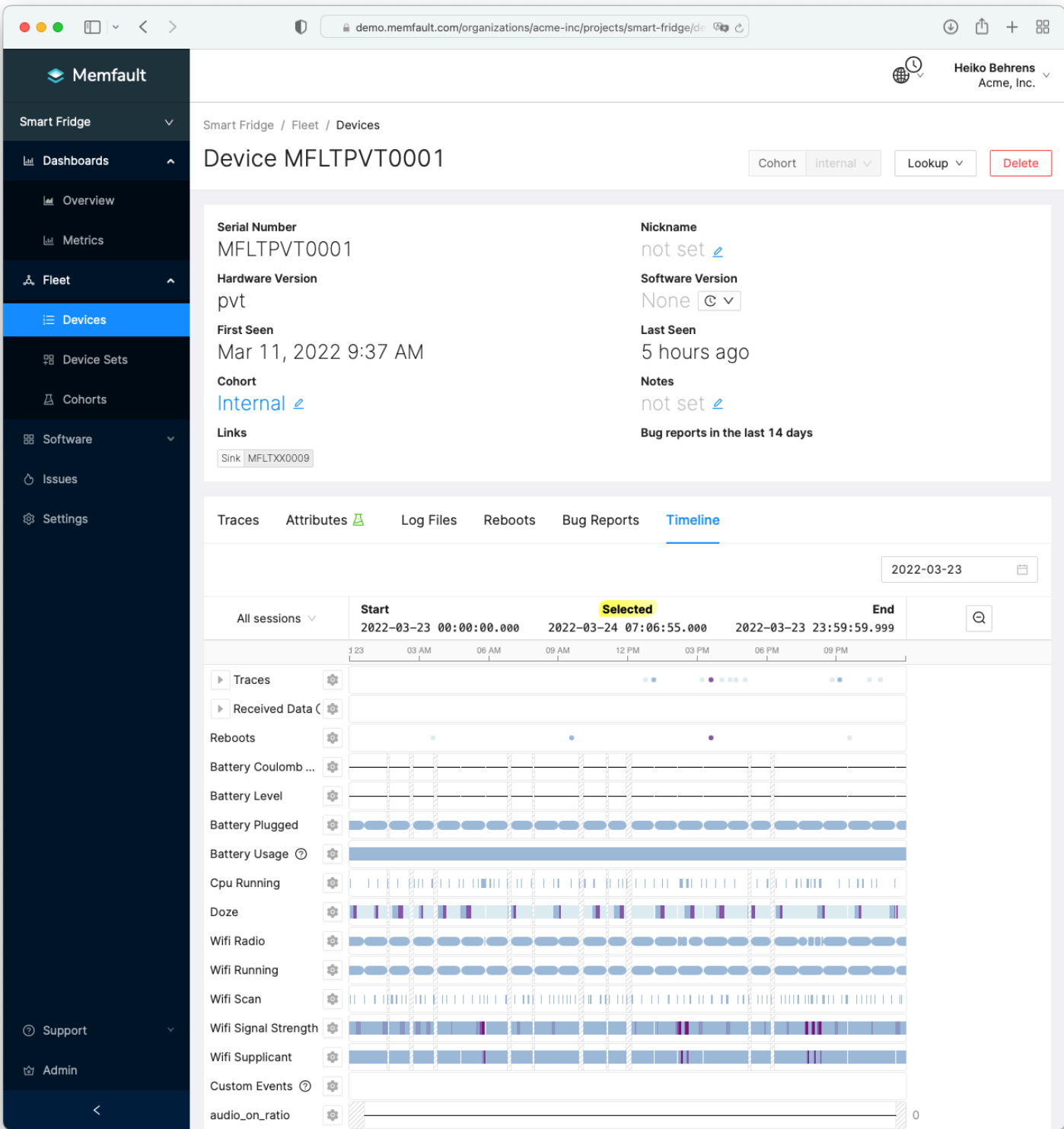
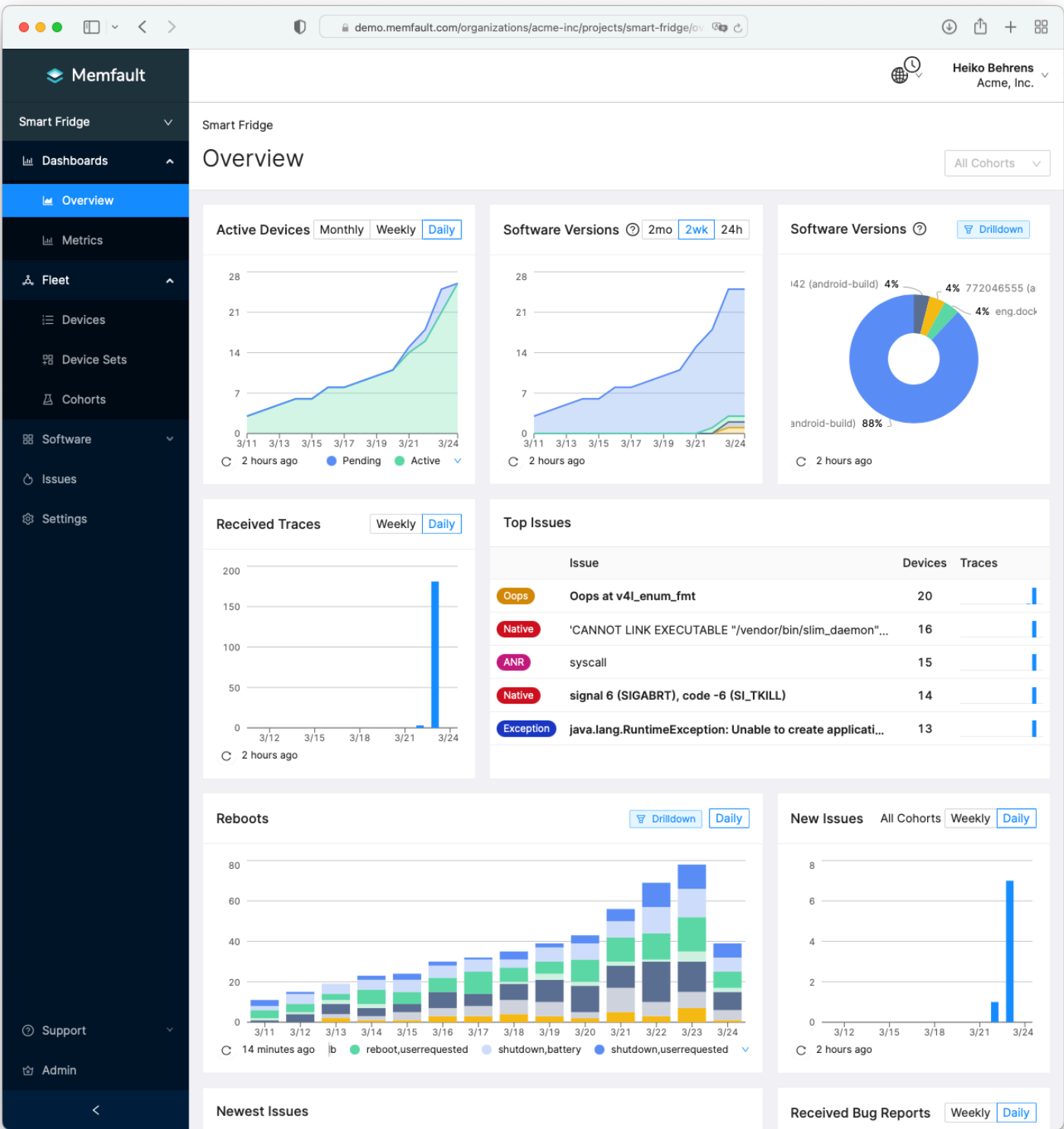
- A. Yes, via Memfault
- B. Yes, other solution
- C. No

Getting Started with Memfault

As an Android engineer, how do I
integrate Bort into the AOSP build?
How can I use it to observe my fleet
and perform post-mortem debugging?



Observing Your Fleet with Memfault



Getting Started With Memfault

- ◇ Bort is well documented and quick to integrate
 - ◇ Highly configurable, source code available on GitHub
- ◇ Memfault offers a device-centric perspective of your fleet out of the box
 - ◇ Fleet overview dashboard
 - ◇ Post-mortem debugging and logs (similar to Android bug reports)
 - ◇ Per-device timeline (similar to Android battery stats)

Updating via System Updates

Android devices can receive and install over-the-air (OTA) updates.

★ New: Incremental Updates



Managing System Updates in Memfault

Memfault

Version Matrix

Dashboards

Fleet

Devices

Device Sets

Cohorts

Software

Issues

Settings

Support

Admin

dev.memfault.com/organizations/bort-4-0-webinar/projects/version-mat...

All Systems Operational

Heiko Behrens
Bort 4.0 Webinar

Version Matrix / Cohorts

default

Lookup

Delete

Details

Slug
default

Size
80 devices

Name
default

Version Management

Distribution

Settings

Device Distribution

pvt

Software Version	# Devices
2.0.0 (android-build)	62 (78%)
1.1.0 (android-build)	16 (20%)
1.0.0 (android-build)	2 (3%)

Current Deployment

Release
google/bulthead/bulthead:1.1.0/OPM7.18...
keys

Date
an hour ago

Deployed by
Heiko Behrens

Status
Done

Software Versions

2mo 2wk 24h

Memfault

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All Systems Operational

Heiko Behrens
Bort 4.0 Webinar

Version Matrix / Cohorts

second_example

Lookup

Delete

Details

Slug
second_example

Size
97 devices

Name
second_example

Version Management

Distribution

Settings

Future version

25% staged

Current version

Target

	2.0.0	2.1.0	2.2.0	Total	
1.0.0 (android-build) (pvt)	2	0	0	2	
1.1.0 (android-build) (pvt)	16	0	0	16	
2.0.0 (android-build) (pvt)	2.1.0	0	62	62	
2.1.0 (android-build) (pvt)	2.2.0	0	10	15	
	+	18	72	5	95

Memfault

Version Matrix

Dashboards

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All Systems Operational

Heiko Behrens
Bort 4.0 Webinar

Version Matrix / Fleet / Devices

Device D2E7A5D9E3080ACE

Cohort

second_example

Lookup

Delete

Serial Number
D2E7A5D9E3080ACE

Nickname
not set

Hardware Version
pvt

Software Version
2.1.0

Update available

Past Software Versions

Seen at	Software Type	Version
Not available	android-build	2.1.0
Not available	android-build	2.0.0
Not available	android-build	1.1.0
Not available	android-build	1.0.0

Future Releases

2.1.0 (android-build)

Current Software Version

2.2.0

Next Release to be deployed

Inspect details

View Cohort details

End date

Issue

Captured

Source Type

Device Serial

Software Version

Cohort

No Data

Over-The-Air System Updates

- ◇ Supports updates via RecoverySystem and Update Engine (A/B or Seamless)
- ◇ Downloads can be resumed and are backed by global CDN
- ◇ UI notifications of available updates, and download progress
- ◇ Memfault supports mix of full updates and incremental updates
- ◇ Beta cohorts, staged rollouts
- ◇ Visibility of current version distribution and ongoing rollout

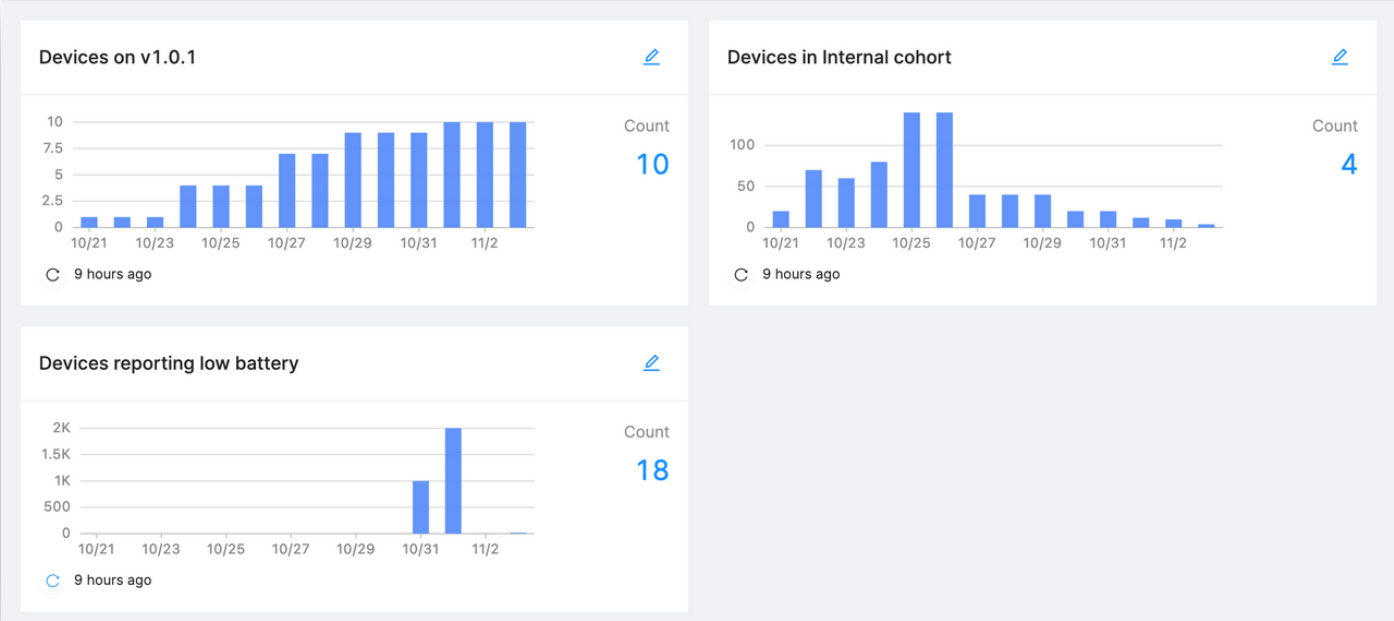
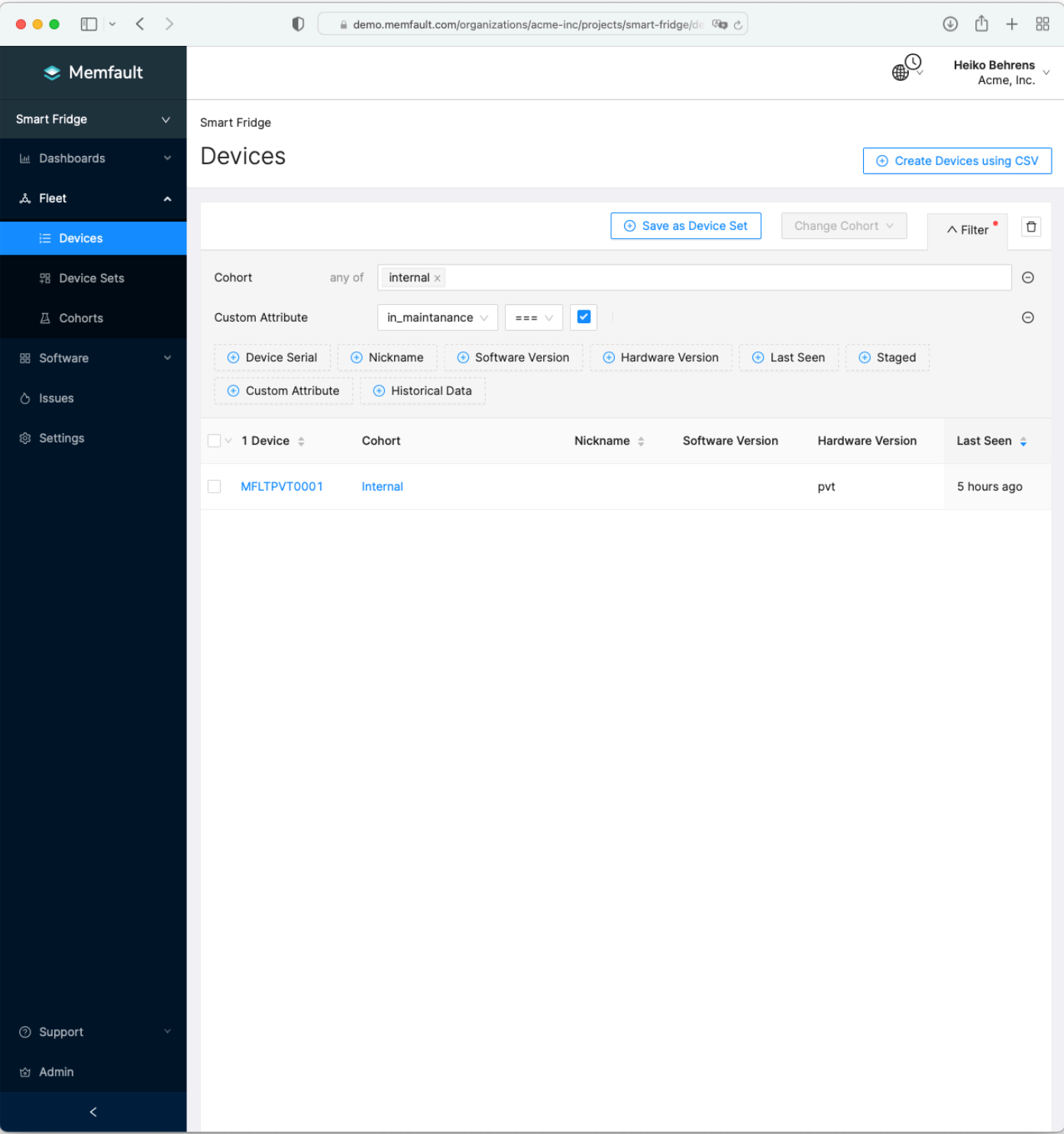
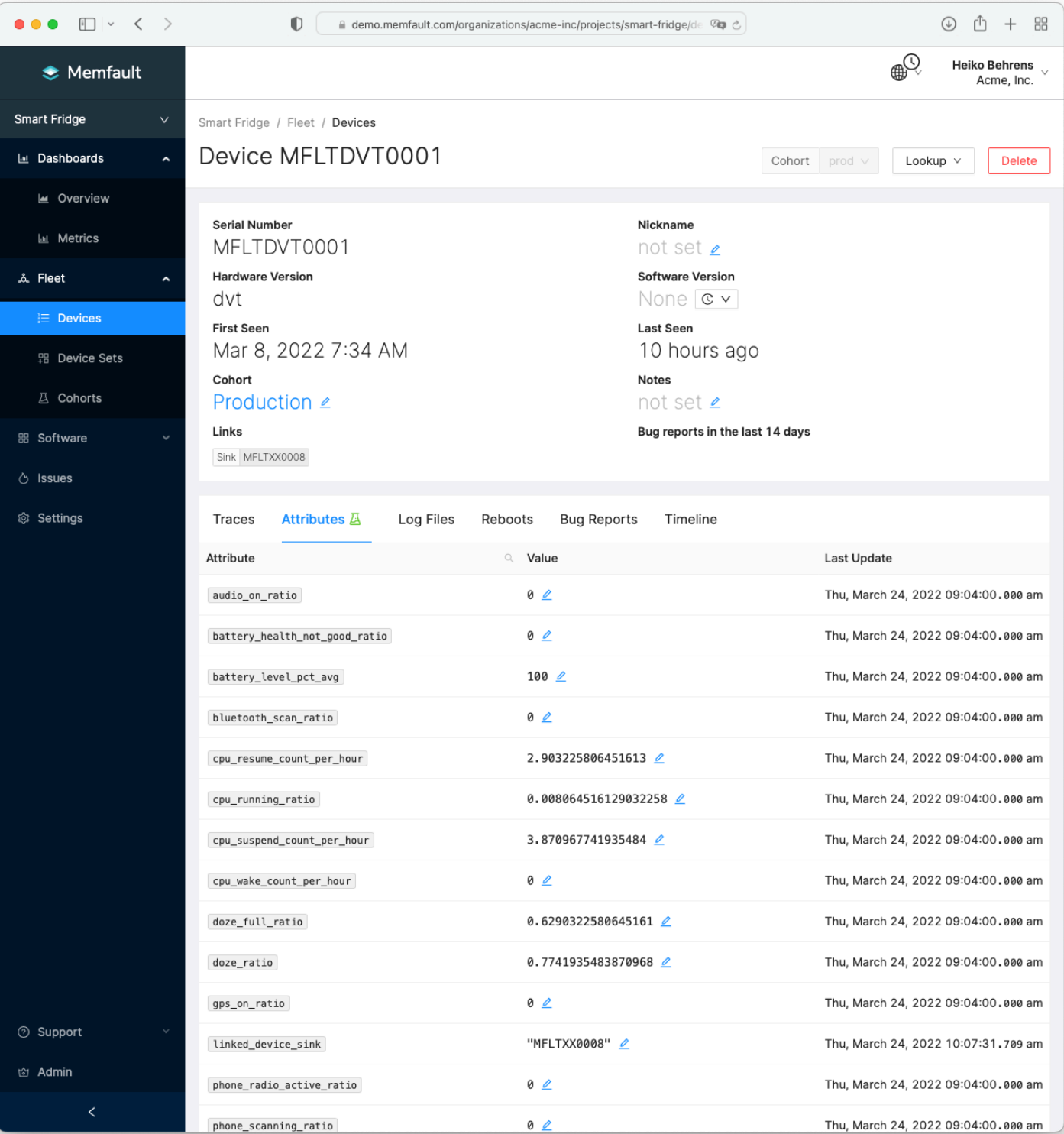
Fleet Management via Device Attributes

Define and populate custom device attributes to segment your fleet according to product-specific needs.

★ New: [Bort Custom Metric Reports](#)



Device Attributes in Memfault



Device Attributes

- ◇ **On-Device Metrics Service** (receive + spool metrics)
 - ◇ Collects default built-in metrics (battery stats + system properties)
 - ◇ Support for custom metrics (from apps and services)
- ◇ **Fleet Segmentation** (populated via most-recent metric reading, API, or manual)
 - ◇ “Are the battery issues related to a particular batch?”
 - ◇ “What’s the version distribution in Europe vs. North America?”
- ◇ **Inventory Management**: “Which devices are currently in repair?”

Poll #2

Do you collect
metrics today?

- A. No
- B. Only some generic system-wide values
- C. < 20 custom metrics
- D. Everything collects telemetry everywhere

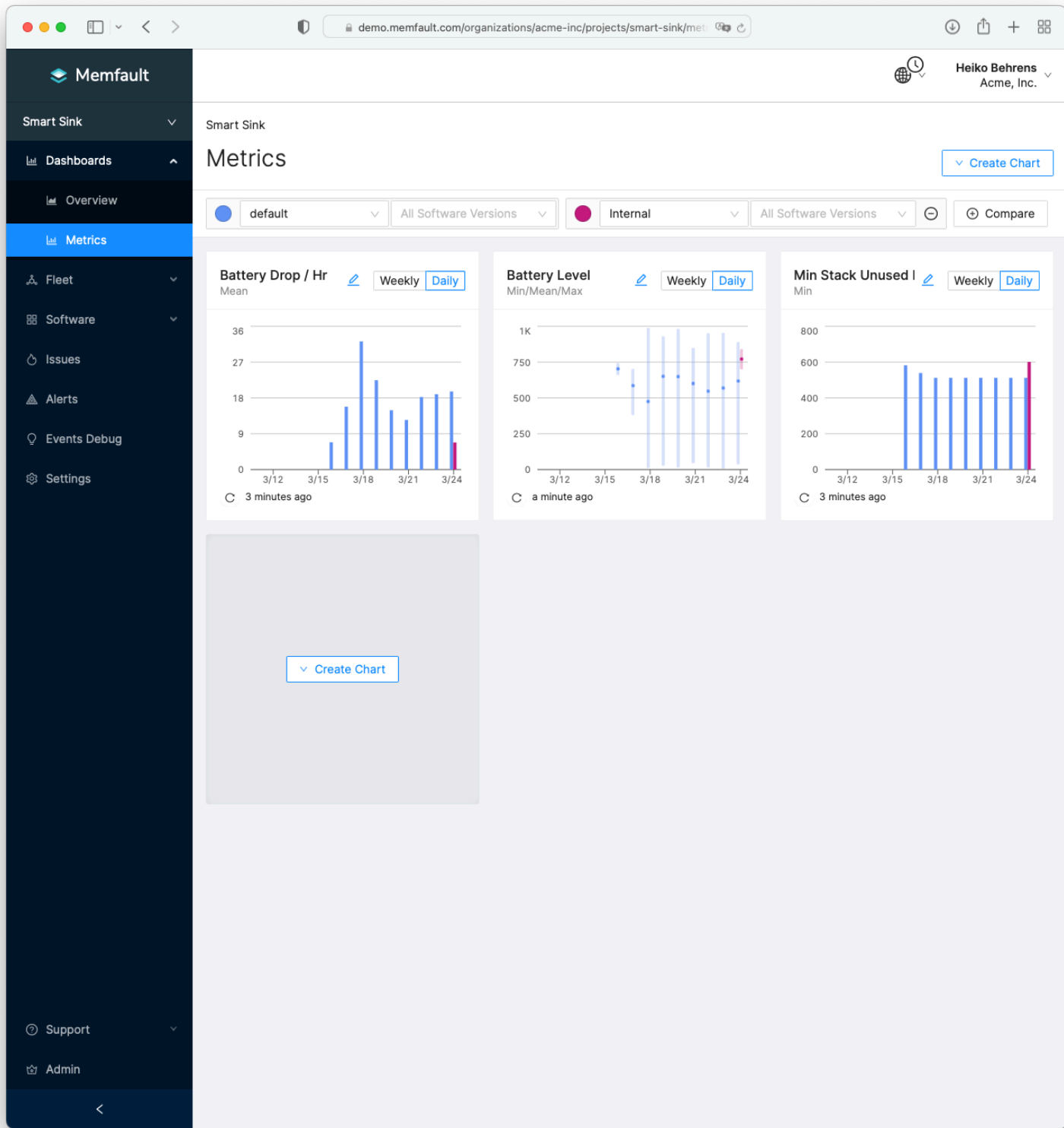
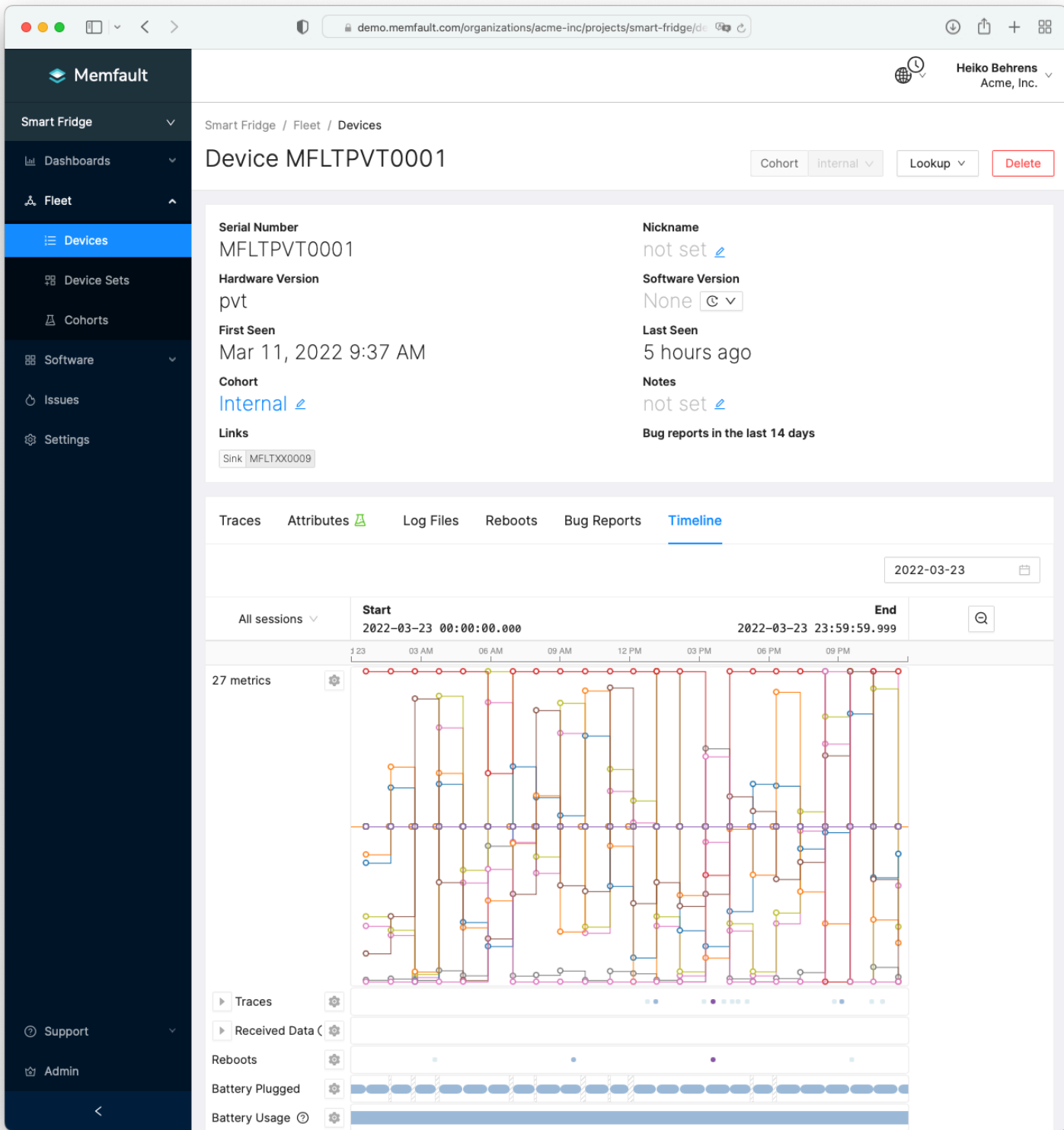
Fleet Monitoring via Time Series Metrics

A metric is a measurement captured at runtime. Combing large numbers of metrics and calculating statistics is called an **aggregation**.

★ New: **Bort Custom Metrics**



Fleet-Wide Charts via Time Series Metrics



Time Series Metrics

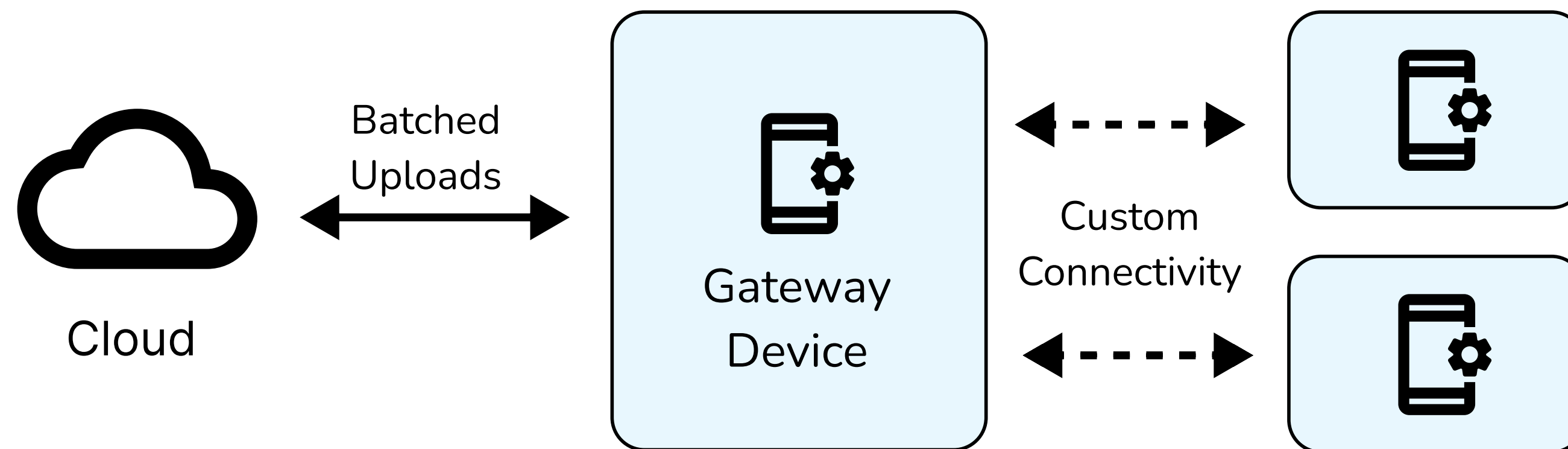
- ◇ Proactive fleet monitoring via **charts and alerts**
- ◇ Describing device populations via **historical data**
 - ◇ “Devices on 0.2-beta that were charged >90% this week but are below 10% now”
 - ◇ “Did the frequency of disconnects decrease since 2.1-fix4321?”
- ◇ Even more powerful when combined with **Device Attributes**, some customer voices
 - ◇ “What impact does the latest driver or BSP update have on performance?”
 - ◇ “How do KPIs vary from factory to factory? (Different builds due to chip shortage)”
 - ◇ “What devices did not update, and why? (Devices were low battery)”

Advanced Topologies via **Linked Devices**

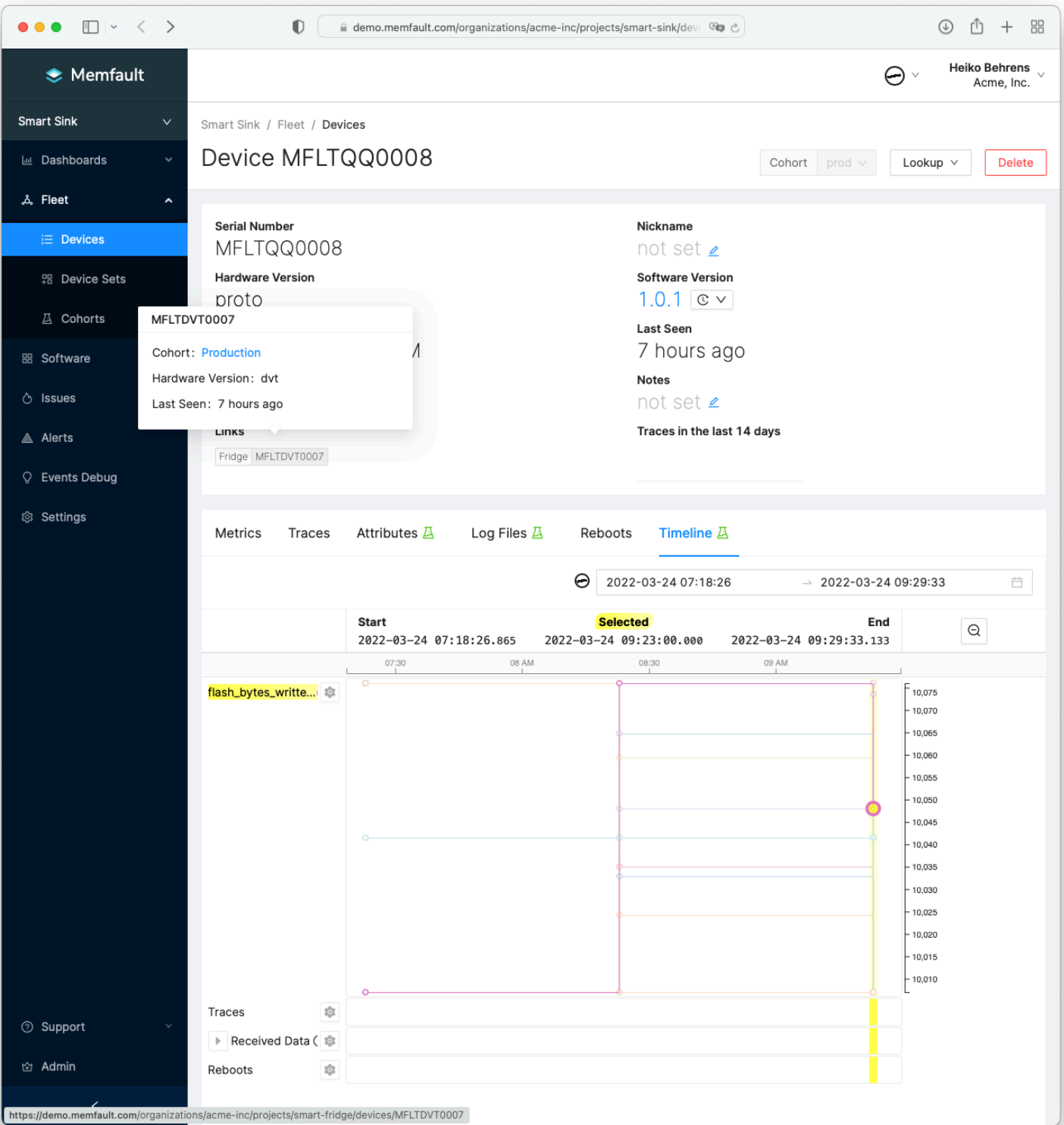
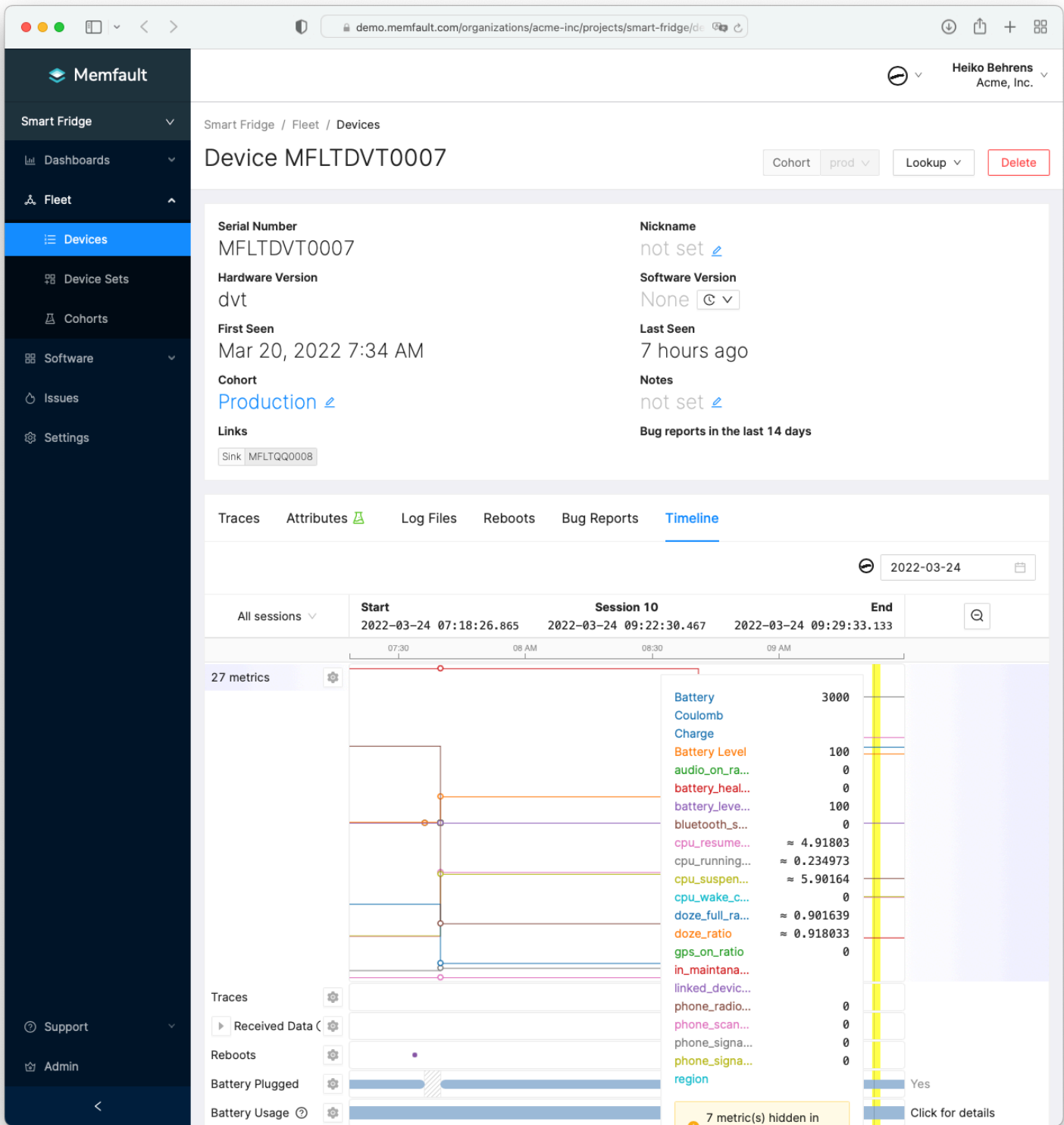
- ★ New: **Device Links**
- ★ New: **Custom Data Connection**



API connectivity for Offline Devices



Linked Devices



Memfault supports **Advanced Device Topologies**

- ◇ Represent products that consist of multiple devices
 - ◇ Simplified navigation when investigating connectivity issues
 - ◇ Visualizing time-related data side-by-side
- ◇ Support of scenarios with strict security requirements (no direct connectivity)

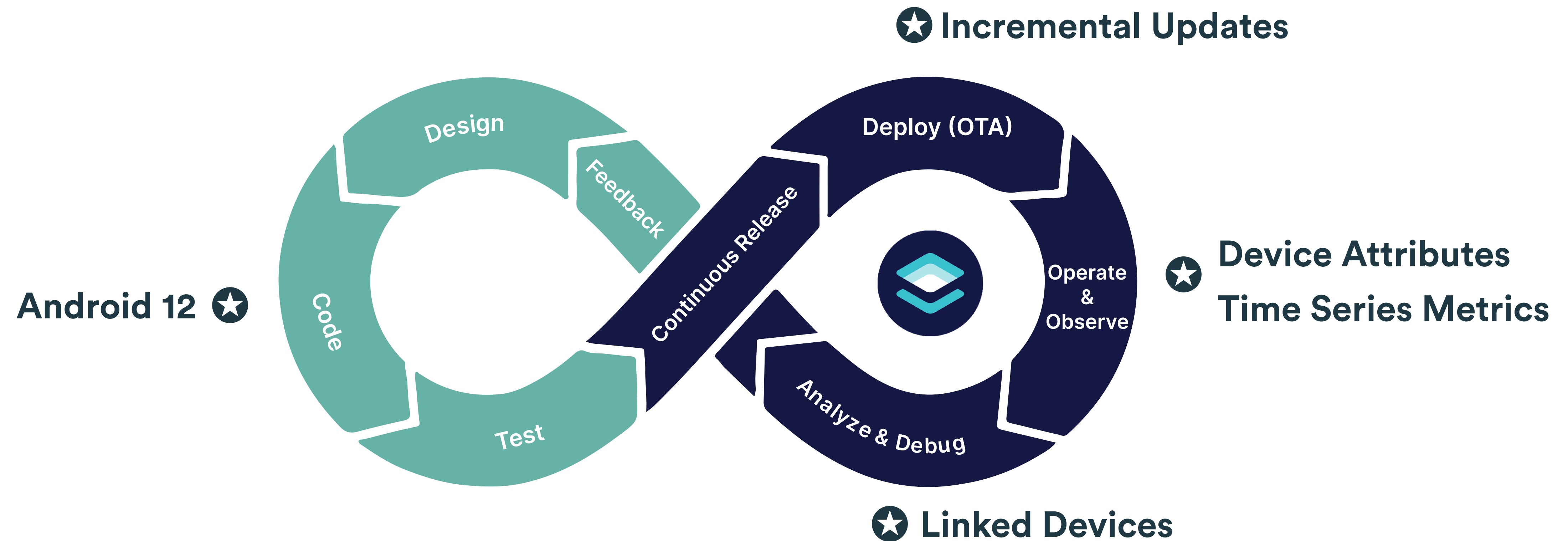


The Big Picture

★ ... and what is new since Bort 4.0

Fleet Management & Observability with Memfault

★ ...and what is new since Bort 4.0



What does Memfault offer?

	Monitoring (Metrics)	Debugging (Logs)	Debugging (Crashes)	Updates (System Updates)
AOSP				
Agent				
Backend				
Dashboard				

What does Memfault offer?



Android (AOSP)

Dashboard

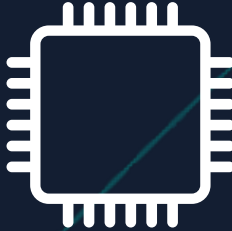


Monitoring
(Metrics)

Debugging
(Logs)

Debugging
(Crashes)

Updates
(System Updates)

Memfault offers Cloud Debugging and Observability for **Any Embedded Device!**

		Monitoring (Metrics)	Debugging (Logs)	Debugging (Crashes)	Updates (System Updates)
	Microcontrollers				
	Android (AOSP)				
	Embedded Linux	Initial Support	Coming Soon	Coming Soon	Initial Support
Dashboard		Common UI across your entire fleet of embedded devices			

Bis zum nächsten Mal!

- ◇ memfault.com/android
- ◇ twitter.com/memfault
- ◇ linkedin.com/company/memfault
we're hiring!



Heiko Behrens

Head of Product, Memfault