Debugging Android Devices in the Field
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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?
Applying DevOps Thinking

Bort

Development Process

Fleet Management & Observability

-one-time integration

Design

Feedback

Continuous Release

Deploy (OTA)

Operate & Observe

Analyze & Debug
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

**Speaker**

**Heiko Behrens**  
Head of Product, Memfault

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**On-Demand Webinar**

**How to Debug, Update & Monitor Embedded Android Devices**

Recorded: Thursday, October 28, 2021

**On-Demand Webinar**

**Managing Android Devices at Scale with Memfault AOSP SDK v4.0**

Recorded: Thursday, March 24, 2022
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!

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

Chris Hayes
Android Solutions, Memfault