

Mobile Performance at Scale

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CNUTCon 2017

全球运维技术大会

上海·光大会展中心大酒店 | 2017.9.10-11

智能时代的新运维

大数据运维
安全
SRE
DevOps
Kubernetes
Serverless
游戏运维
AI Ops
智能化运维
基础架构
监控
互联网金融





斯达克学院

实践驱动的IT教育



斯达克学院(StuQ)，极客邦旗下实践驱动的IT教育平台。通过线下和线上多种形式的综合学习解决方案，帮助IT从业者和研发团队提升技能水平。



10大职业技术领域课程

<http://www.stuq.org>

SPEAKER INTRODUCE

黄力菲 Engineering Manager

黄力菲(Leo Huang): 现在 Facebook 任 Engineering Manager。2010年至今在 Facebook 带领团队开发了开源开发工具 Nuclide, 以及代码审核工具 Phabricator。目前主管产品性能测试工具和平台的开发。2002-2010在微软从事 Visual Studio, SQL Server 引擎和智能个人设备的开发工作。毕业于清华大学自动化系, 在美国俄亥俄州立大学计算机系获硕士学位。



SPEAKER INTRODUCE

倪安迪 Software Engineer

倪安迪(Andi Ni): 现于 Facebook 任 Software Engineer, 从加入至今一直从事 Facebook 内部移动应用性能监测平台的开发工作, 目前主管 iOS 移动应用的性能监测与优化。毕业于浙江大学计算机系, 在卡内基梅隆大学获硕士学位。



TABLE OF
CONTENTS 大纲

- **Challenge: Performance**
- Performance Culture
- Simulator vs Physical Device
- On-demand Experiment
- Continuous Monitoring
- End-to-end Workflow

Facebook's Challenges

iOS Apps

Facebook Instagram
Messenger Ads Manager
Workplace Moments
Pages Manager Groups

Obj-C
Java

Swift

Cross-platform Components
Runtimes

Android Apps

Facebook Instagram
Messenger Ads Manager
Workplace Moments
Pages Manager Groups

JavaScript

C++

Language



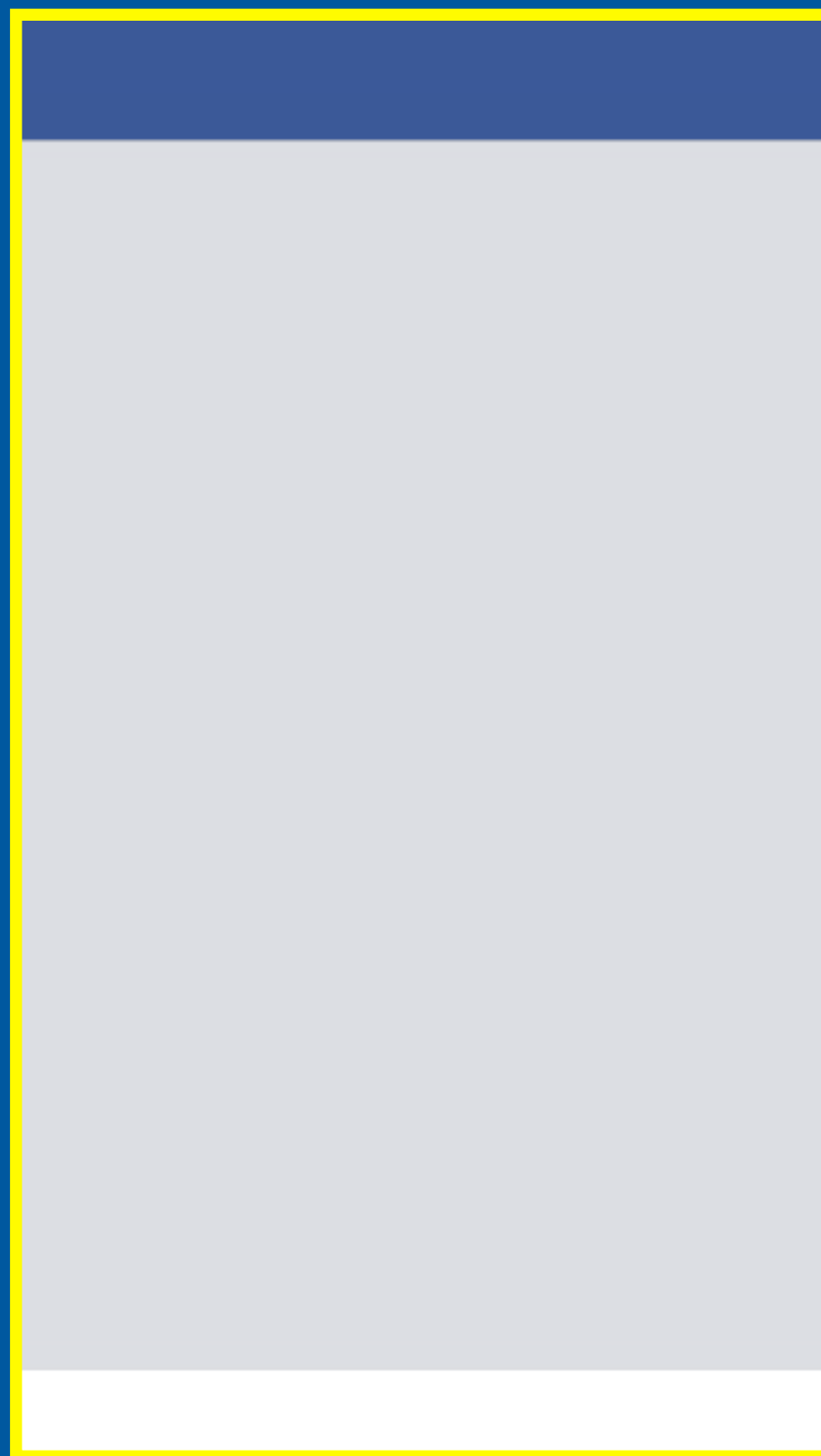
Some of the largest apps shipped on either platform

Diverse Markets to Support

- Over 1.3 billion mobile users around the world
- Hundreds of different device models
- Modem and 2G to 4G, LTE, and WIFI

**MOVE
FAST AND
BUILD
THINGS**

POSTER BROUGHT TO YOU BY YOUR FRIENDS AT  THE FACEBOOK ANALOG RESEARCH LABORATORY



Performance matters to our users

What kind of performance do we care about?

Scroll perf

Data usage

Animation speed

Cached data

Feed load time

Story load time

Battery

App size

Photo load time

Startup
(cold & warm)

Memory usage
(foreground & background)

But how do we improve all the things?

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Most developers are not perf experts





The natural impulse is to slow the
world down to not break
performance.

But we can' t compromise.

**MOVE
FAST AND
BUILD
THINGS**

POSTER BROUGHT TO YOU BY YOUR FRIENDS AT  THE FACEBOOK ANALOG RESEARCH LABORATORY

Let them do what they do best
With performance enabled
Without slowing down

So how do we enable mobile performance at Facebook?

Treat it like any other feature

Deep organizational support is critical

Build awareness and empathy
with everyone

And good tools

"A man is only as good as his tools."

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Nothing systematically improves
unless **systematically measured**

Pitfall #1

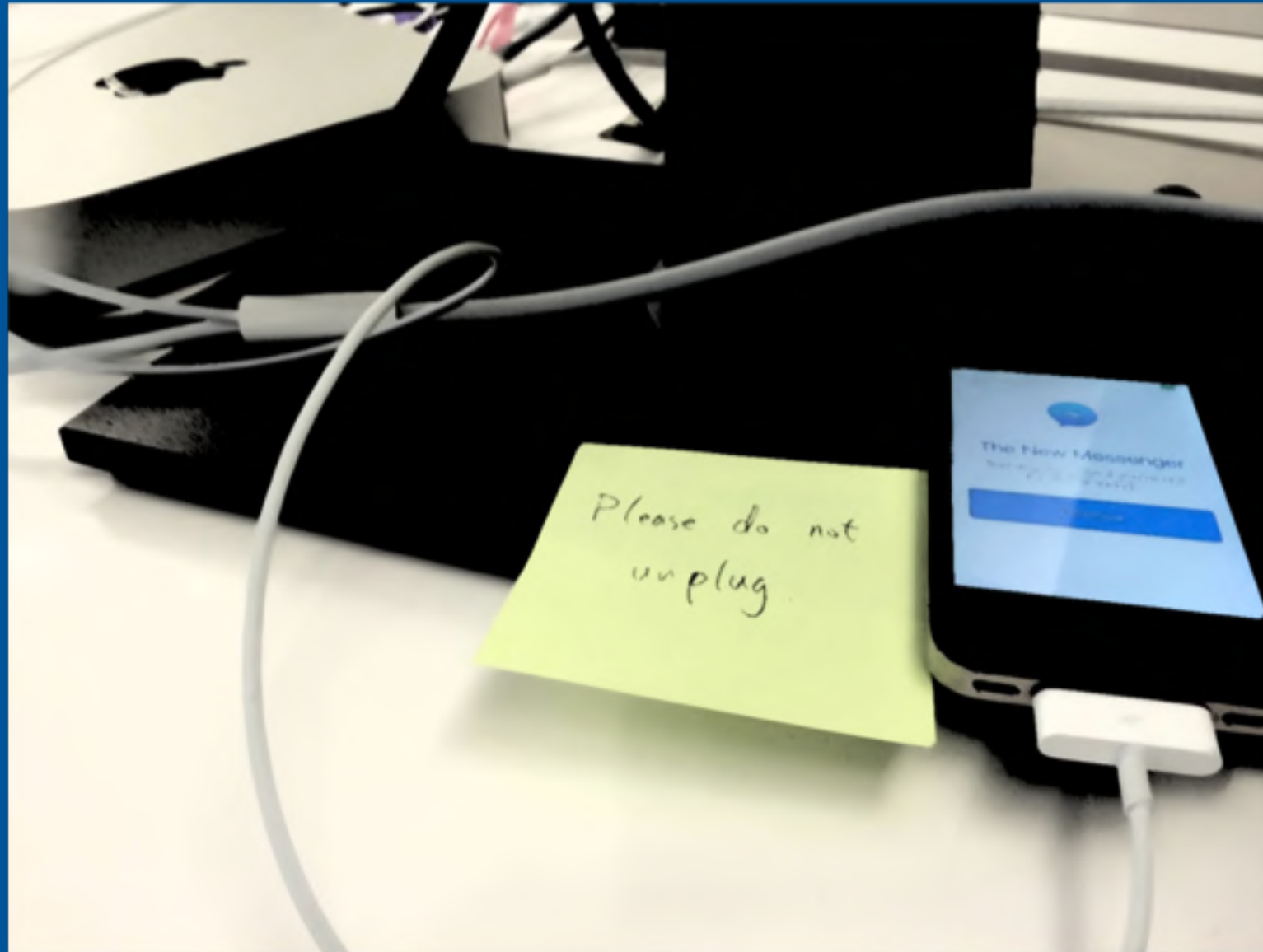
Simulators won't give accurate numbers
Run on real devices

Pitfall #2

Avoid perf comparisons by hand

Device Lab @ Facebook

Device Lab v1



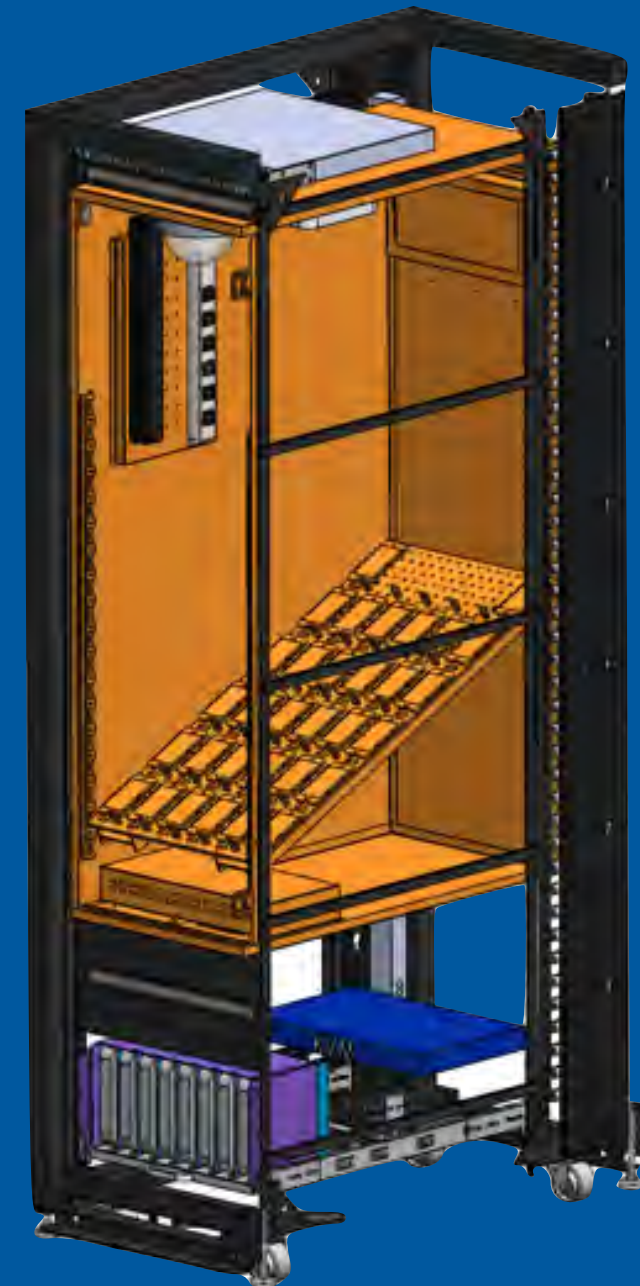
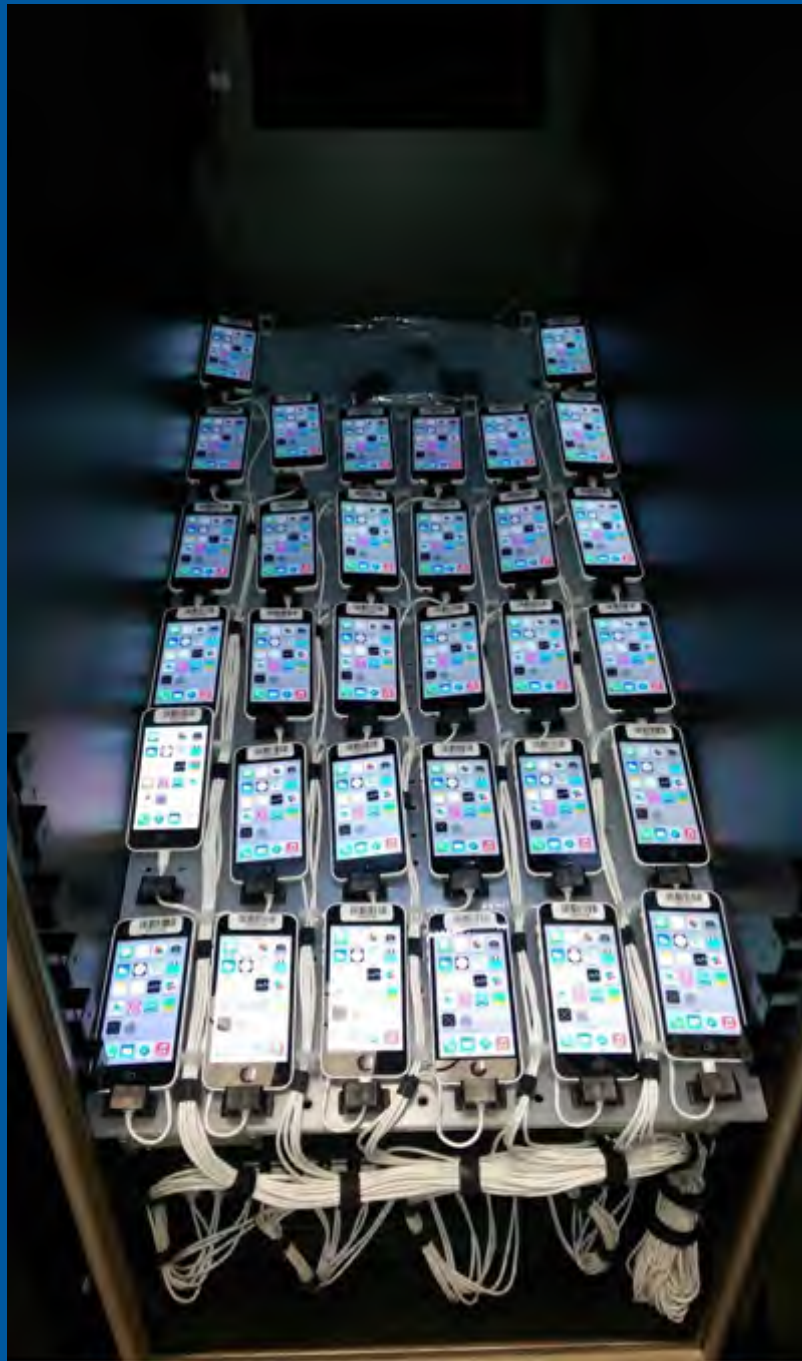
Device Lab v2



Device Lab v3



Custom Racks in Data Centers



Evolving Rack Design



OneWorld: Device as a Service

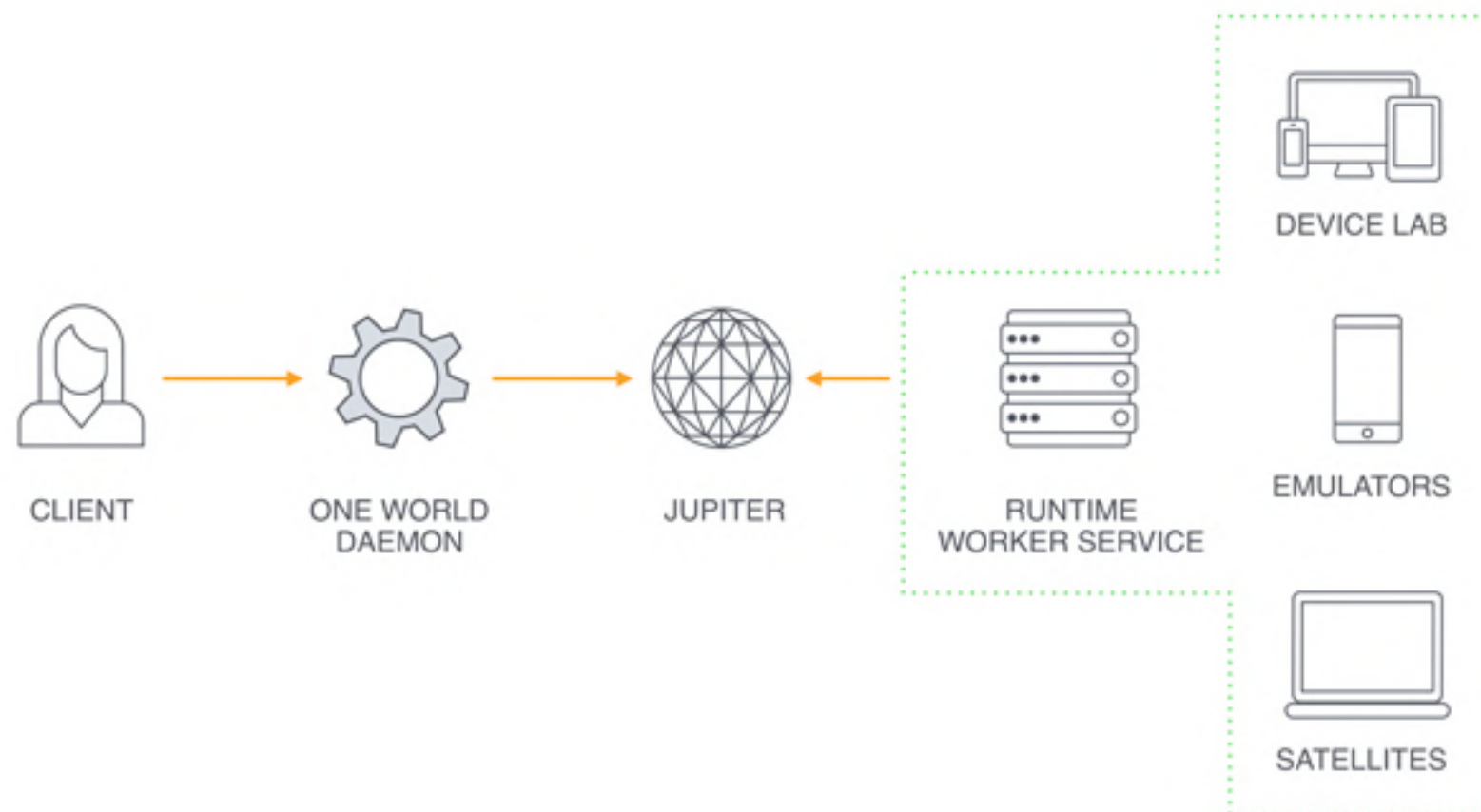


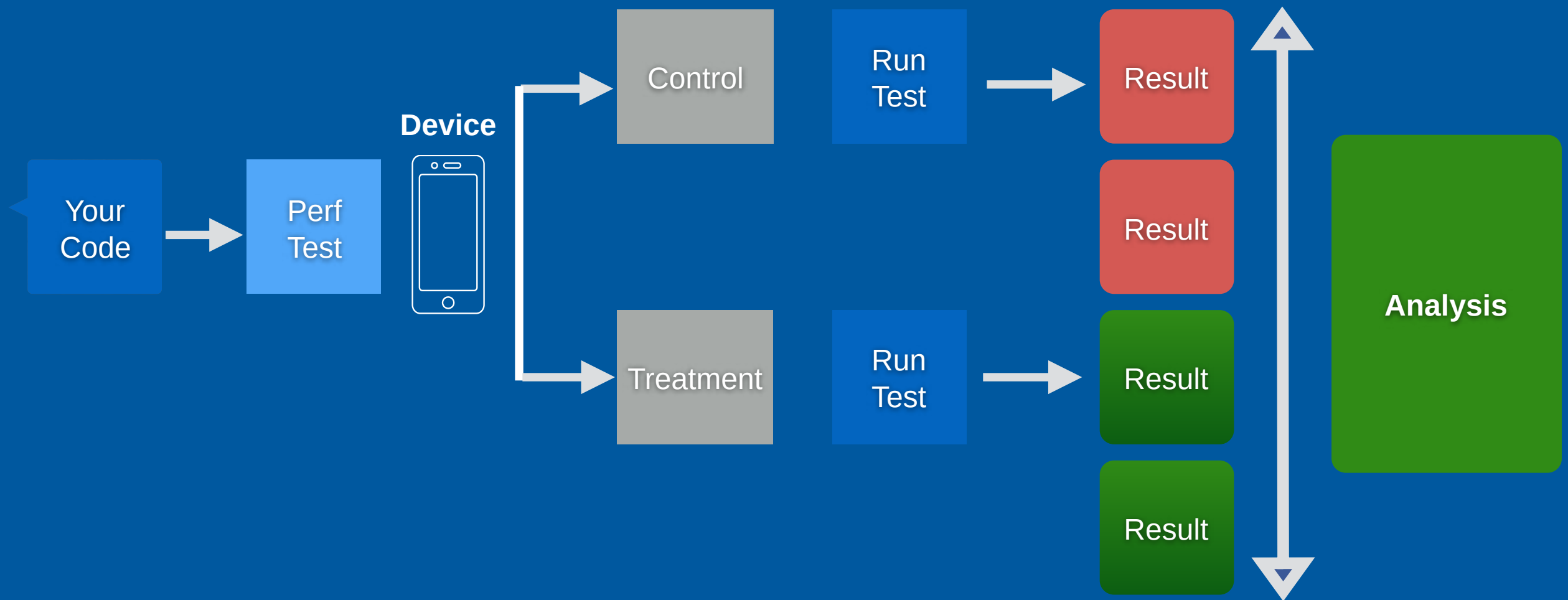
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On-demand MobileLab

Automated, on-demand, pre-commit A/B perf experiments

A/B Experiment



Integrated with Code Review Tool

[Dummy] Diff that might affect mobile performance [Go To Changeset](#)

☐ Needs Review All Users

Author [sigmix](#) Press ? to show keyboard shortcuts.

Reviewers ☐ [lifeihuang](#)

Perflab ☐ [Run Perflab Experiment](#)

Builds & Tests [diff](#) [sanity](#)

Passed 1

SUCCESS 1

[nano-check](#)

All jobs finished and nothing is wrong. Everything's just fine!

- Edit Revision
- Edit Dependencies
- Edit Linked Facebook Tasks
- Download Raw Diff
- Perflab
- MobileLab**
- Scanlab
- Shrubbery
- Picknic Request

Simple Scheduling

MobileLab: Schedule Experiment

Select Experiment Parameters

TEST SELECTION

Test

android.fb4a.coldstart.text_fee... ↕

Trials

50

TREATMENT

Source

Phabricator Revision ↕

Phabricator Revision

CONTROL

Source

Phabricator Revision ↕

Phabricator Revision

Launch

Specify Advanced Options...

Result (Structured Raw Data)

results

^ Struct (with 5 values)
.control

^ List (with 50 values)

[0] ^ Struct (with 2 values)

.metrics ^ Dict (with 122 values)

.trace_ids null

[1] ^ Struct (with 2 values)

.metrics ^ Dict (with 120 values)

.trace_ids null

[2] ^ Struct (with 2 values)

.metrics ^ Dict (with 120 values)

.trace_ids null

[3] ^ Struct (with 2 values)

.metrics ^ Dict (with 120 values)

.trace_ids null

[4] ^ Struct (with 2 values)

.metrics ^ Dict (with 120 values)

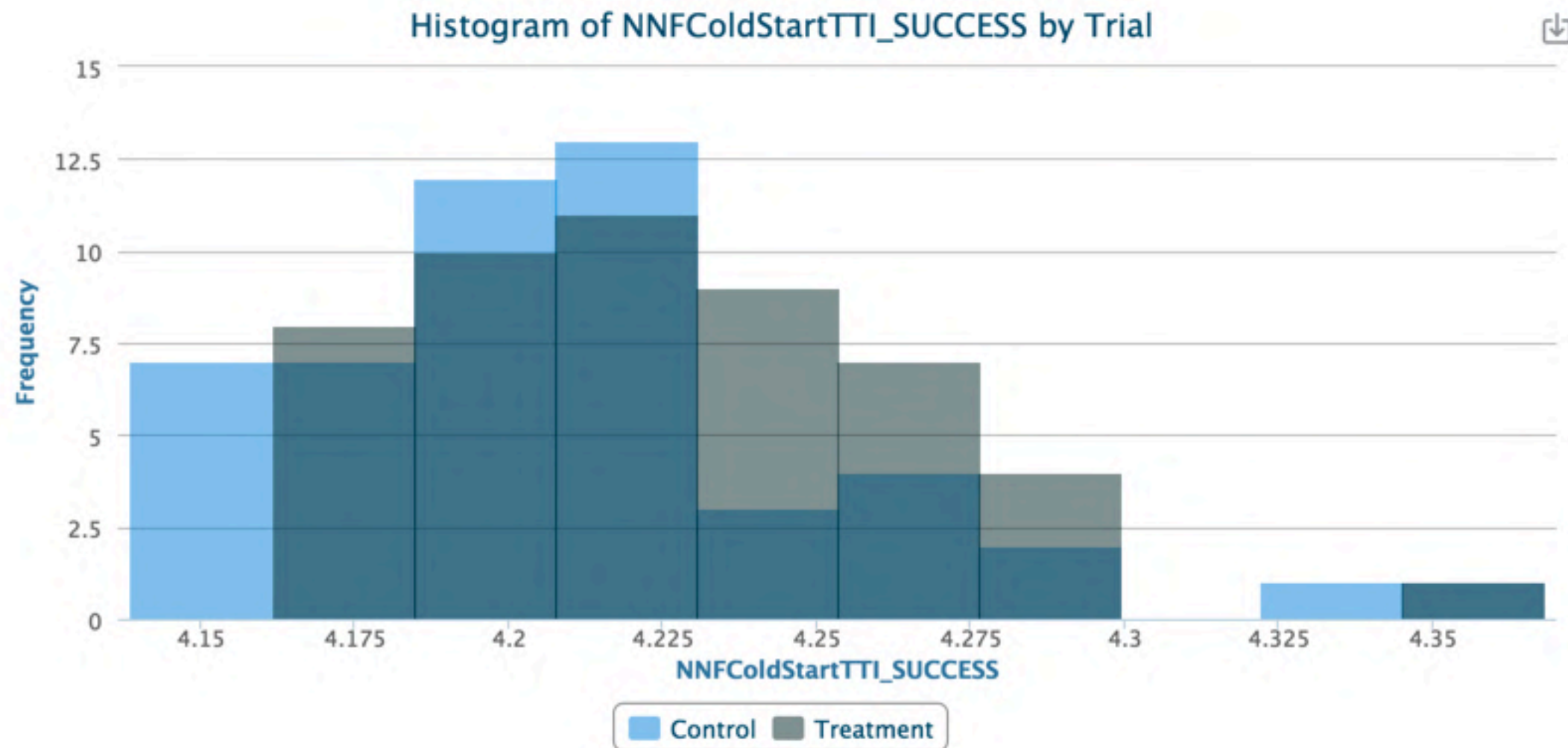
.trace_ids null

[5] ^ Struct (with 2 values)

.metrics ^ Dict (with 120 values)

.trace_ids null

Result (Plot)



Result (Analysis)

Primary Metrics

Metric	Value	95% Confidence Interval
NNFColdStartTTI_SUCCESS (QPL)	+0.0193 s	[+0.0028 s, +0.0365 s]

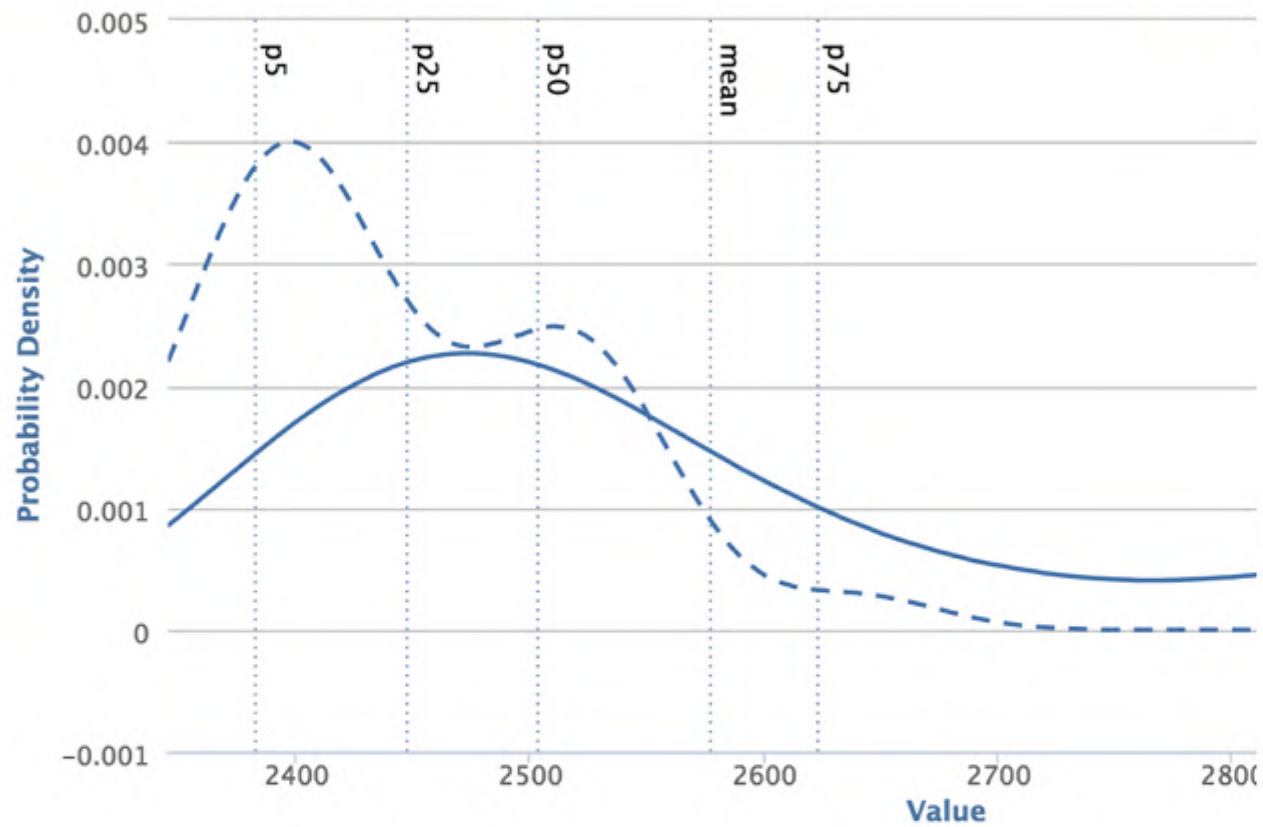
Run-to-run Comparison

StartTTI

Aggregated Device 0 Device 1 Device 2 **Device 3** Device 4

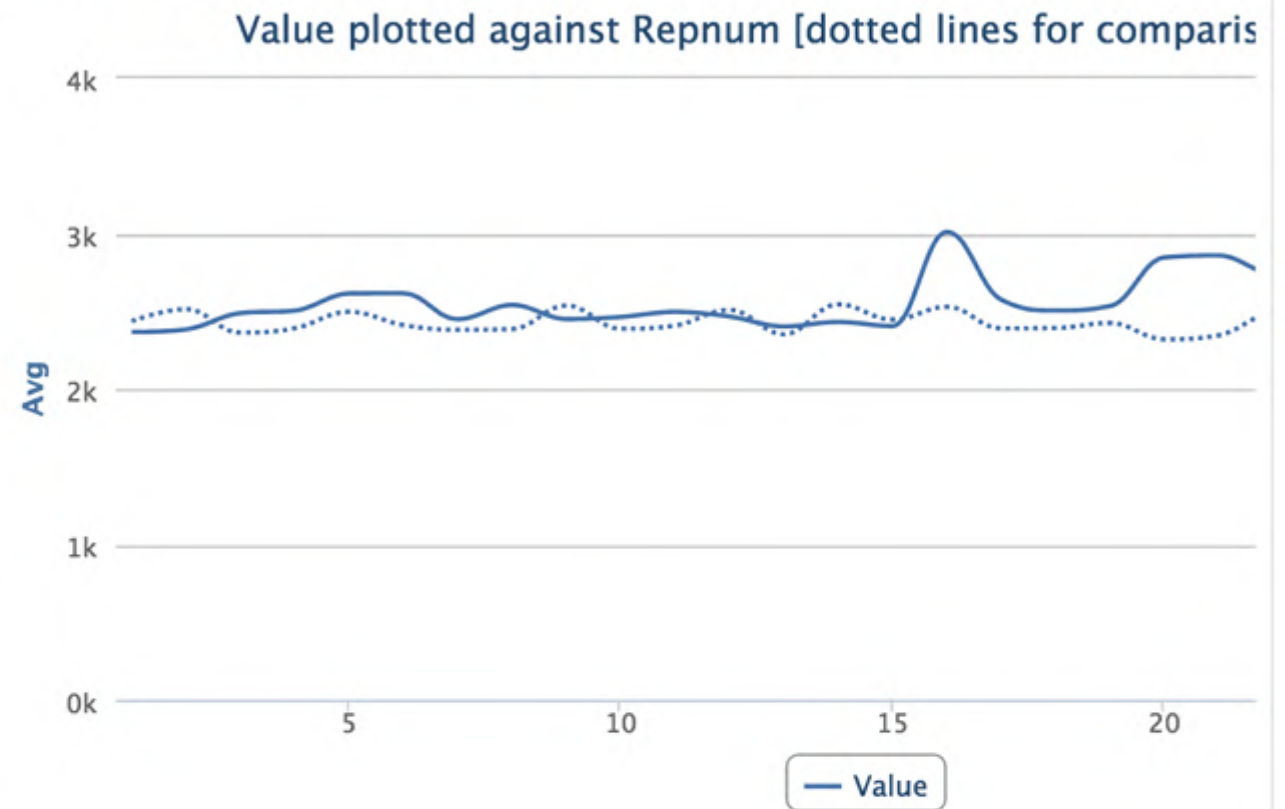
Value Distribution, Diff Comparing to Base

[Dive in](#)



Value over Repetition Number, Diff Comparing to Base

[Dive in](#)



Pitfall #3

Even with good tools
Some won't use them

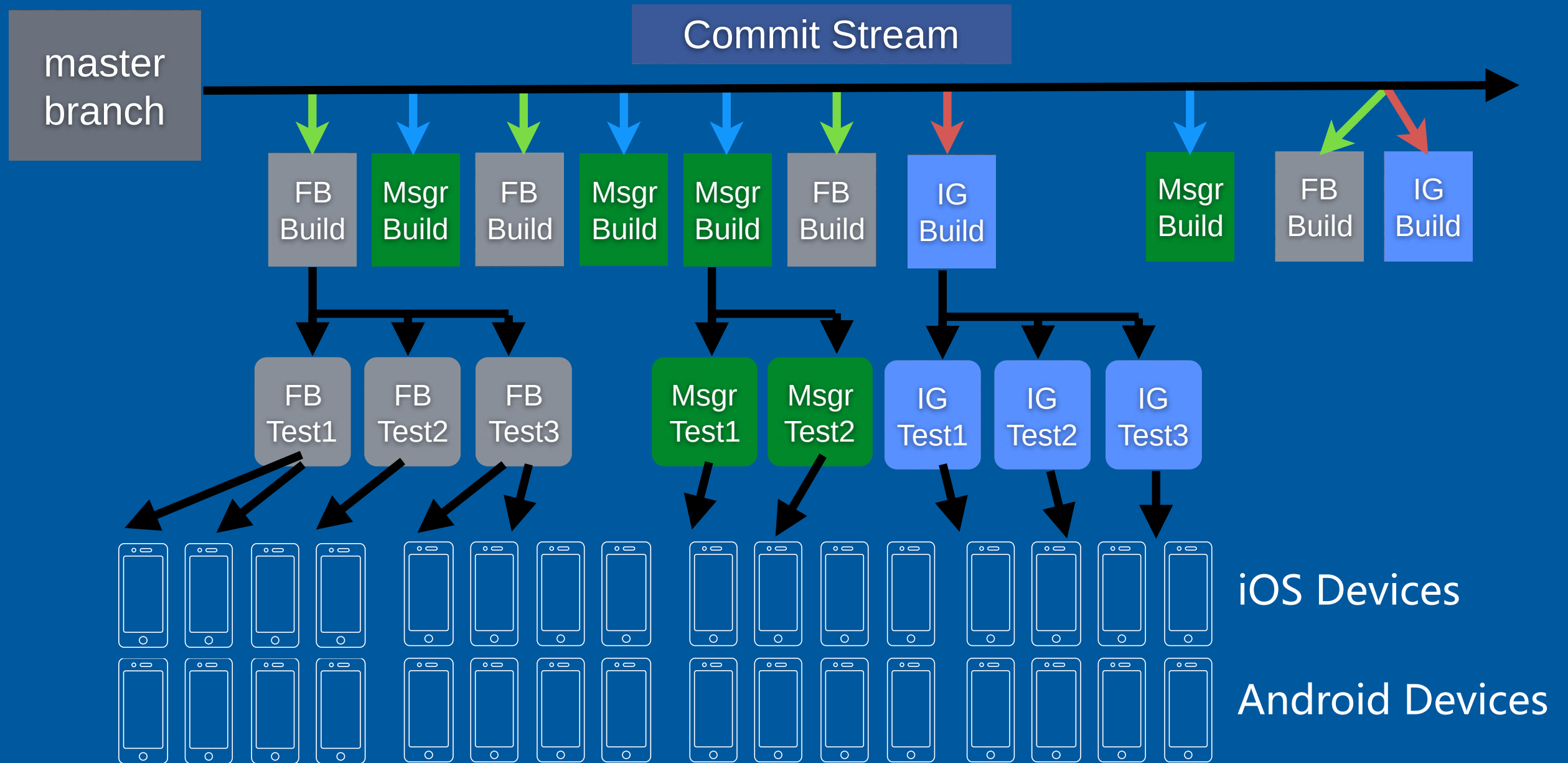
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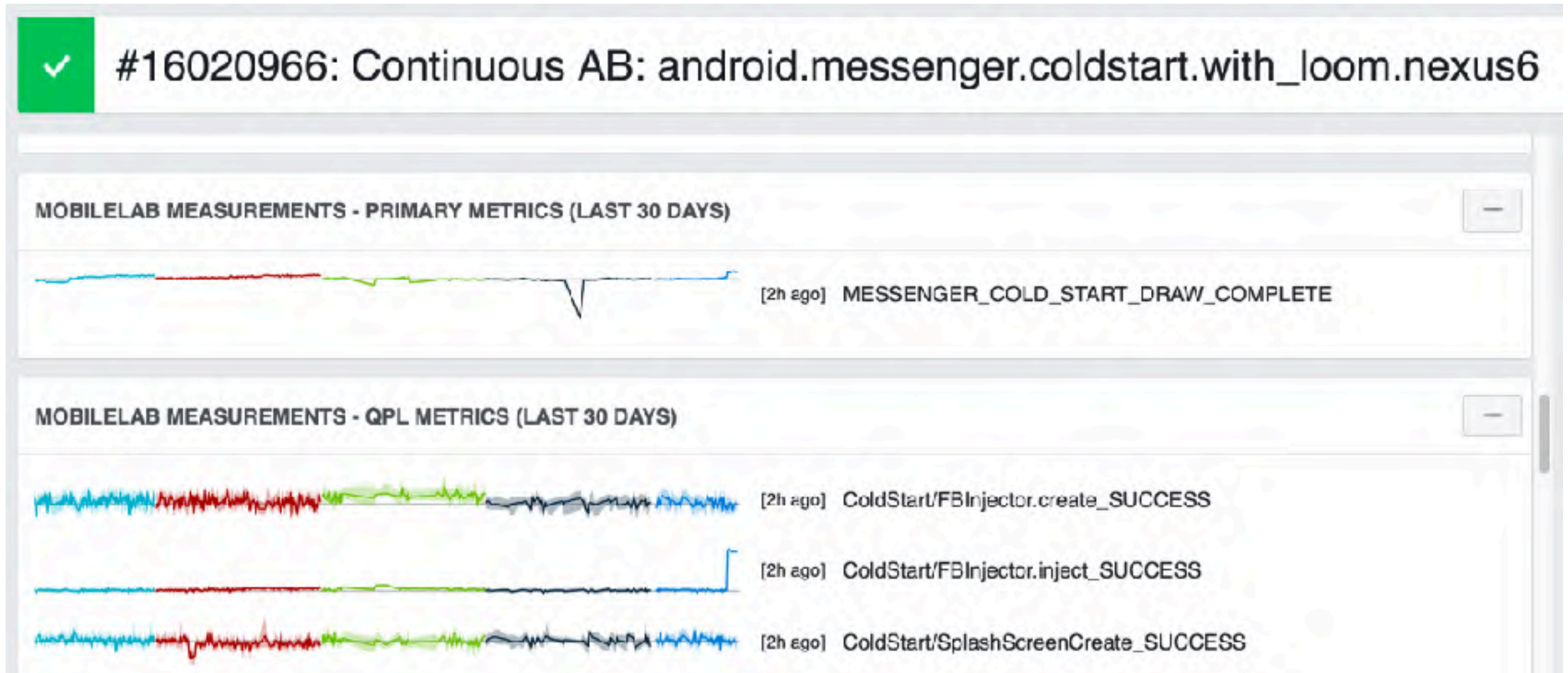
Continuous MobileLab

Automated, continuous, per-app perf experiments

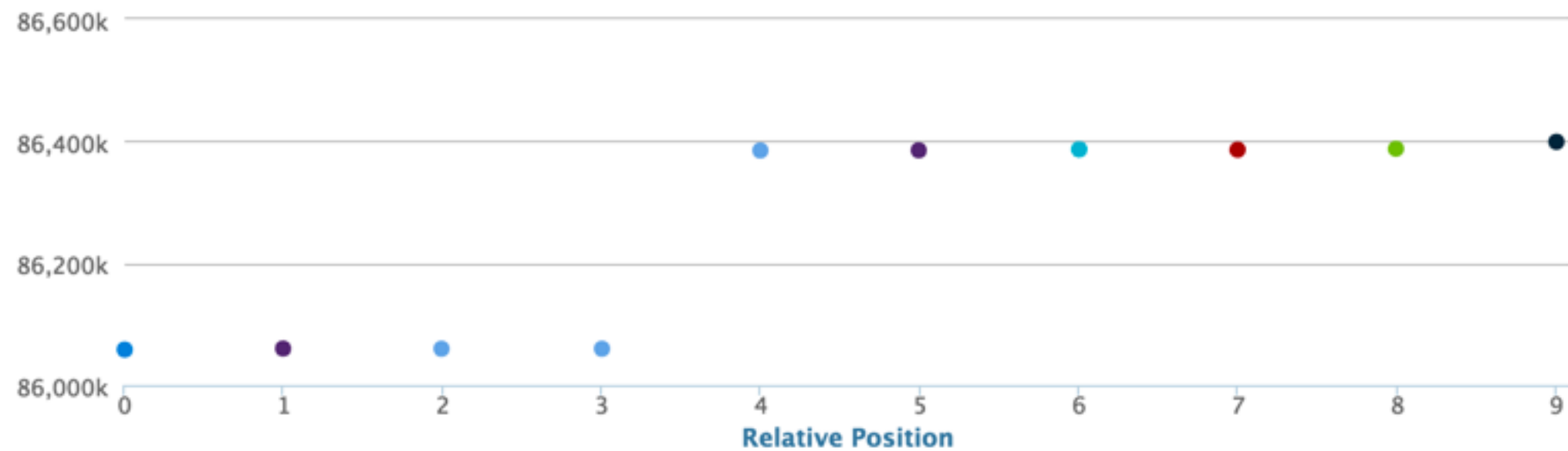
Continuous Testing on Commit Stream



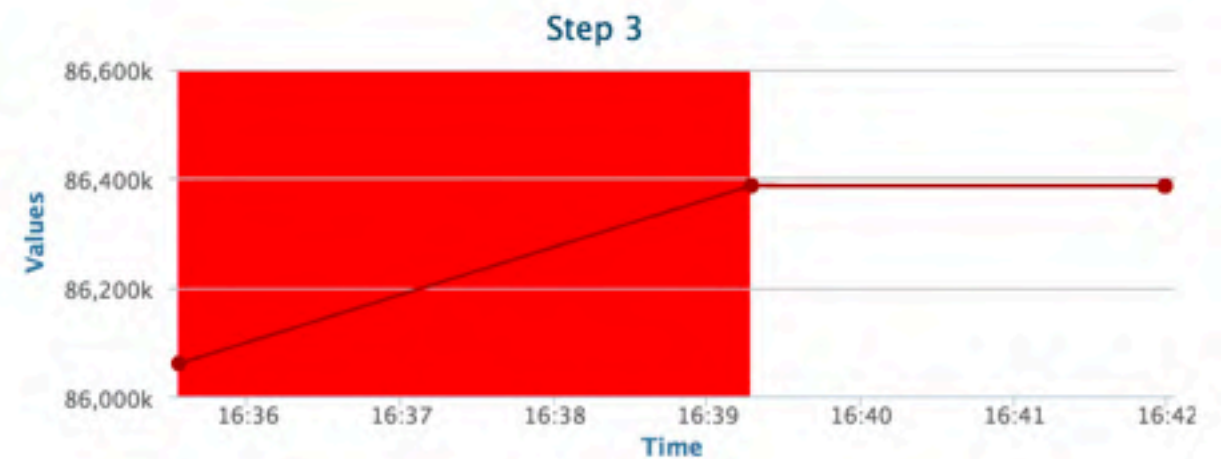
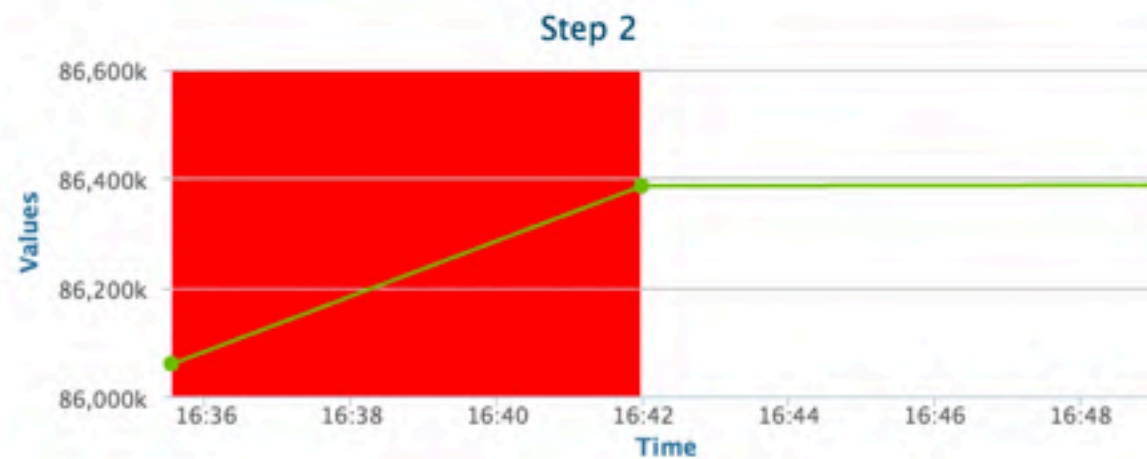
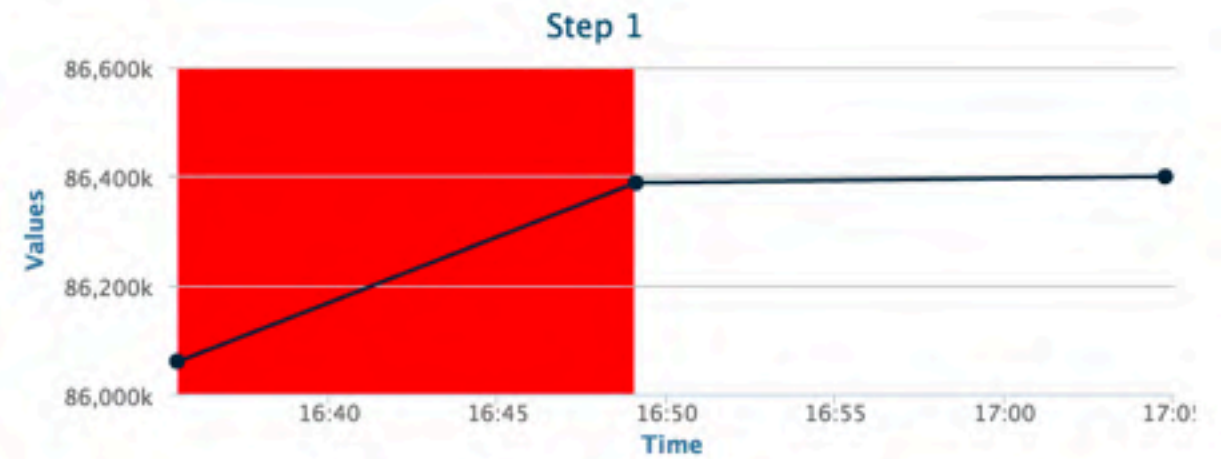
Per Release Monitoring



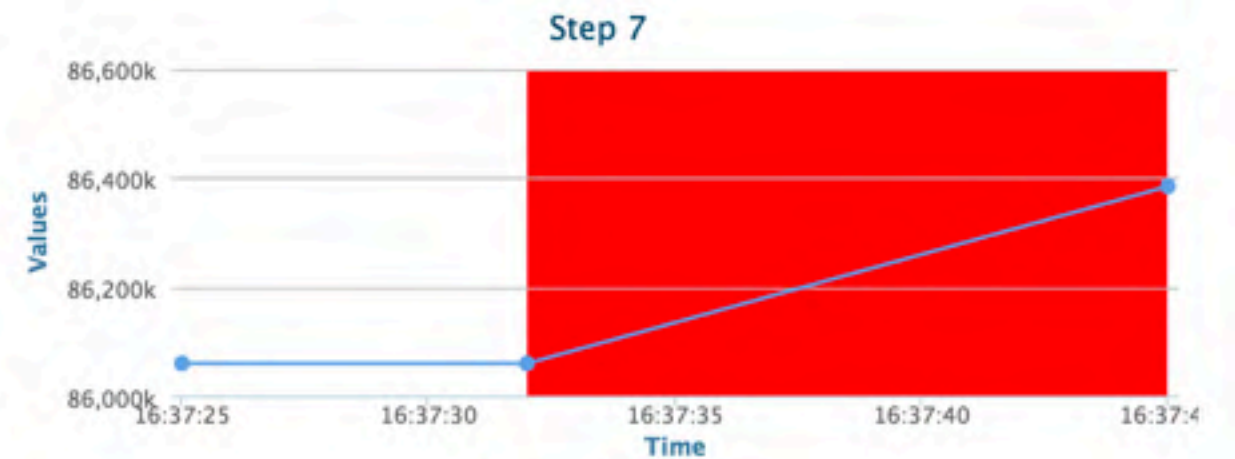
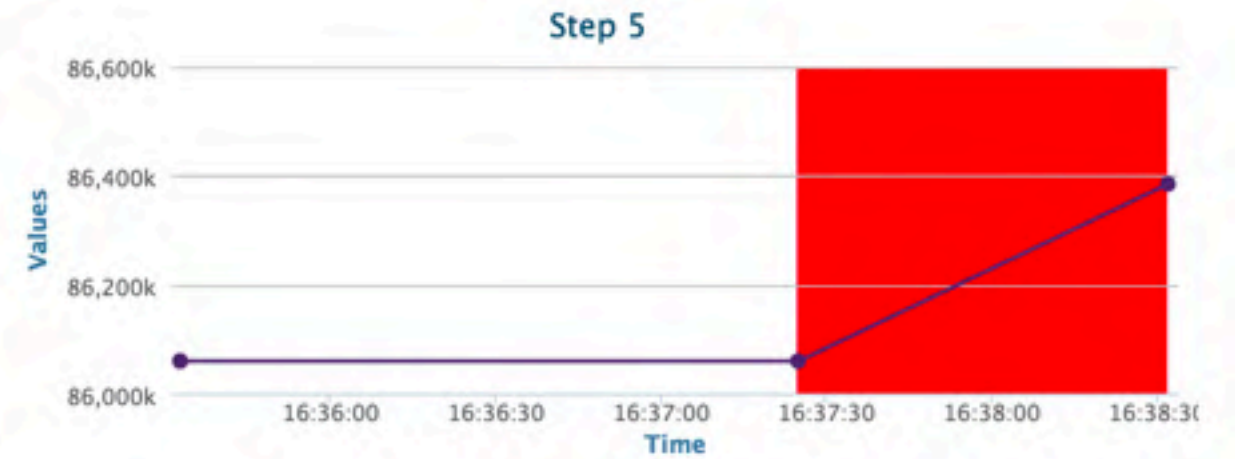
Regression Detection



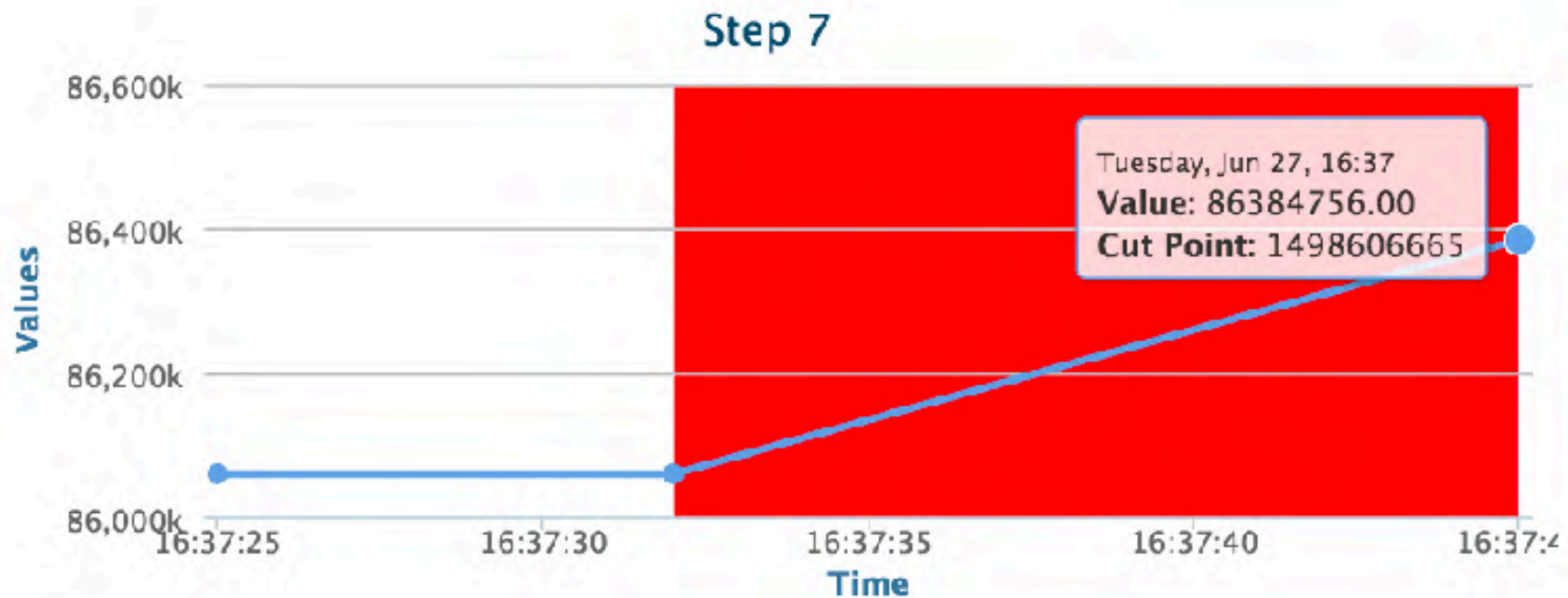
Bisect



More Bisect



Offending Commit Detected



Structured Bisect Result

steps

```
^ List (with 10 values)
[0] ^ Union (with 1 value)
    .range ^ IncidentTrackerOrderingWindow (with 3 values)
[1] ^ Union (with 1 value)
    .range ^ IncidentTrackerOrderingWindow (with 3 values)
[2] ^ Union (with 1 value)
    .range ^ IncidentTrackerOrderingWindow (with 3 values)
[3] ^ Union (with 1 value)
    .range ^ IncidentTrackerOrderingWindow (with 3 values)
[4] ^ Union (with 1 value)
    .range ^ IncidentTrackerOrderingWindow (with 3 values)
[5] ^ Union (with 1 value)
    .range ^ IncidentTrackerOrderingWindow (with 3 values)
[6] ^ Union (with 1 value)
    .range ^ IncidentTrackerOrderingWindow (with 3 values)
[7] ^ Union (with 1 value)
    .range ^ IncidentTrackerOrderingWindow (with 3 values)
[8] ^ Union (with 1 value)
    .blame 1498606665
[9] ^ Union (with 1 value)
    .blame 1498606665
```


MobileLab

Perf Owner

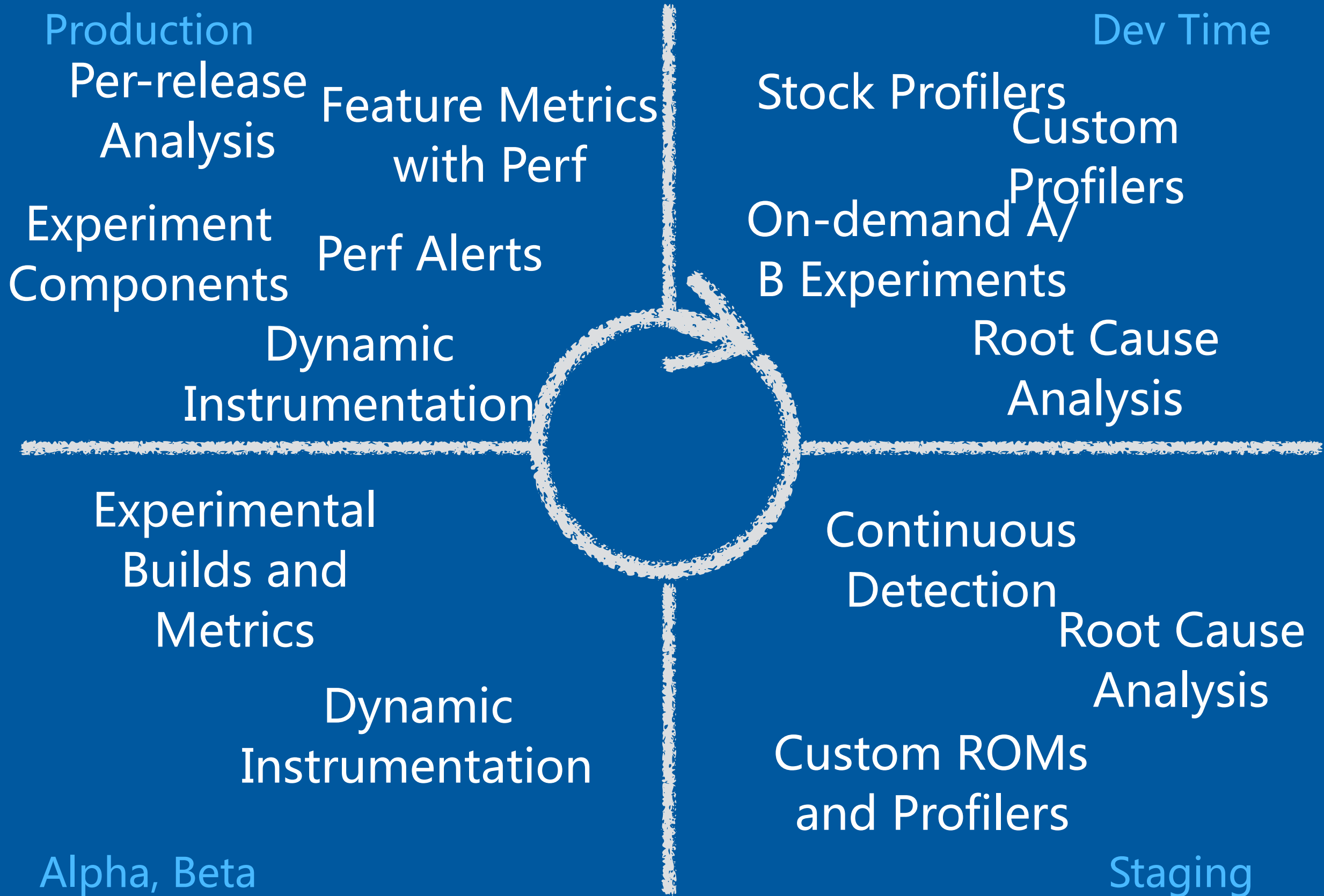


Diff Author

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Perf Tools Used throughout App Lifecycle



THANKS!

让创新技术推动社会进步

HELP TO BUILD A BETTER SOCIETY WITH
INNOVATIVE TECHNOLOGIES

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极客邦科技

InfoQ

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NETWORKS

高端技术人员学习型社交平台



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