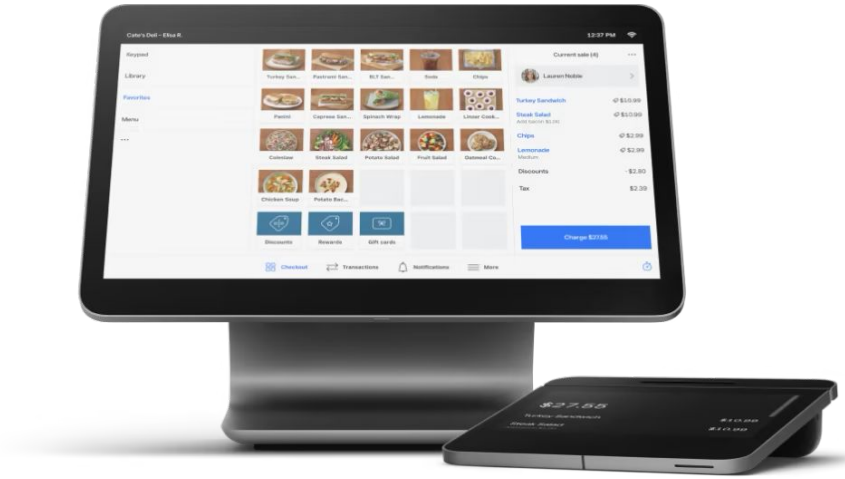
Debugging Android Devices in the Field

Chris Hayes

Android Solutions Engineer - (He/Him)

- Enjoys: Digging into hard problems
- Previously: Square (9 years)
  - Android App Development
  - Android Build Systems
  - Android OS Platform
- Full Time remote out of Colorado, USA



AOSP Diagnostics Overview

The latest in performance monitoring and debugging logs to understand your AOSP device and fix problems

Overview

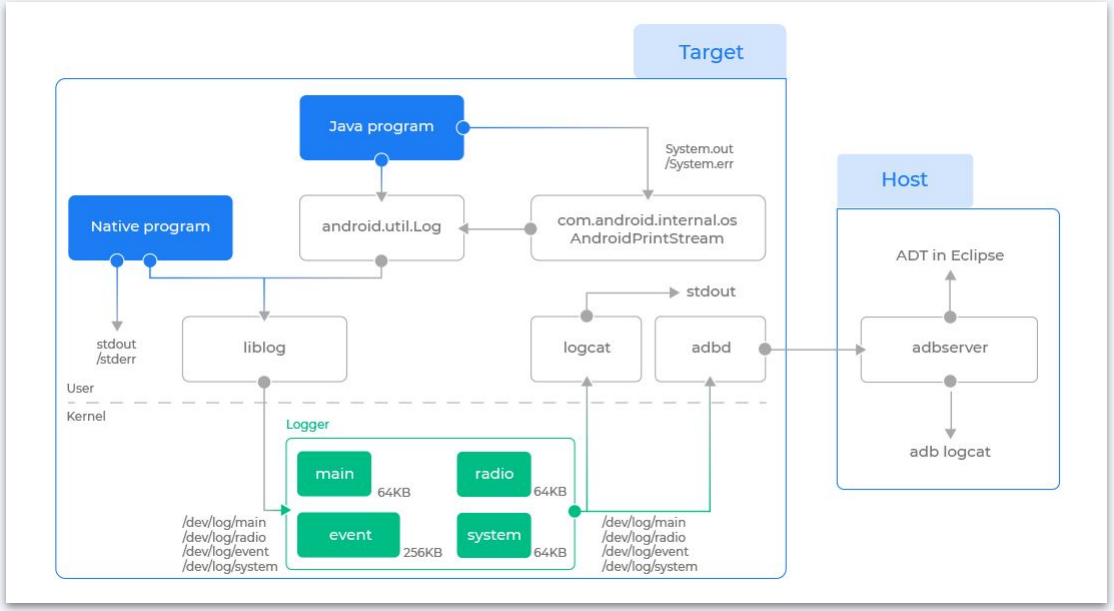
Logging

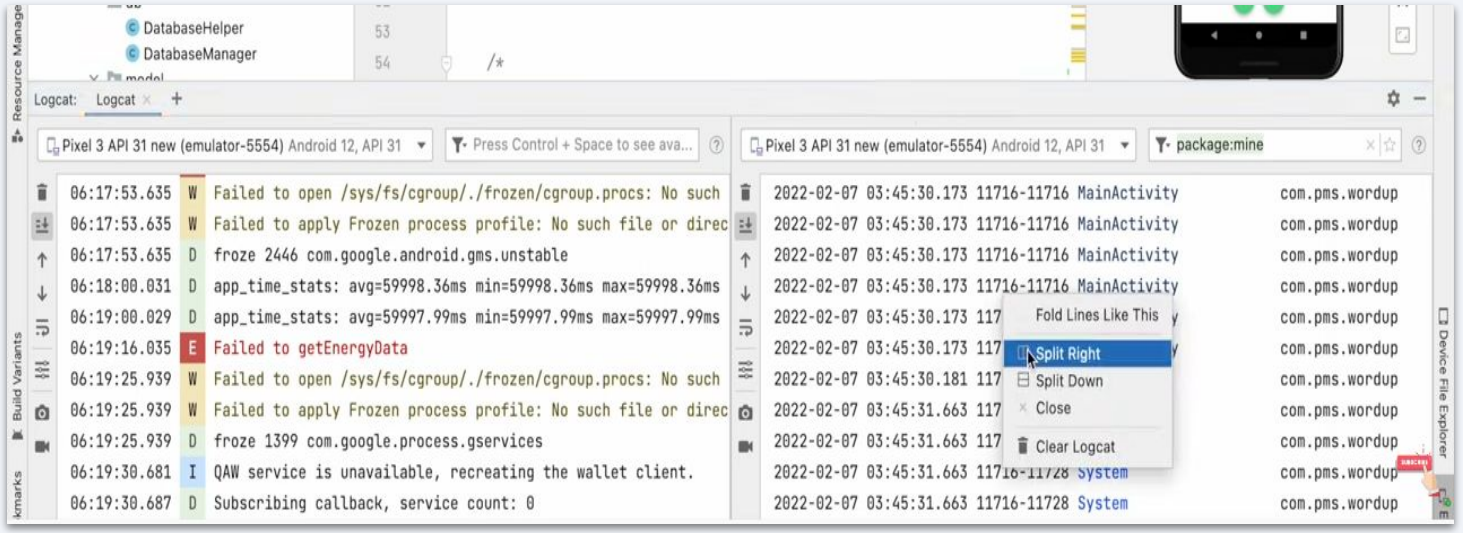
Diagnostic Tools

Observing Your Fleet

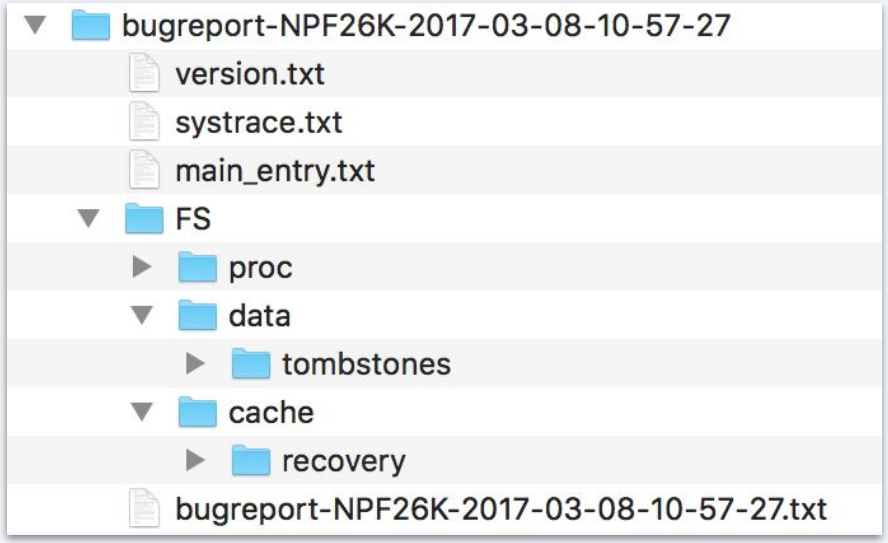
Logs for AOSP Developers

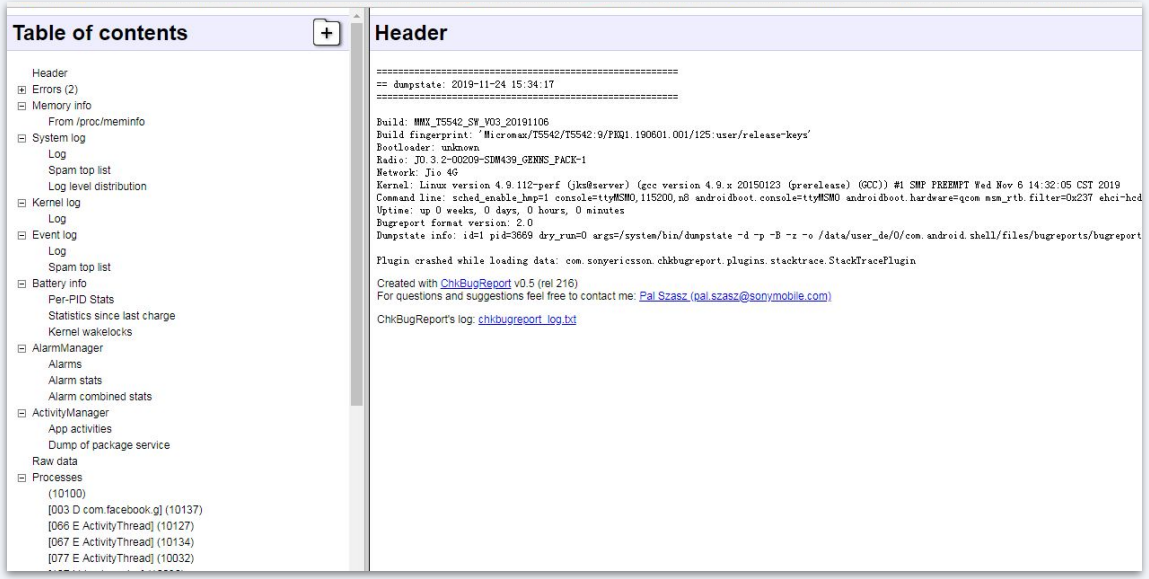
- Logcat = Circular buffers of AOSP app logs
  - main, system, crash, radio, event
  - Logcat V2 – new updates in Dolphin!
- Kmesg/dmesg = Kernel/driver logs (/proc/kmesg)
  - Great for capturing message from reboot
- **Helpful Resources**
  - Android Debugging Core Topics
  - Android Studio Logcat User Guide
  - Android Log Analysis by pCloudy
  - Logcat V2 features from googleblog
  - Logcat V2 detail overview (YouTube)





Debug Tools (log capture and analysis)





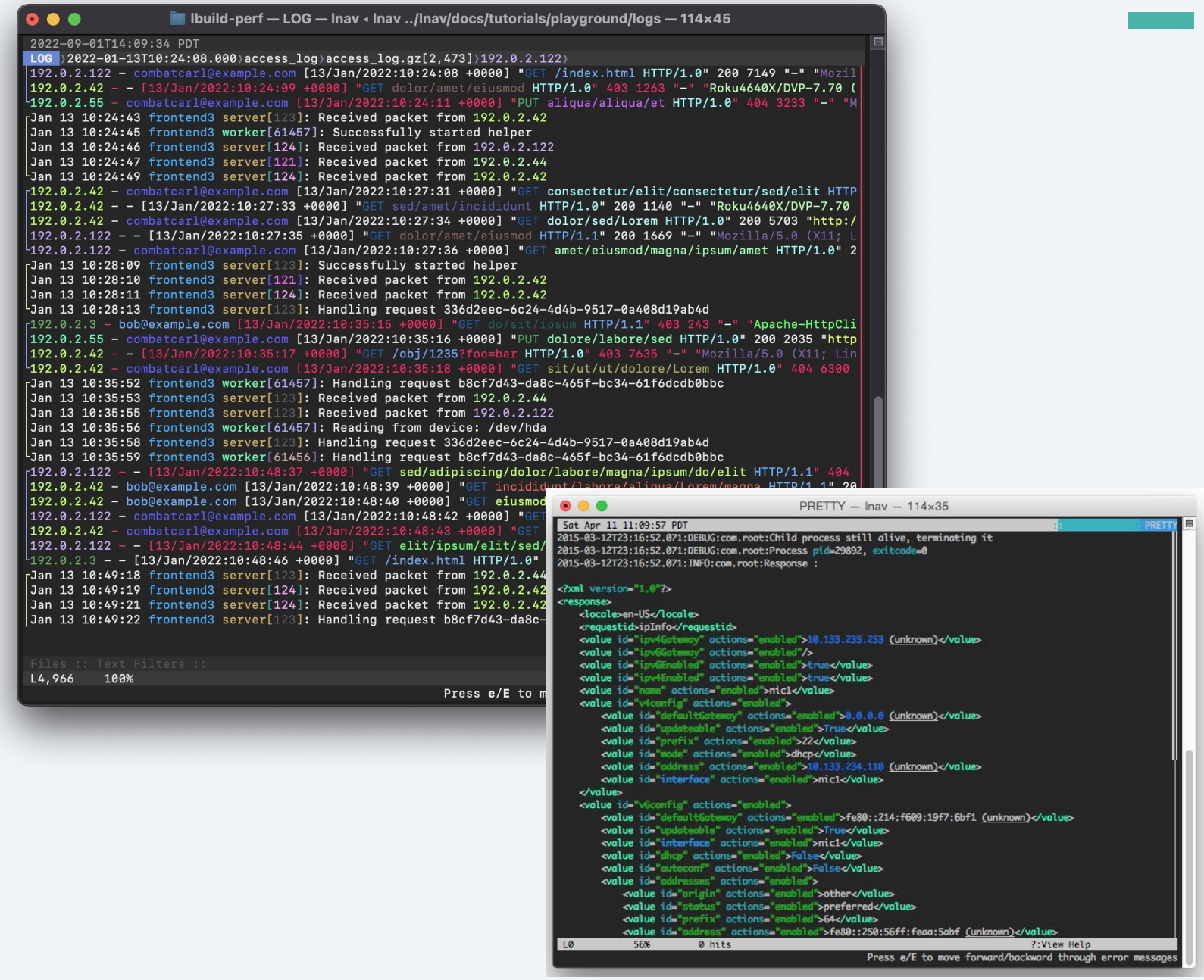
- ADB – Android Debug Bridge
  - Connect your host to device, get logs from logcat
- Bug Reports – Snapshot of logs for troubleshooting
  - Dumpsys – System services
  - Dumpstate – Error logs
  - Logcat – System messages
- DropBoxManager – More targeted reports
  - Data specifically from apps that crash

- **Helpful Resources**
  - Android Debugging Core Topics
  - Android Studio Bug Report User Guide
  - Android Bug Report Videos (YouTube)
  - A helpful viewer: ChkBugReport

LNAV

- Feature rich log navigator
- SQL query language built in
- Histogram view
- Multi-log interpolation
  - Merge logcat and kernel logs
- Supports custom log formats
- Syntax highlighting
- Custom regex highlighting
- Pretty-print structured data

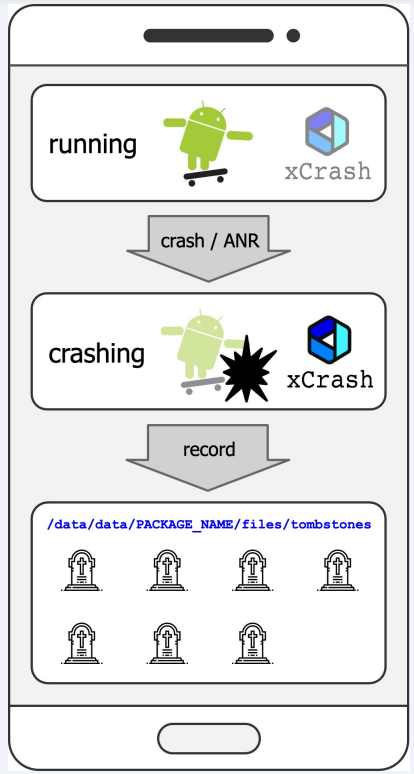
- **Helpful Resources**
  - lnav features
  - Android Log Format



Android Crash Data from the Logs and Tools

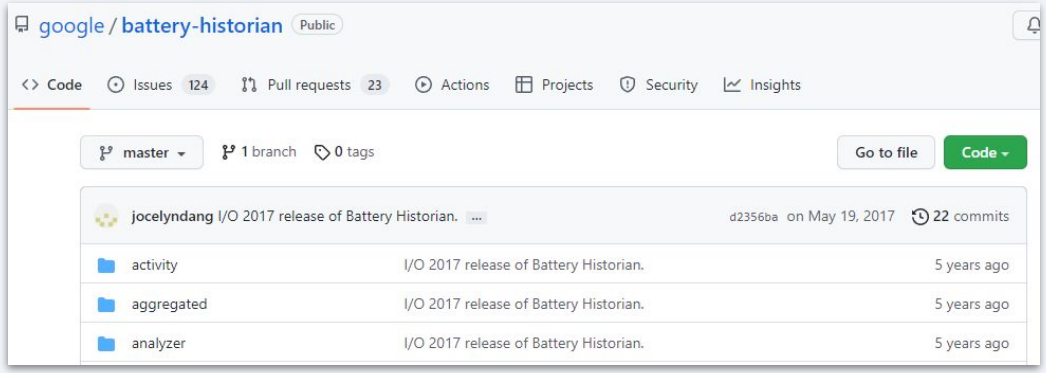
- Tombstones - More detail than logcat from crash dump
  - /data/tombstones/<file>
  - Stack traces of all processes, memory map, open files
- ANRs – Application Not Responding (5 seconds)
- Kernel Oops – Serious, possibly fatal kernel errors
  - Found in logcat
- WTFs – an assert triggered by logcat
- Java exceptions
- SELinux policy violations
  - In audit.d logs

- **Helpful Resources**
  - Debugging Native Crashes in Android Apps

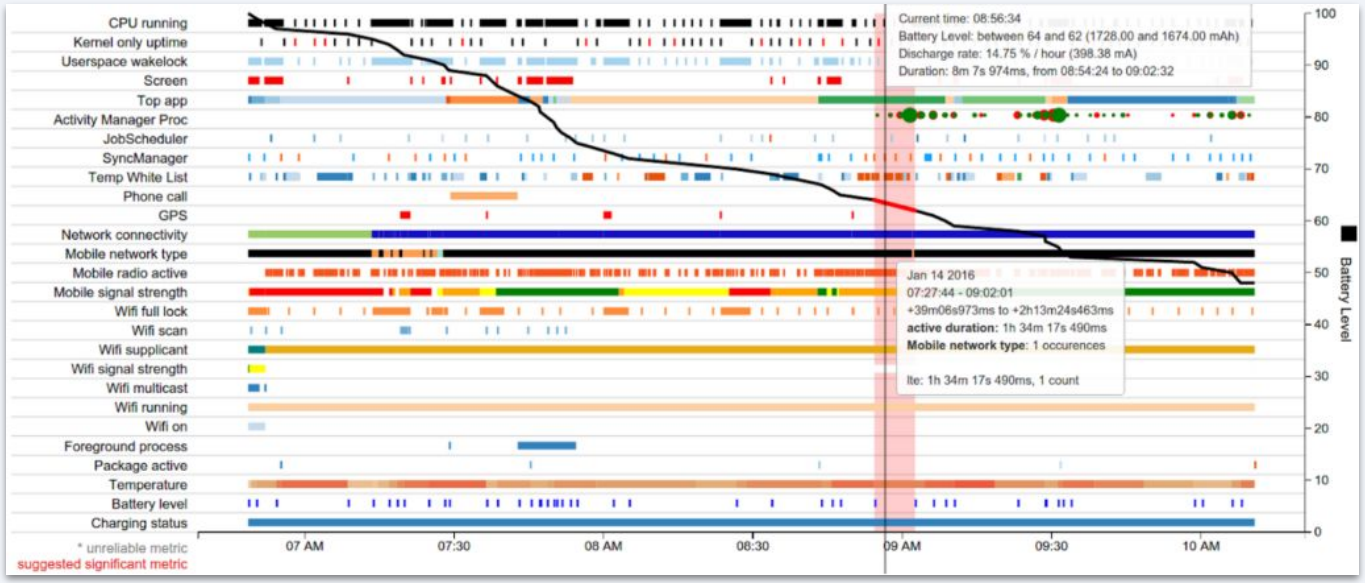


Batterystats & Battery Historian

- Batterystats – collects battery data on device
  - Which processes are drawing current?
  - When are they doing it?
  - Adb can get logs



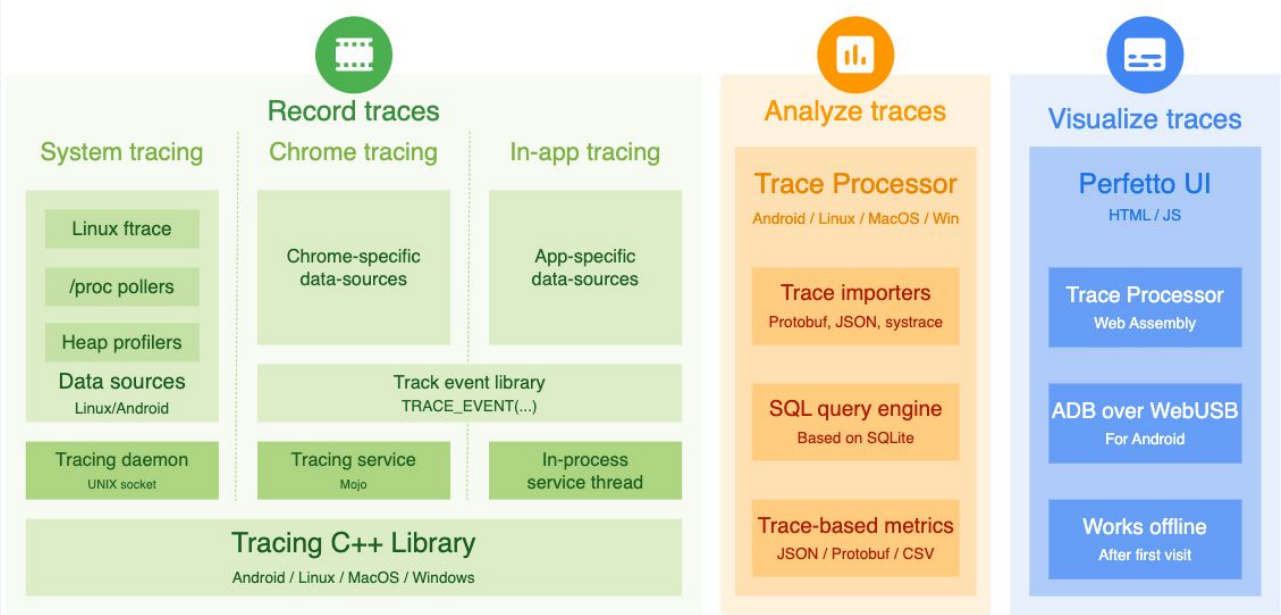
- Battery Historian – a viewer for Batterystats
  - Can consume a bug report (logs are in it)
  - Can show System Stats and App Stats



- **Helpful Resources**
  - Battery Historian GitHub
  - Battery Historian Video (YouTube)
  - Deeper Dive on Battery Historian (YouTube)

Performance Tracing & Monitoring

- Perfetto
  - Full system tracing framework and analysis tools.
  - Capture high frequency ftrace data: scheduling activity, task switching latency, CPU frequency and much more
- Leak Canary
  - A memory leak detection library for Android.
  - Built in heap analyzer
  - Allows for uploading heap analysis to third party services

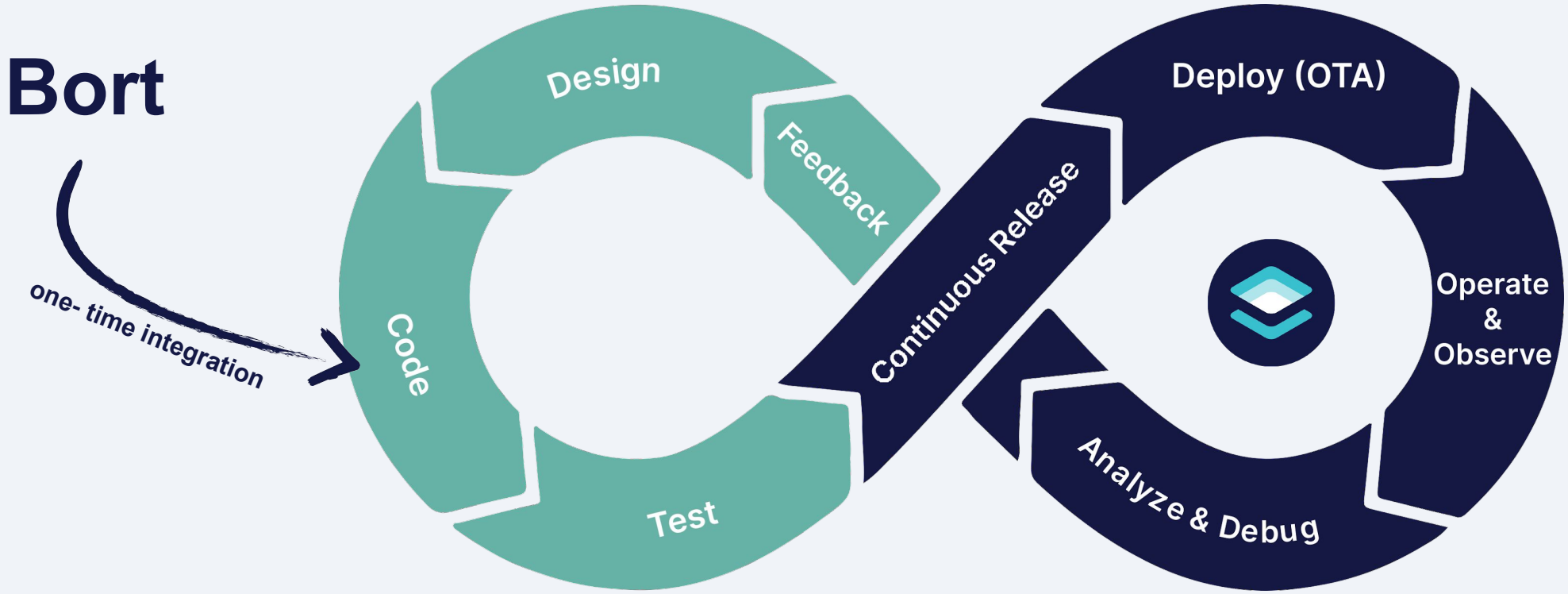


- **Helpful Resources**
  - Perfetto GitHub
  - Perfetto Docs
  - Leak Canary Getting Started

What is a common problem with the existing tools and information?

Memfault

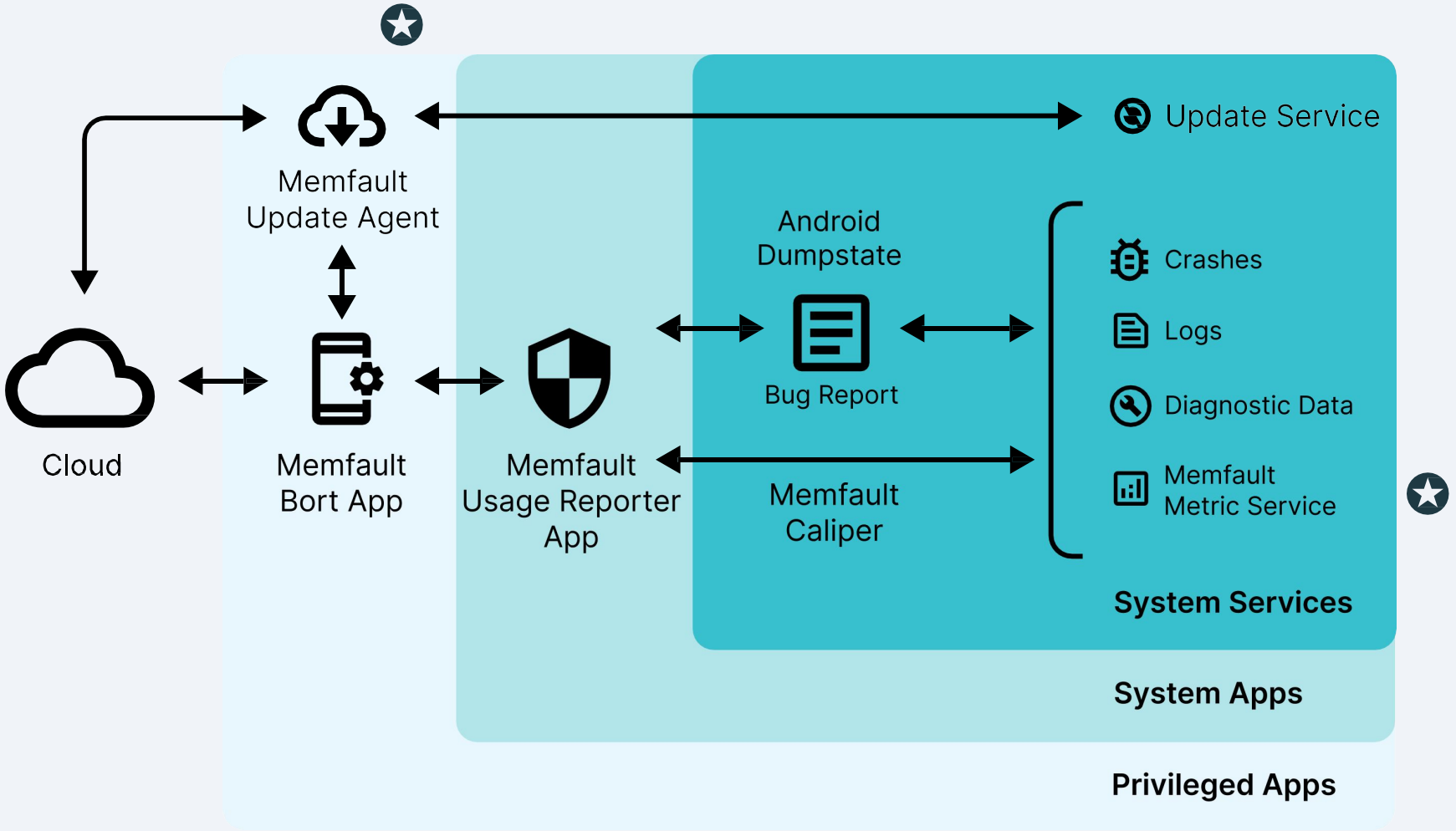
Applying DevOps Thinking



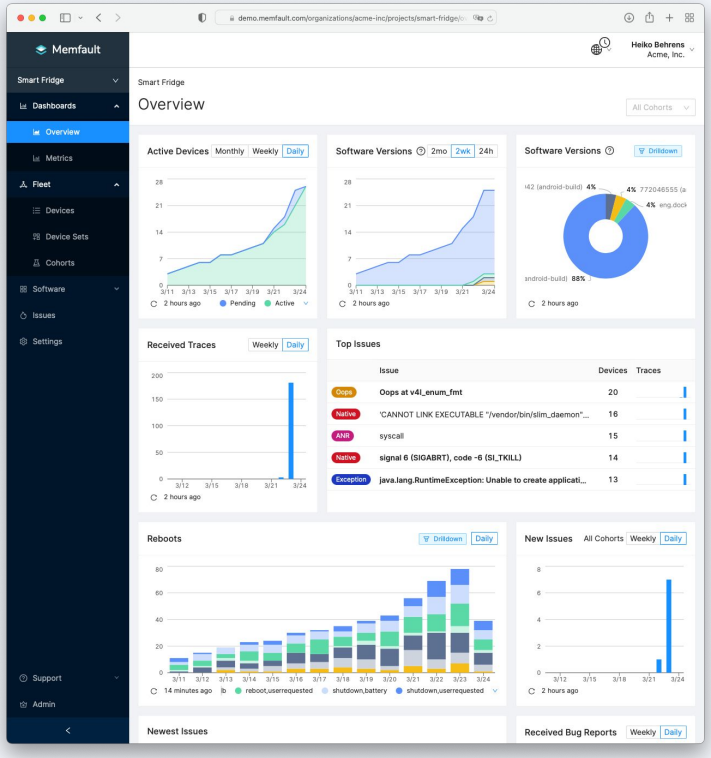
Development Process

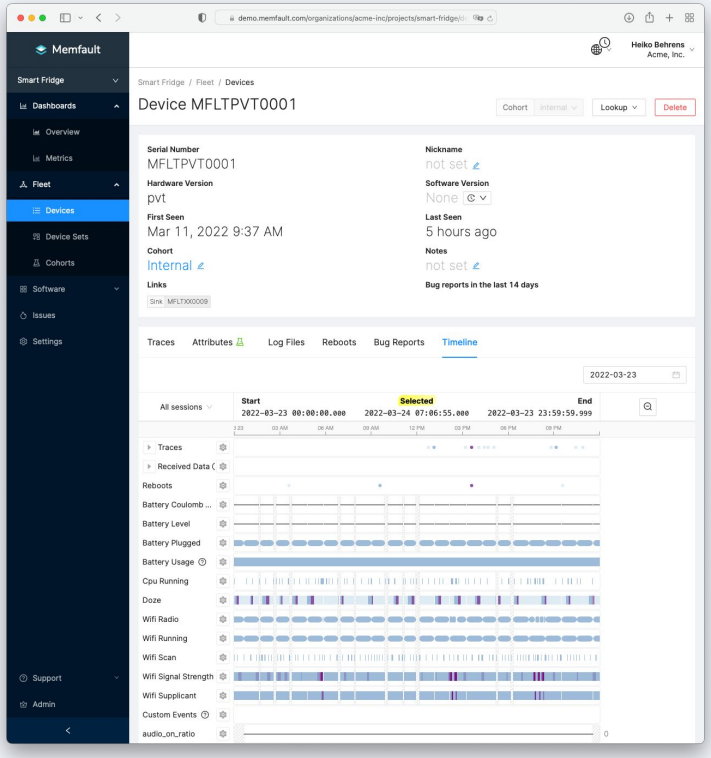
Fleet Management & Observability

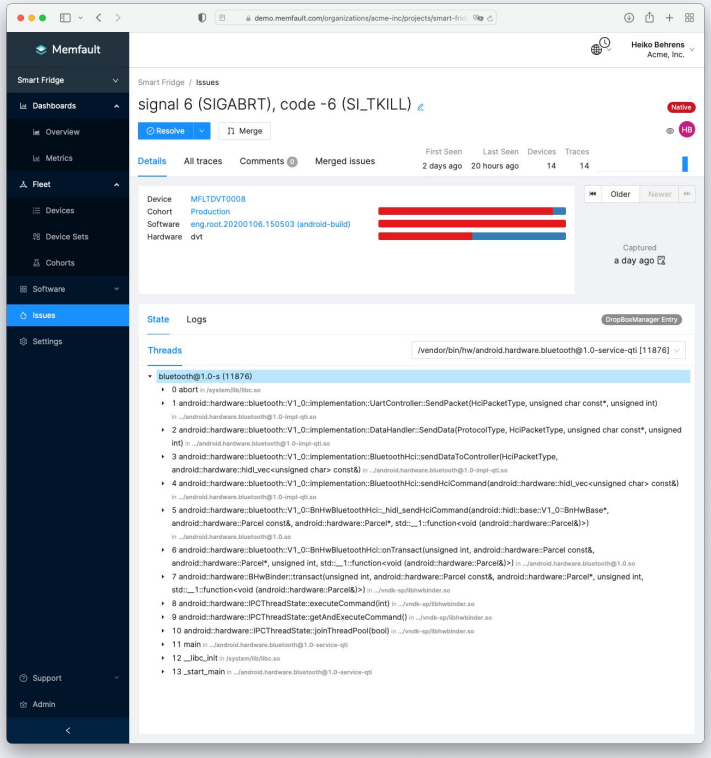
Inside Bort, the Memfault AOSP SDK



Observing Your Fleet with Memfault







Live Demo

Learn more about AOSP Tools and Memfault

Speaker

Ryan Case
Director of Engineering, Memfault

Link to Webinar

Speaker

Heiko Behrens
Head of Product, Memfault

Link to Webinar

The AOSP and AAOS Meetup

Meetup Group

Led by Chris Simmonds

Based out of the UK

Remote Friendly

Talks all about AOSP and AAOS!

Thank You!

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we're hiring!

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Chris Hayes

Android Solutions, Memfault