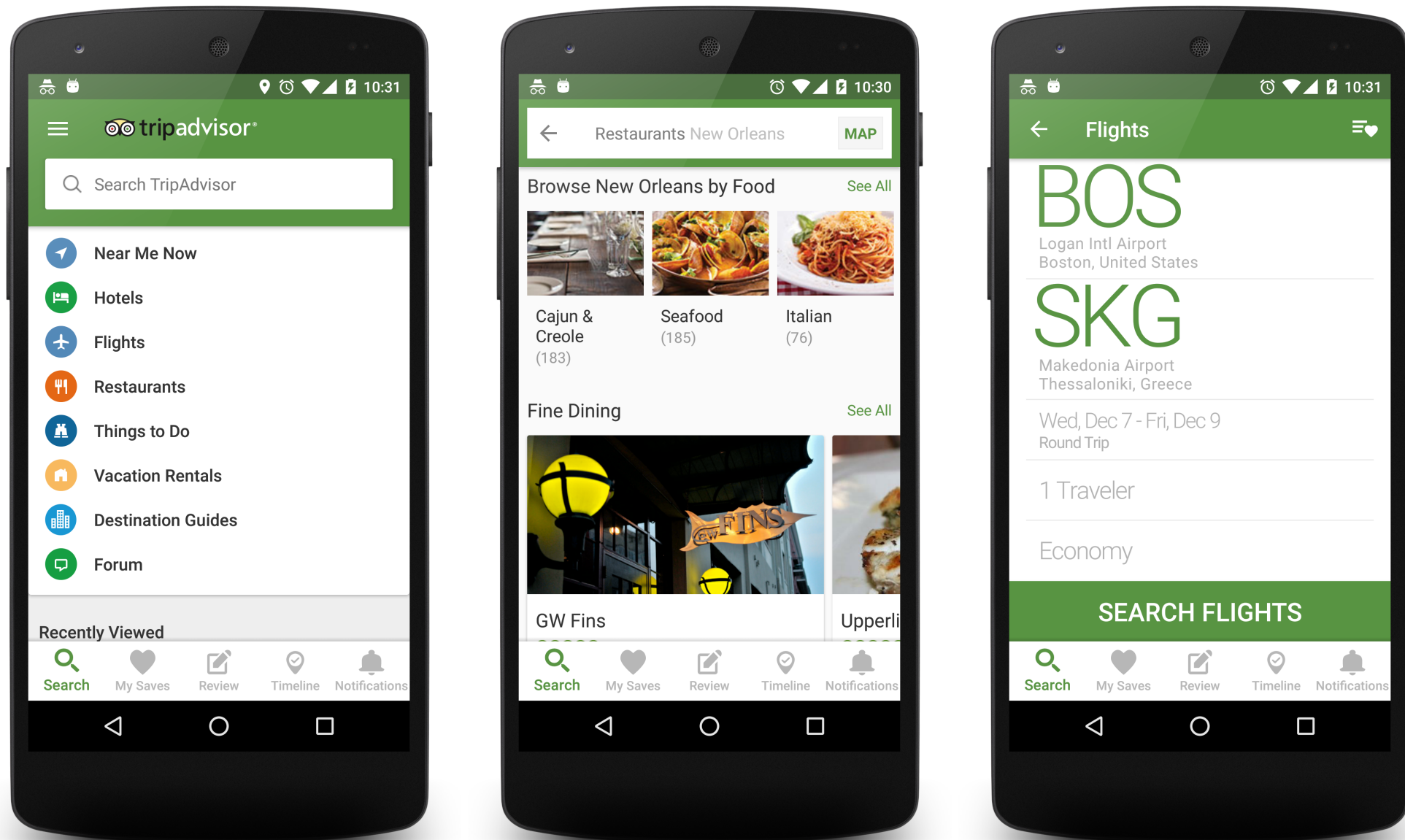


NATIVE RELEASE ENGINEERING AT TRIPADVISOR





~**100 million** active installs
~**1.5 million** daily active users
~**190** developers have contributed
~**81** since the past year
~**40** the past month

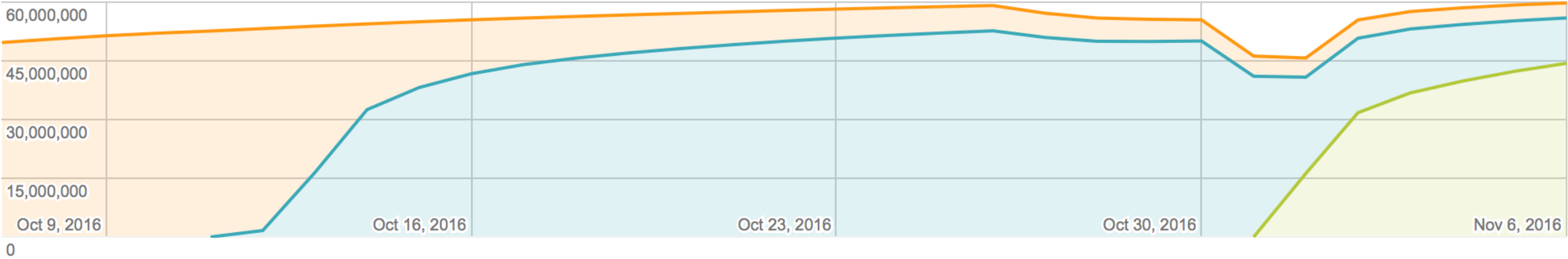


NATIVE RELEASE CHALLENGES

The hard truth

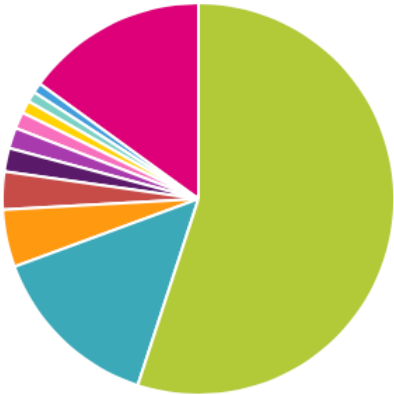
- You can't take it back.
- You can't force users to update.
- You have to consider what goes in the client and what in the server.

INSTALLS ON ACTIVE DEVICES BY APP VERSION



INSTALLS ON ACTIVE DEVICES ON NOV 6, 2016

TOP 10 / STAGED ROLLOUT / BETA / ALPHA			YOUR APP	
<input checked="" type="checkbox"/>	161024016		44,377,840	55.01%
<input checked="" type="checkbox"/>	161010007		11,591,359	14.37%
<input checked="" type="checkbox"/>	160926013		3,824,963	4.74%
<input type="checkbox"/>	160829013		2,510,213	3.11%
<input type="checkbox"/>	160912010		1,560,489	1.93%
<input type="checkbox"/>	160801020		1,376,117	1.71%
<input type="checkbox"/>	161024015		1,104,022	1.37%
<input type="checkbox"/>	160815020		845,101	1.05%
<input type="checkbox"/>	160704015		699,506	0.87%
<input type="checkbox"/>	160718014		667,039	0.83%
	Others		12,110,891	15.01%



Exceptions matter

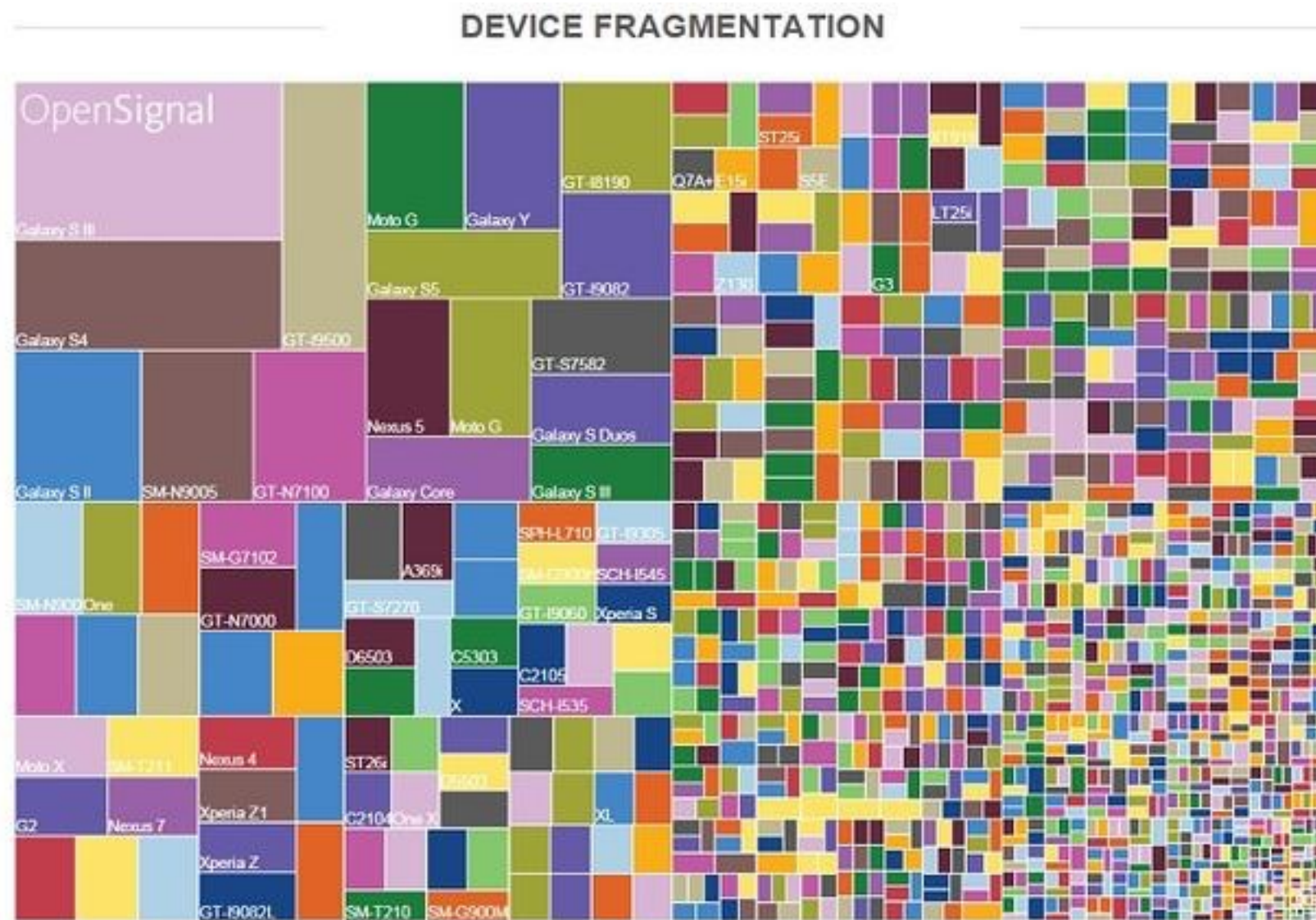
(a lot)



Crash galore Love the app..... When it's not crashing

Fragmentation

... makes testing harder



First impressions matter



To-do list, Task List - Any.do

Any.do Productivity

Everyone

Offers in-app purchases

You don't have any devices

Editors' Choice Top Developer

★★★★★ 262,108

Add to Wishlist

Install



Ultimate To-Do List

Custom Solutions Productivity

Everyone

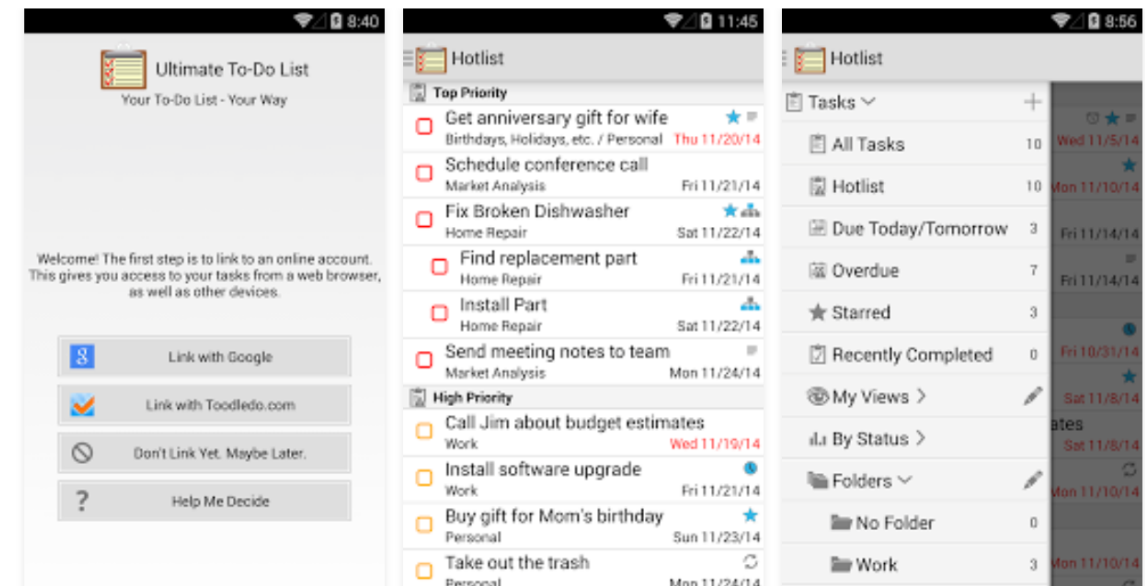
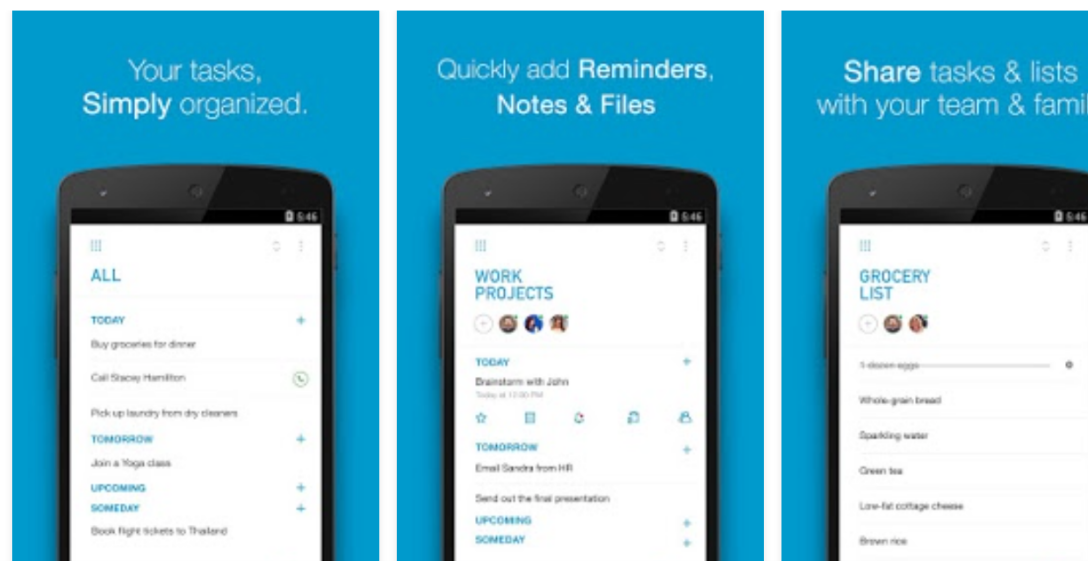
Offers in-app purchases

You don't have any devices

★★★★★ 1,361

Add to Wishlist

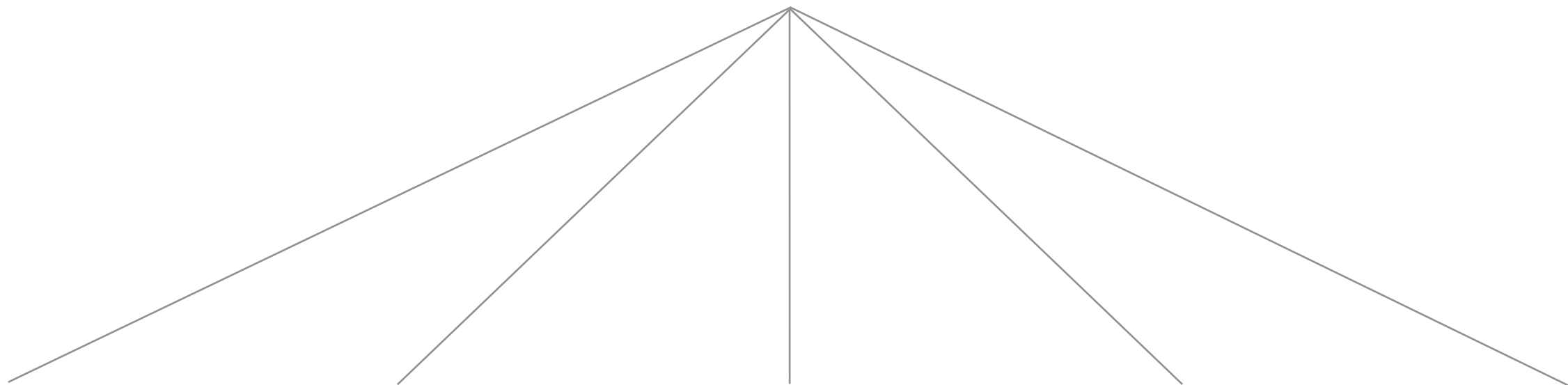
Install





CODING IN SCALE

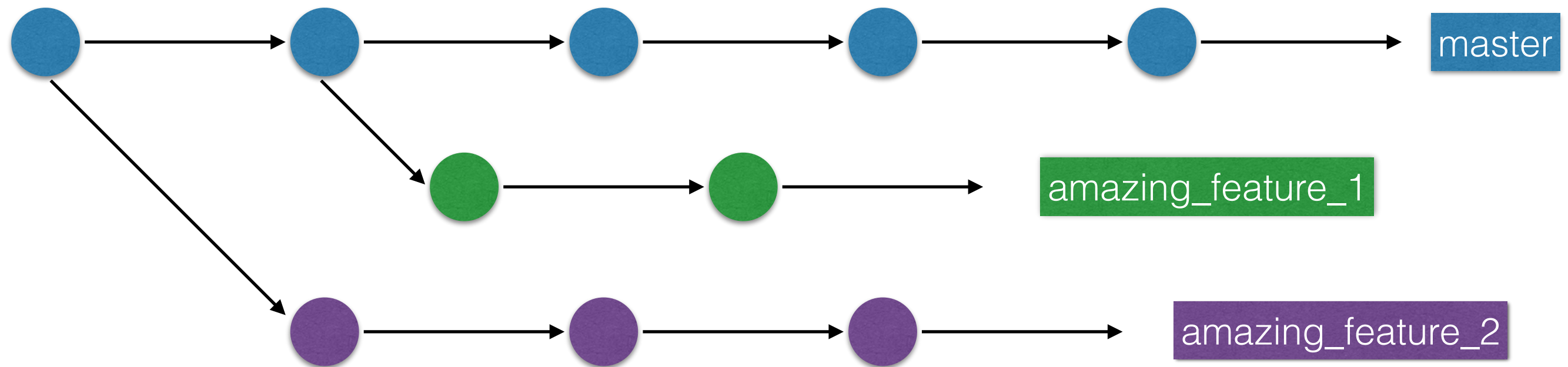




Version control!



Branch per feature



1. Pull request

2. Code reviews

3. 2 + 1s


4. Static analysis

5. Automated tests


6. Merge

OverviewDiffCommits

Details

**Chrysanthi Chaleva** created a pull request 21 Jul 2016
<https://jira.tripadvisor.com/browse/CMN-2783>


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1 build 


CMN-2783


Learn more

Activity




**Chrysanthi Chaleva** **MERGED** bugfix/CMN-2783-android-soft-gate-on-photo-removal to mainline in commit [9e1e2595b1a](#) 21 Jul 2016


**Native Jenkins**
[BuildFinished android-stash-sonar-pull-requests] [98f77feb3019eaedf74bc99bb51bfa2c67fa4e92](#) into [00124ccad2e1b88d85f5bef86ab48438c508d7b1](#)
✓ **BUILD SUCCESS** - Build #334 which took 26 min
Reply · Create task · Like · 21 Jul 2016

**Native Ops**
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src/main/java/com/tripadvisor/android/lib/tamobile/config/ConfigManager.java	236	Remove this unused method parameter "ignoreFeatureLock".	Details


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Reply · Create task · Like · 21 Jul 2016


**Mani ShafaatDoost** marked the pull request as **APPROVED** 21 Jul 2016

**Mani ShafaatDoost** commented on a file 21 Jul 2016 in removed commit [6f5b223bf01](#) **REMOVED**


apps / TAMobileLibrary / src / main / java / com / tripadvisor / android / lib / tamobile / activities / **LocationDetailActivity.java**


```
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**Mani ShafaatDoost**
remove sGatePhotoClick
Reply · Create task · Like · 21 Jul 2016

**Chrysanthi Chaleva**
ahh thanks mani, missed that
Reply · Edit · Delete · Create task · 21 Jul 2016

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So satisfying
Reply · Create task · Like · 21 Jul 2016

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**Chrysanthi Chaleva** **OPENED** the pull request 21 Jul 2016

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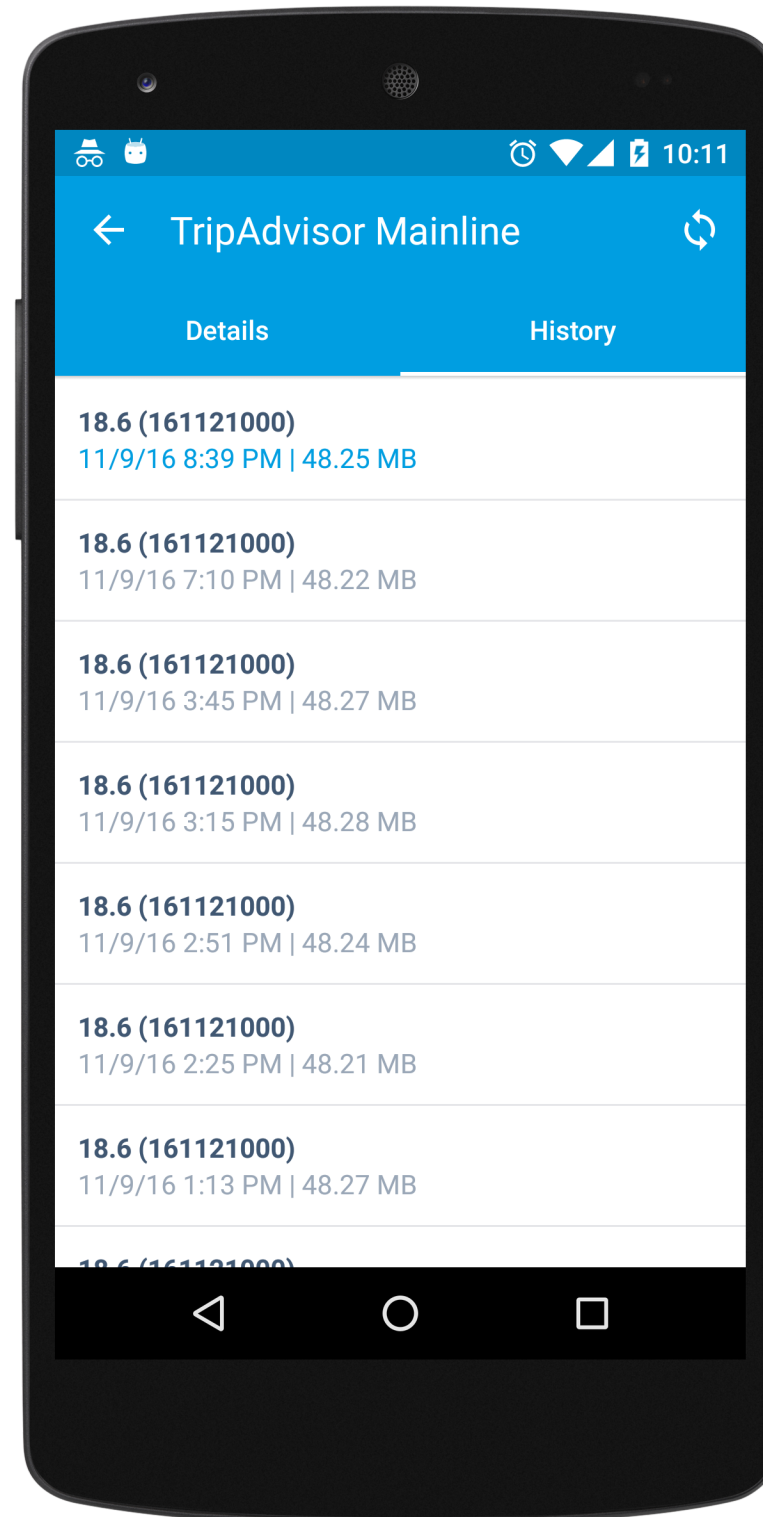
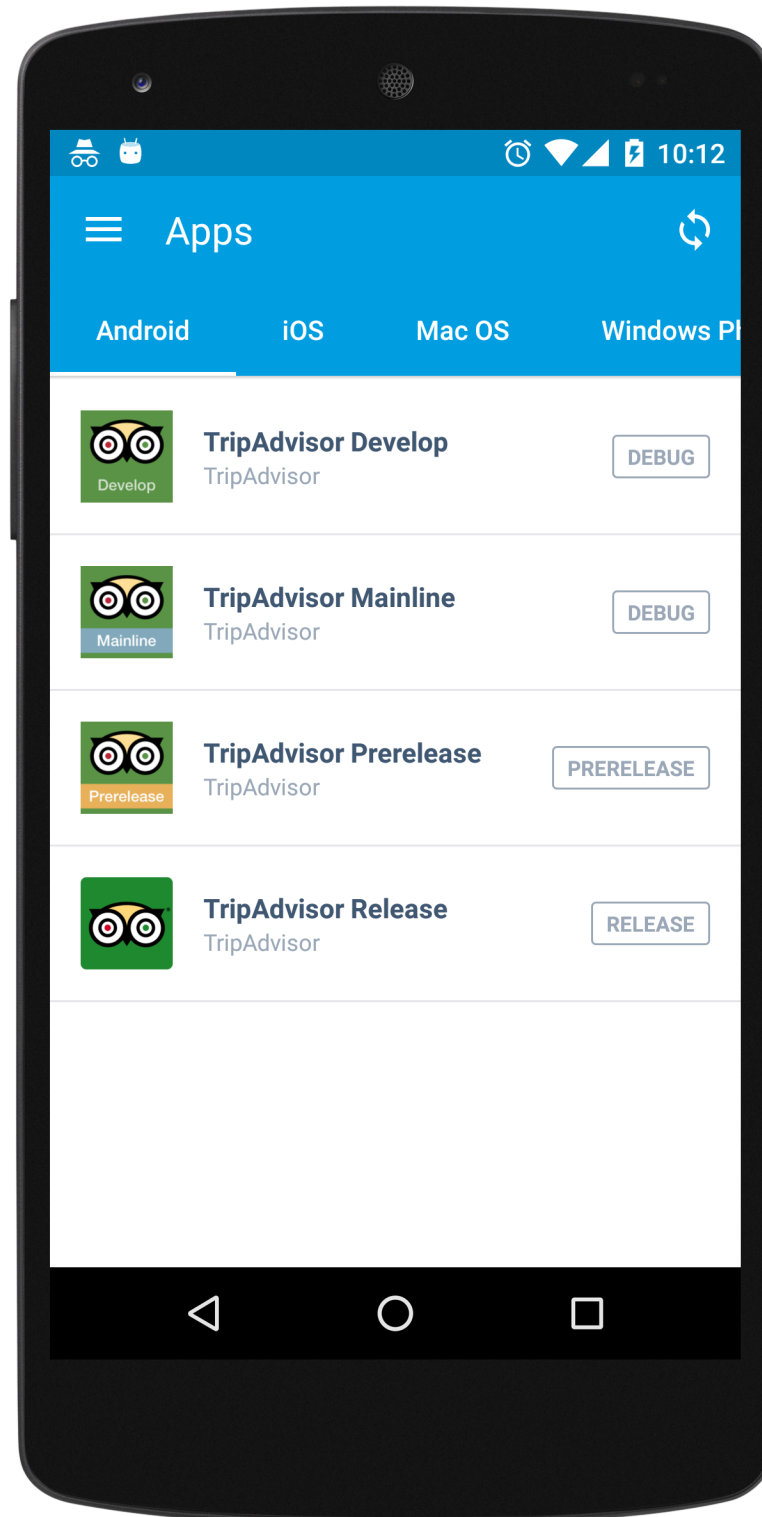
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Dogfooding



Communication is important!

- Mobile Design Review
- Brown bags
- Mobile guilds
- Hackathons



RELEASING

How often? Monthly?

- Not fast enough for product managers.
- Need to be able to quick fix.
- Have to be more agile.

How often? Daily?

- Not possible (apple takes days to review and play store needs a day)
- Plus users don't really like very frequent updates!



Crap It updates too often

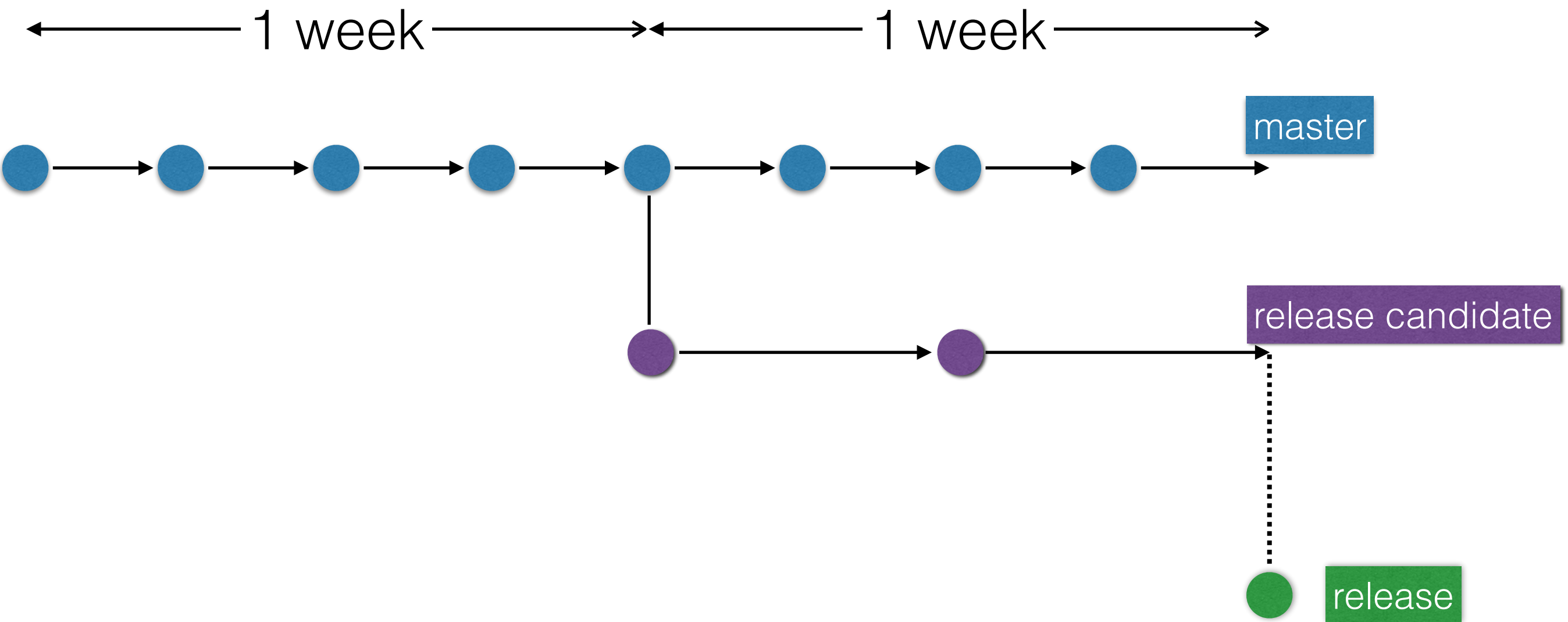


Have to fight auto update Have to fight auto update all the time



Never ending updates Its getting frustrating to update this program every time i just wanna look something up

How often?



Native ops

- A dedicated team responsible for release engineering.

Step 1:

Preparing a release version

Things you do once

- Choose a suitable package name.
- Create a certificate for signing your app.
- Decide if it will be free or paid.
- Decide what platforms and screens to support.

Things you do every time

- Update version code and name.
- Remove logging and debugging.
- Verify your manifest and permissions.
- Makes sure the server is pointing to production.

Things you do every time

- Shrink and obfuscate your app.



```
android {  
    defaultConfig {}  
    buildTypes {  
        release {  
            minifyEnabled true  
            proguardFiles getDefaultProguardFile('proguard-android.txt'), 'proguard-rules.pro'  
        }  
    }  
}
```

Things you do every time

- Sign you app
- .. manually: Build -> Generate signed APK
- or automatically:



```
android {  
    defaultConfig {}  
    signingConfigs {  
        release {  
            storeFile file("myreleasekey.keystore")  
            storePassword "password"  
            keyAlias "MyReleaseKey"  
            keyPassword "password"  
        }  
    }  
    buildTypes {  
        release {  
            signingConfig signingConfigs.release  
        }  
    }  
}
```

Step 2: Prepare your listing

- Description and what's new text (localized)
- App icon, graphics and screenshots

Launcher Icon Generator

Foreground

IMAGECLIPARTTEXT

TRIMTRIMDON'T TRIM

PADDING0%

Color
For transparent
foregrounds0%

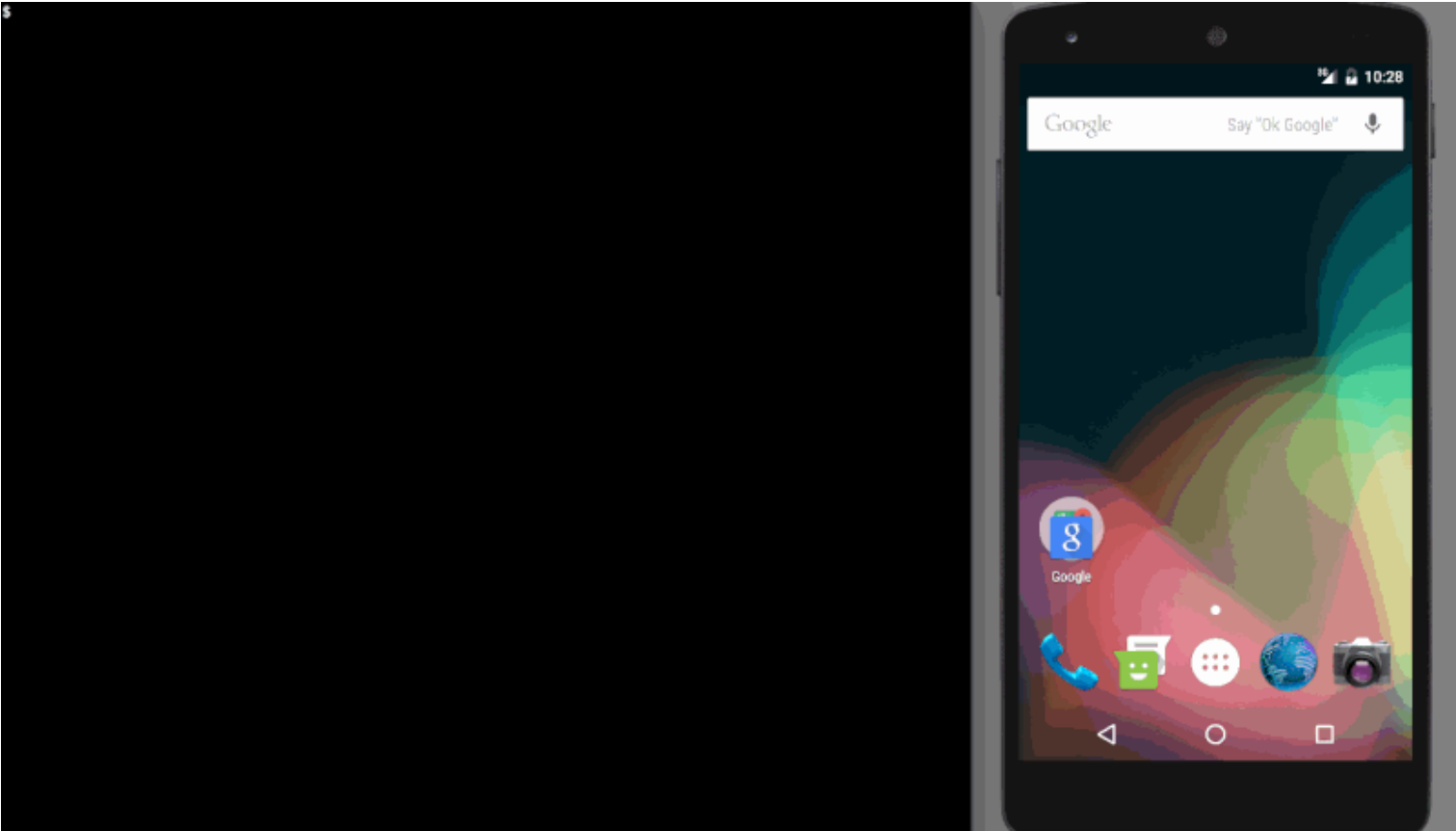
ScalingCROPCENTER

ShapeNONEBEVELSQUARECIRCLEVERTICAL RECTANGLEHORIZONTAL RECTANGLE

Background

EffectNONELONG SHADOWSCOREDOG-EAR

DOWNLOAD .ZIPGENERATE WEB ICON



Step 3: Uploading your apk



- Retrieves and edits meta data.
- Uploads your apk automatically.
- Uploads promos and graphics.

```
fastlane_version "1.97.2"

default_platform :android

platform :android do

  desc "Alpha release app. Deploy a new version to the Google Play Store - Alpha channel"
  lane :alpha do |options|
    gradle(task: "clean")

    gradle(task: "assemble")

    sign_apk(
      keystore_path: "${HOME}/keyvault/android.jks",
      alias: "android-fastlane-example",
      storepass: options[:storepass],
      tsa: "http://timestamp.comodoca.com/rfc316",
    )

    zipalign(apk_path: "#{lane_context[SharedValues::SIGNED_APK_PATH]}")
    gradle(task: "test")

    supply(
      track: 'alpha',
      apk: "#{lane_context[SharedValues::SIGNED_APK_PATH]}"
    )
  end
end
```

fastlane / examples

Code

Issues0

Pull requests1

Projects0

Pulse

Graphs

collection of example fastlane setups <https://fastlane.tools>

139commits

1branch

0releases

17contributors

branch: master

New pull request

Find file

Clone or download

KrauseFx committed with mfurtak Remove not about submitting Fastfile (#36)

Latest commit 6272574 3 days ago

Acast	Merge branch 'master' of github.com:fastlane/examples	10 months ago
ArtsyEidolon	Added logos	2 years ago
BeMyEyes	Updated BeMyEyes Fastfile	6 months ago
Fabric	Add Fabric app fastlane files	8 months ago
Fitbay	Removed autogenerated documentation header	a year ago
Logos	Add SoundCloud to Fastlane examples	7 months ago
MindNode	Add simulator that iTunesConnect requires	3 months ago
MyDayToDo	added the framed screenshots to show what they look like once framed ...	a month ago
ProductHunt	Updated Product Hunt config to use pilot	6 months ago
SoundCloud	Add SoundCloud to Fastlane examples	7 months ago
SunApps	(Typo fix)dynamic -> dynamic	10 months ago
Timehop	Simplified Timehop Fastfile	8 months ago
Touchwonders	Update links to fastlane docs (#30)	3 months ago
Wikipedia	Fix getting version number	9 days ago
gitignore	Adds Acast	10 months ago
README.md	Remove not about submitting Fastfile (#36)	3 days ago

README.md

fastlane Example Setups

This repository contains a few `fastlane` example setups that help you getting started.

Acast

Simple setup, saving tons of time

- Slack notifications on failed builds or unsuccessful tests
 - Slack notifications are only fired if they're run on our CI
- Managed provisioning profiles using [match](#)
- Creation of screenshots using [snapshot](#)
 - Text and device frames are added to screenshots using [frameit](#)
 - Delivered to iTunes Connect using [deliver](#)
- Submission to App Store using [gym](#) and [deliver](#)

[Overview](#) • [Fastfile](#) • [Appfile](#) • [Deliverfile](#) • [Gymfile](#) • [Matchfile](#) • [Scanfile](#) • [Snapfile](#) • [Framefile](#)

Timehop

Traveling in time using fastlane

- Automatic generation of the changelog
- Advanced manual key management
- Printing out random squirrels and boats
- Table flips

[Overview](#) • [Fastfile](#)

Fitbay

Full stack deployment

- Crashlytics, TestFlight, and App Store distribution
- Automatic build environment selection
- Managing of Provisioning Profiles
- Slack Team notifications
- Version number bump and Git commit
- Custom scripts
- Lane switching with private lanes

[Overview](#) • [Fastfile](#)

Fabric app

Standard Setup

- Deploy updates through Crashlytics Beta
- Submit to the AppStore with screenshots and metadata
- Code generation for xib names, identifiers, etc using [R.swift](#)

[Overview](#) • [Fastfile](#) • [Snapfile](#) • [Appfile](#)

Artsy eidolon

Standard Setup

- Building and Signing of the iOS App
- Version Bump & Git Actions
- Hockey Distribution
- Production Keys

[Overview](#) • [Fastfile](#)

Wikipedia by Wikimedia Foundation

Advanced - Multiple Environments

- Different Bundle Identifiers per `lane`
- Advanced Testing
- Hockey Deployment
- App Store and TestFlight Deployment
- Custom `fastlane` actions like automatic change-logs based on git

[Overview](#) • [Fastfile](#) • [Deliverfile](#) • [Appfile](#) • [Metadata](#)

SoundCloud

Standard Setup

- Deployment to iTunes Connect
- Building acceptance tests builds with Frank
- Managing Certificates/Provisioning Profiles
- CI steps as lanes
- Project setup

[Overview](#) • [Fastfile](#)

Firefox by Mozilla

Advanced - submodules and custom actions

- Different Bundle Identifiers per `lane`
- Custom enterprise deployment
- `snapshot` setup with UI Tests
- Advanced shell scripting

[Overview](#) • [Fastfile](#) • [Snapfile](#) • [SnapshotTests.swift](#) • [Custom Actions](#)

MindNode

Advanced iOS/Mac Setup

- Mac and iOS Universal App
- App Store and TestFlight Deployment
- Automated Screenshots
- Screenshot Framing & Adding of Titles
- Copying of example data for screenshots
- Custom `xcodebuild` command

[Overview](#) • [Fastfile](#) • [Snapfile](#) • [MindNode.js](#) • [screenshots](#) • [Framefile.json](#) • [MacScreenshots](#)

Product Hunt

Standard Setup

- App Store and TestFlight Deployment
- Managing of Provisioning Profiles
- Push Notifications
- Version Bump & Git Actions

[Overview](#) • [Fastfile](#) • [Deliverfile](#) • [metadata](#)

Be My Eyes

Standard Setup

- App Store and TestFlight Distribution
- Local action `get_global_value`
- Version Bump & Git Actions

[Overview](#) • [Fastfile](#) • [Deliverfile](#) • [get_global_value](#)

SunApps

App Factory

- Maintain and Deploy hundreds of Apps
- Automatically create new Apps
- Create profiles and push certificates
- Screenshots
- Remote configuration of `Fastfile` and `snapshot` scripts

A description on how the setup works is available in the [Overview](#).

[Overview](#) • [Fastfile](#) • [Deliverfile](#) • [Snapfile](#) • [Appfile](#) • [snapshot.js](#)

Controlling the release

Alpha/Beta channels

The screenshot displays the Google Play Developer Console interface for the app 'RPM' (com.games.rpm). The top navigation bar includes the Google Play logo, 'Developer Console', a search bar, and user information (RPM, user@gmail.com, Sign out). The left sidebar lists various management tools: Statistics, User Acquisition, Finance, Ratings & Reviews, Crashes & ANRs, Optimisation Tips, Cloud Test Lab, GCM Diagnostics, and the 'APK' section which is currently selected. The main content area is titled 'APK' and features a 'Switch to simple mode' button. It is divided into three tabs: 'PRODUCTION' (763,820 versions), 'BETA TESTING' (822 versions), and 'ALPHA TESTING' (Set up Alpha testing for your app). Below these is the 'BETA CONFIGURATION' section, which includes 'MANAGE TESTERS' (Choose how to run your testing programme. Learn more) and 'OPEN BETA TESTING' (Switch to another type of beta testing). The 'OPEN BETA TESTING' section contains a 'Maximum number of testers' input field (with a note that the number needs to be at least 1000) and a 'Feedback channel' dropdown. On the right side of the console, there are several summary cards: a 'Top Issues' card listing crashes (e.g., JsonClient.java line 136 with 71 crashes), a 'Tester Activity' card showing recent tester actions (e.g., Sam Phillips launched 4 hours ago), and a 'Developer Activity' card showing developer actions (e.g., Sam Phillips added testers 1 day ago). At the bottom, a list of testers is shown with their names, email addresses, and progress bars indicating their status in the beta testing process.

Google play | Developer Console

RPM user@gmail.com Sign out

RPM
com.games.rpm View in Play store
PUBLISHED 4 December 2014

Statistics
User Acquisition
Finance
Ratings & Reviews
Crashes & ANRs
Optimisation Tips
Cloud Test Lab
GCM Diagnostics

APK
Store Listing
Content Rating
Pricing & Distribution
In-app Products
Services & APIs

APK Switch to simple mode

PRODUCTION
Versions
763, 820

BETA TESTING
Versions
822

ALPHA TESTING
Set up Alpha testing for your app

BETA CONFIGURATION

MANAGE TESTERS
Choose how to run your testing programme. [Learn more](#)

OPEN BETA TESTING Switch to another type of beta testing

Maximum number of testers
If you set a maximum number of testers, the number needs to be at least 1000.

Feedback channel

Top Issues

Issue	Crashes
JsonClient.java line 136 demo.app.network.JsonClient.getRedi...	71
DownloadAppTask.java line 45 demo.app.tasks.DownloadAppTask.do...	28
ApkDownloadClient.java line 59 demo.app.network.ApkDownloadClient...	19
AirService.java line 443 demo.app.core.Service.checkForUpda...	11

Tester Activity

Tester	Activity	Time
Sam Phillips	Launched	4 hours ago
Joan Smith	Installed	1 day ago
David Fisher	Accepted	2 days ago
Sam Robbins	Invited	3 days ago

Developer Activity

Developer	Activity	Time
Sam Phillips	Added testers (4)	a day ago
Sam Phillips	Removed testers	6 days ago

Andrea Falcone
tester@crashlytics.com

Marshall Moutenot
tester@crashlytics.com

Mike Furtak
tester@crashlytics.com

Sam Phillips
tester@crashlytics.com

Joan Smith
tester@crashlytics.com

Staged rollouts

STAGED ROLLOUT FOR PRODUCTION

With a staged rollout, you can publish your app to a certain percentage of the market first to make sure your app works properly before rolling it out to everybody.

Publish this app to

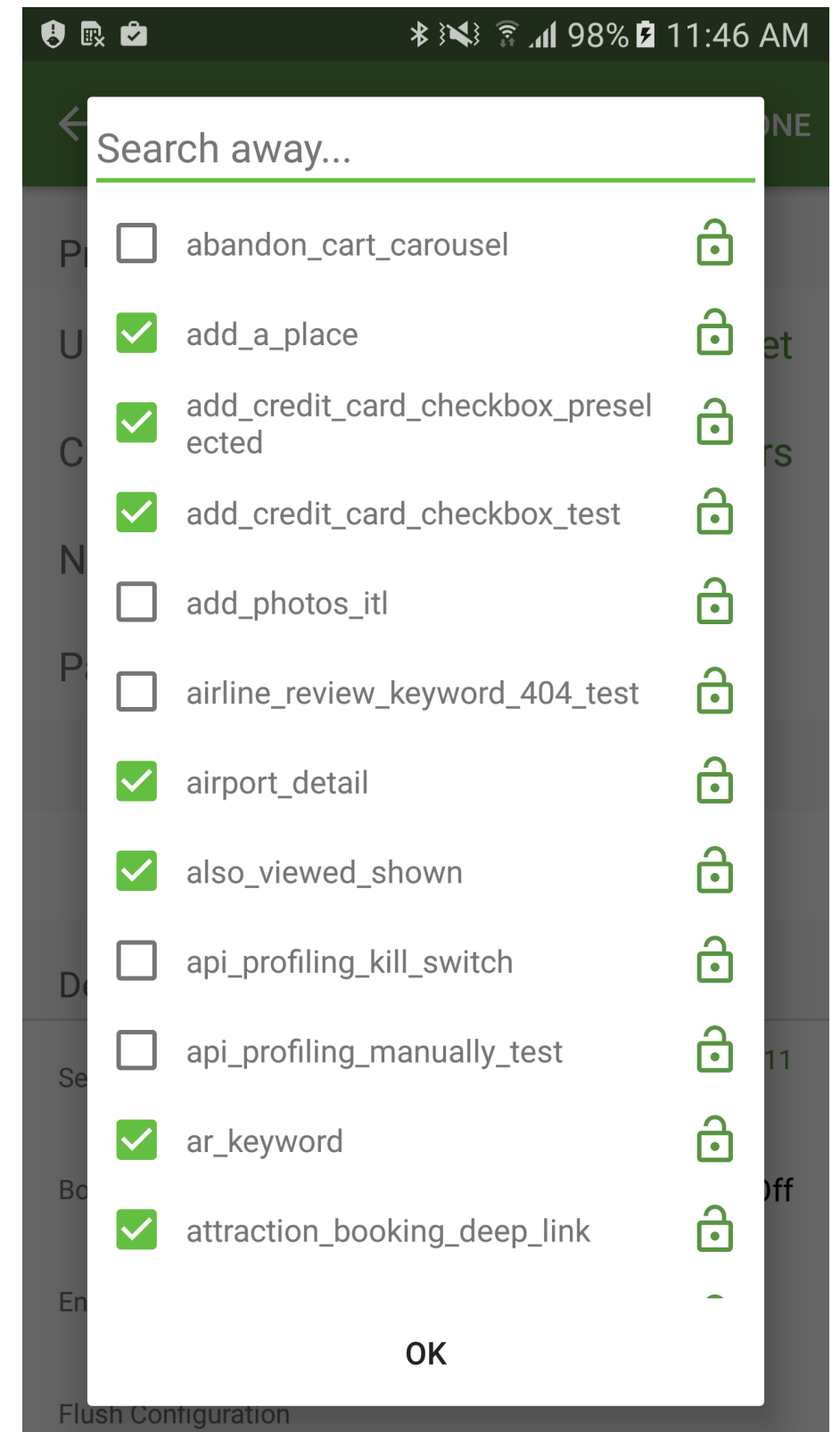
- ☒ 5%
- ☐ 10% 
- ☐ 20%
- ☐ 50%
- ☐ 100%
full rollout, completely replaces the old configuration

Save and publish

Cancel

Feature switches

- Feature switches that get set through a periodic configuration call





TESTING

Unit tests

```
public int addOne(int number) {  
    return number + 1;  
}
```

@Test

```
public void testAddOne_NegativeNumber_CorrectOutput() {  
    int result = addOne(-2);  
    Assert.assertEquals(-1, result);  
}
```



Run on every pull request

	testAttachView_ValidPromoFeatureOn_BannerGetsShown						17s 634ms
	testAttachView_ValidPromoFeatureOff_BannerGetsHidden						94ms
	testAttachView_NullPromoFeatureOn_BannerGetsHidden						48ms
	testAttachView_EmptyPromoFeatureOn_BannerGetsHidden						41ms
	testSetTitle_TitleMissingFromApiResponse_GetsSetFromLocation						46ms
	testSetTitle_TitleInApiResponse_GetsSetFromApiResponse						34ms
	attractionProductResponseSuccessTriggersLoadMoreResult						23ms
	testOnLoadMoreReached_MultipleViewsOfLoadMore_DoesNotTriggerMultipleTrackings						38ms
	testOnEndOfPageReached_MultipleViewsOfEndOfPage_DoesNotTriggerMultipleTrackings						43ms
	testAttachView_CurrentResultsAndTotalResults_ProperlySentToView						38ms
	testAttachView_NotAllPagesLoaded_ShowMoreButtonGetsShown						37ms
	testAttachView_AllPagesLoaded_ShowMoreButtonGetsHidden						30ms
	testAttachView_LoadProductFailure_ShowsLoadingError						44ms
	testAttachView_LoadProductSuccess_HidesLoadingView						34ms
	testAttachView_SuccessResponse_PartnerPhoneLookupProperlyLoadedFromResults						74ms
	testProductGetsSelected_CorrectCustomerServiceNumberPassedOn						47ms
▼	AttractionProductReviewsHistogramViewTest						9s 706ms
	testThatHistogramGetsHiddenOnZeroCount						9s 706ms
▼	AttractionProductTourGradesPresenterTest						700ms
	testLoadData_WithInvalidArguments_ShowsError						131ms



Native Jenkins

[BuildStarted android-stash-sonar-pull-requests]

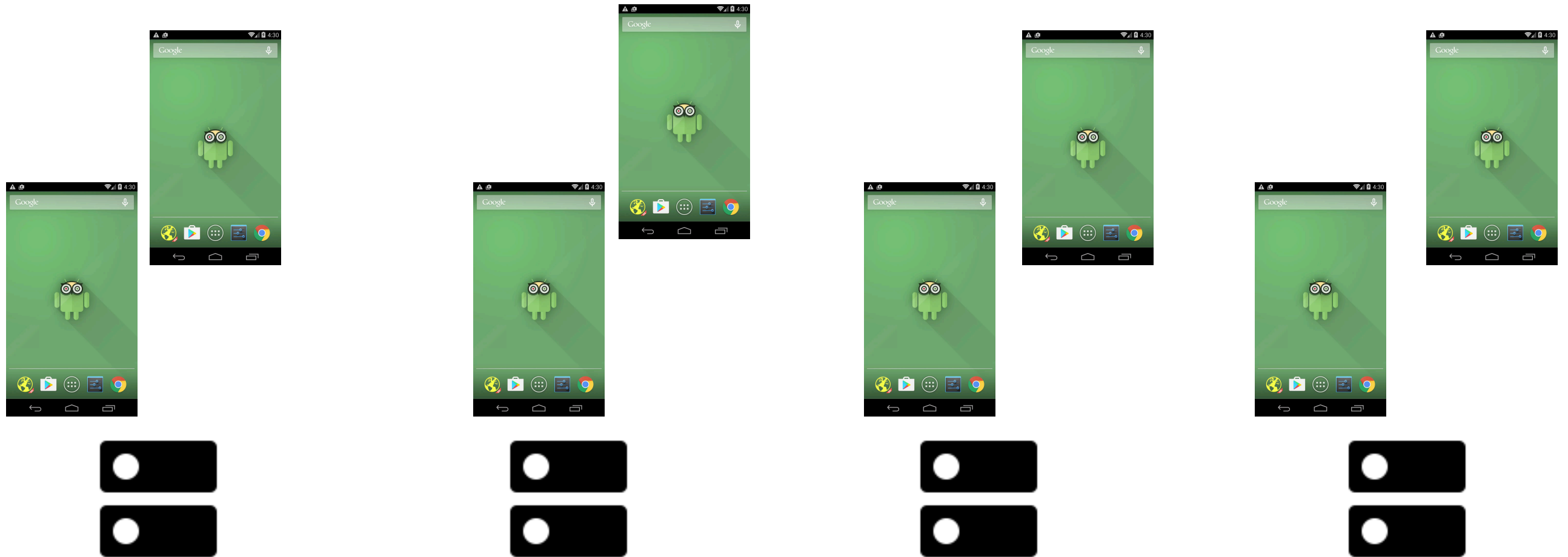
Reply · Create task · Like · 21 mins ago

UI & Integration tests

```
onView(withId(R.id.my_text_view))  
    .check(matches(withText("Hello World!")));
```




















































Run every 6 hours



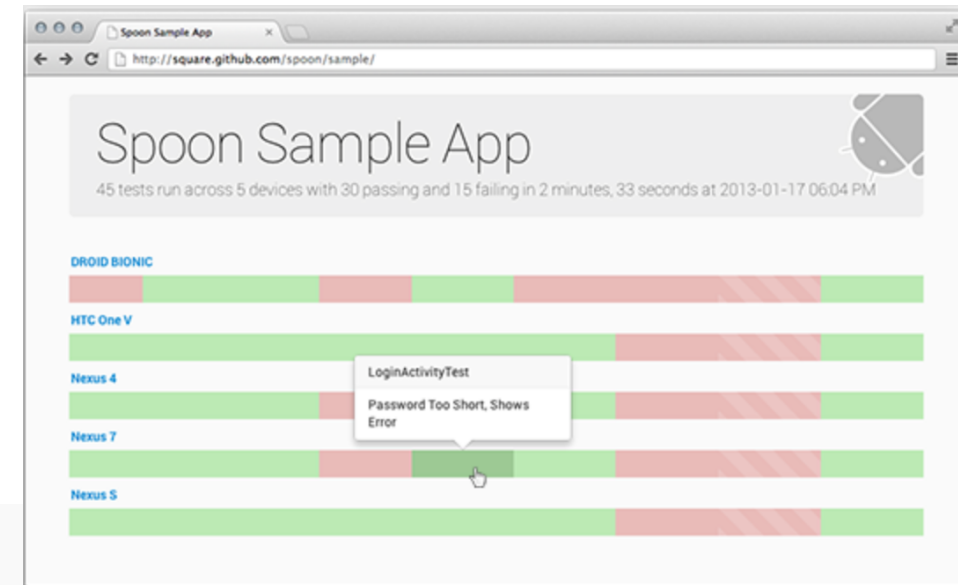
alternatively...



S	W	Name ↓	Last Success	Last Failure	Last Duration	
		android-app-upgrade-test	22 hr - #126	22 hr - #125	28 min	
		android-app-upgrade-test-runner-trigger	22 hr - #44	5 days 21 hr - #38	54 min	
		Android-Pull-Request-Observer	1 min 41 sec - #1509	21 days - #1105	25 sec	
		android-sonar-mainline	1 mo 20 days - #832	1 mo 20 days - #853	8 min 47 sec	
		android-sonar-runner-linux	39 min - #2811	N/A	18 min	
		android-stash-mainline	54 min - #1888	N/A	28 min	
		android-stash-pull-requests	40 min - #8041	N/A	8 min 48 sec	
		android-stash-sonar-pull-requests	40 min - #2949	N/A	19 min	
		android-stash-timeline-team	1 mo 23 days - #176	N/A	9 min 42 sec	
		android-test-all	N/A	18 hr - #30	3 hr 4 min	
		android-test-runner	5 mo 29 days - #8743	6 mo 0 days - #8722	7 min 5 sec	
		android-test-runner-linux	39 min - #22676	2 hr 6 min - #22672	8 min 0 sec	
		android-test-runner-linux-flights	2 mo 10 days - #175	2 mo 9 days - #177	12 min	
		android-test-runner-linux-marshmallow	3 hr 3 min - #760	1 hr 45 min - #763	22 min	
		android-test-runner-trigger	1 hr 45 min - #8667	2 hr 49 min - #8665	24 min	
		android-tests-attractions-mainline	20 hr - #909	2 hr 49 min - #912	52 min	
		android-tests-attractions-prerelease	7 days 13 hr - #84	12 hr - #85	28 min	

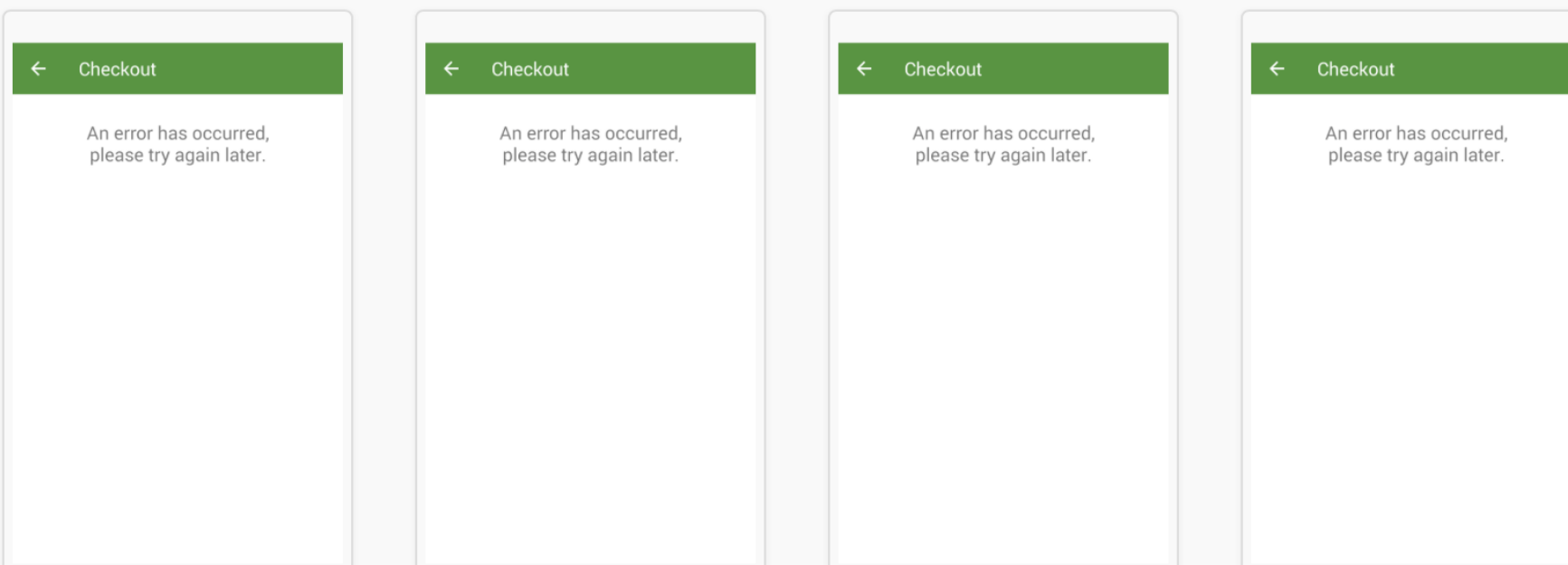
Spoon

Distributing instrumentation tests to all your Androids



End To End DAY,TOUR, Standard

android.support.test.espresso.PerformException: Error performing 'single click' on view 'with id: com.tripadvisor.tripadvisor.debug:id/attr_book_checkout_payment_card'.





android-ui-tests

jenkins android test results status, tests run every 6 hours - "Having flaky tests is as good as having no tests at all" - Steve Wozniak



fastlane · Nov-8 4:50 AM



SearchAndNav Build successful on mainline
[android-tests-nav-mainline #724](#)



fastlane · Nov-8 5:03 AM



SEM Build successful on mainline
[android-tests-sem-mainline #271](#)



fastlane · Nov-8 5:47 AM



Restaurants Build successful on mainline
[android-tests-restaurants-mainline #725](#)



fastlane · Nov-8 6:23 AM



MG Build successful on mainline
[android-tests-mg-mainline #420](#)



fastlane · Nov-8 7:30 AM



Community Build successful on mainline
[android-tests-community-mainline #579](#)



fastlane · Nov-8 7:33 AM



Engagement Build successful on mainline
[android-tests-engagement-mainline #727](#)



fastlane · Nov-8 7:48 AM



Attractions Build successful on mainline
[android-tests-attractions-mainline #908](#)



fastlane · Nov-8 8:16 AM



IBEX Build failed on mainline
[android-tests-ibex-mainline #723](#)



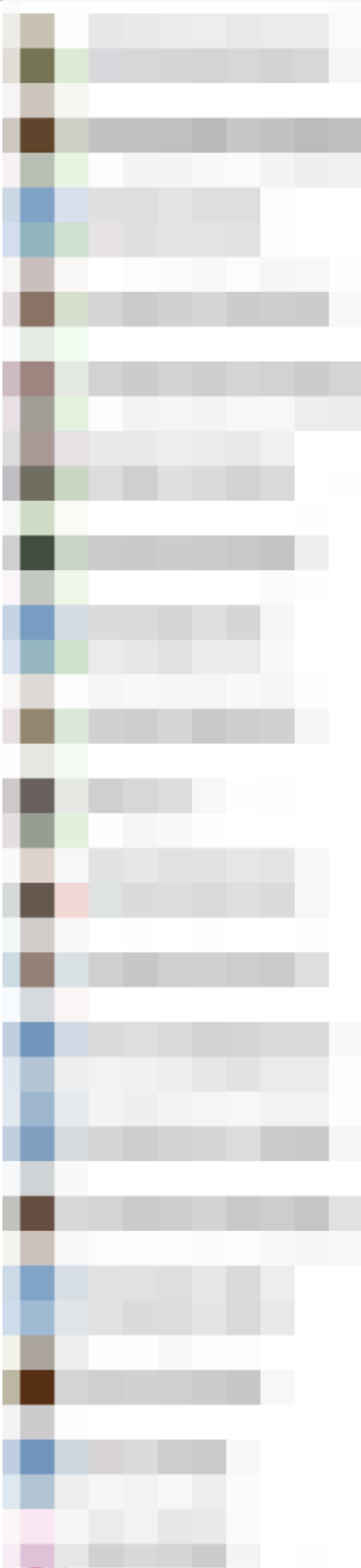
fastlane · Nov-8 8:24 AM



Flights Build successful on mainline



Members





Type	Priority	Estimate	References
Other	High	None	None
iOS Automated Test	Android Automated Test		
TripAdvisorEndToEndTests.TADownloadOfflineCityTests.testOfflineFullPackageDownload	com.tripadvisor.tripadvisor.test.DownloadOfflineTest		

Steps

	Step	Expected Result
1	Go to the geo page for Tokyo, Japan.	Page successfully displays.
2	Tap the <i>Download</i> button (right below the description of Tokyo)	Presented with the option to download the full or basic package. (Full includes photos, basic does not)
3	Select the option to download the full dataset.	Should complete within a few minutes and the dataset should successfully install. Dataset should include photos for POIs.
4	Note: if full package is downloaded, photos will begin to unpack in the background automatically, but you may notice that not all are visible if you go offline immediately.	
5	Put your phone into airplane mode and turn off wifi, then open the Restaurants list for Tokyo	There are restaurants on the list
6	Click into the top restaurant	The restaurant has 3 photos, name, and 3 reviews.

Results & Comments ?

History & Context ?

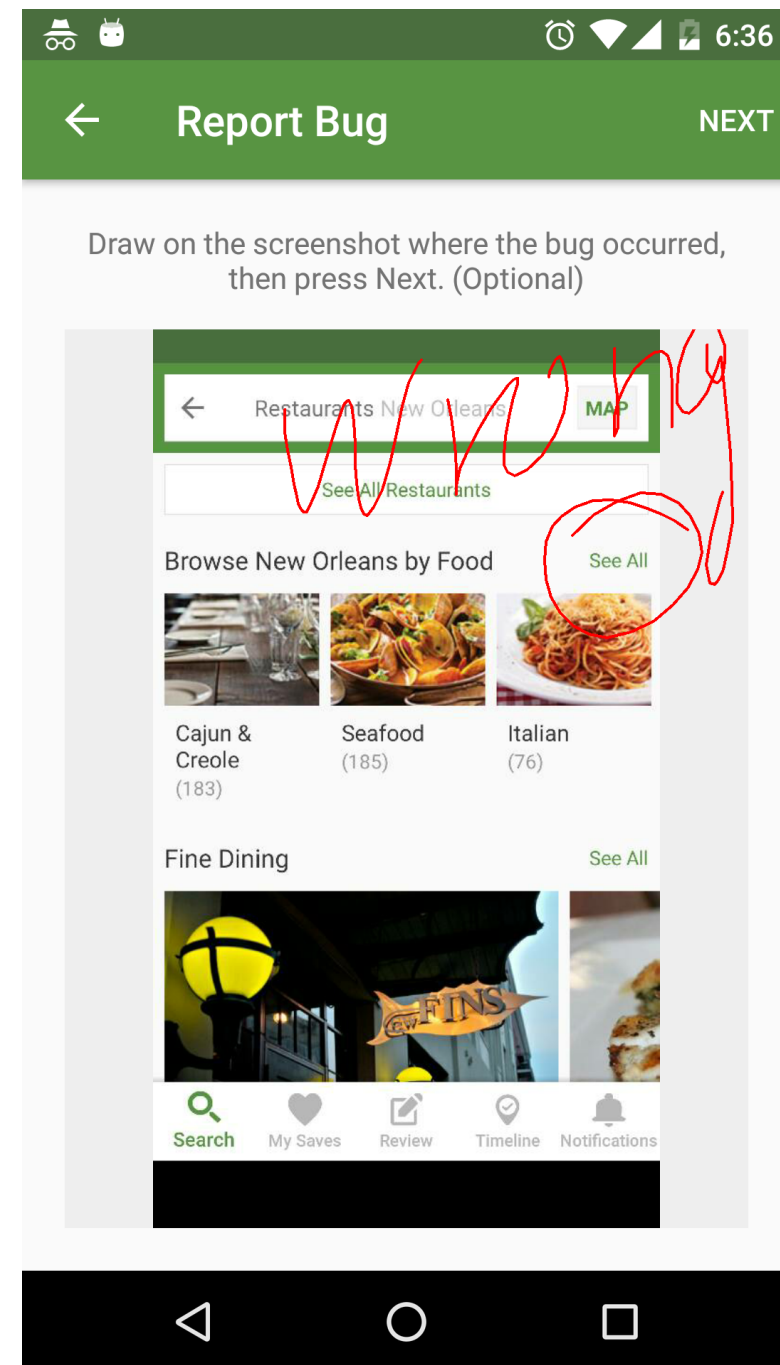
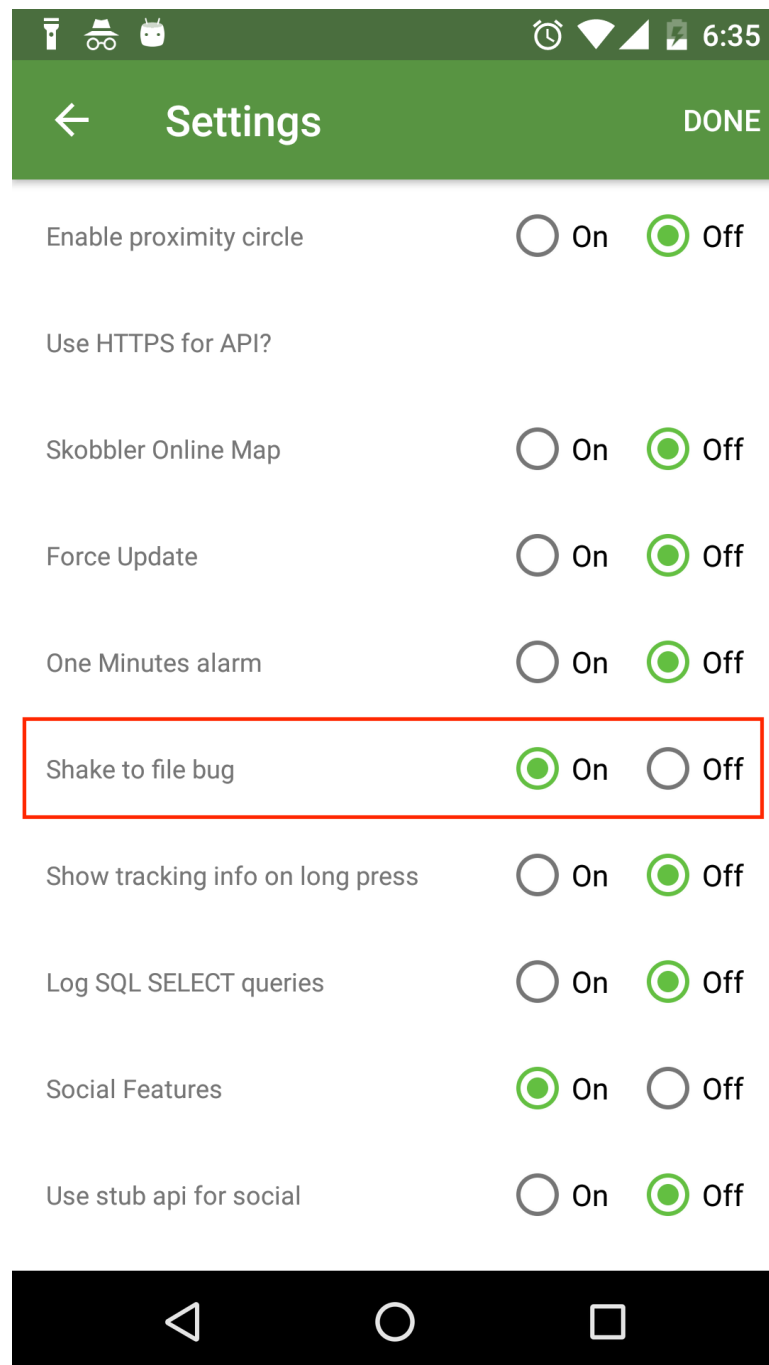
Defects ?

Passed	This test was marked as 'Passed'.
3/15/2016 12:56 PM Ollie the O.	

Manual

- Device lab
- Emulated slow network
- Bug hunts with devs, pms, QA

Rage shake



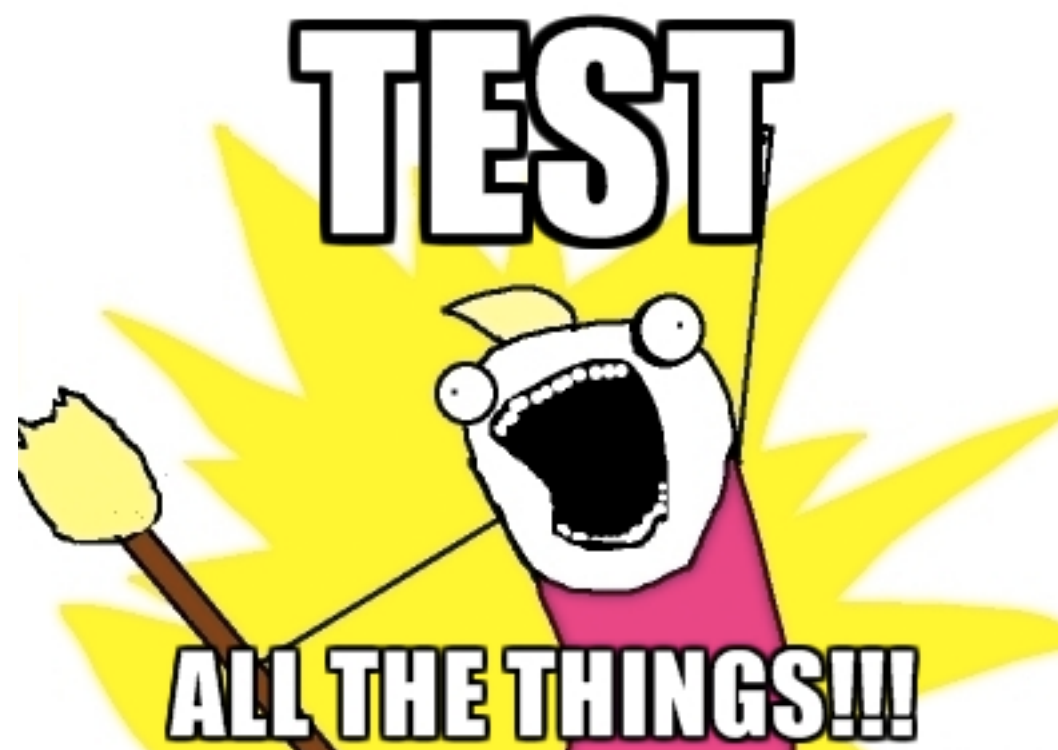
Top excuses for not testing

#1 excuse: “Android is too hard to test.”

#2 excuse: “We were a small team and wanted to get the features to the users first. Now we will write all the tests.”

(not)

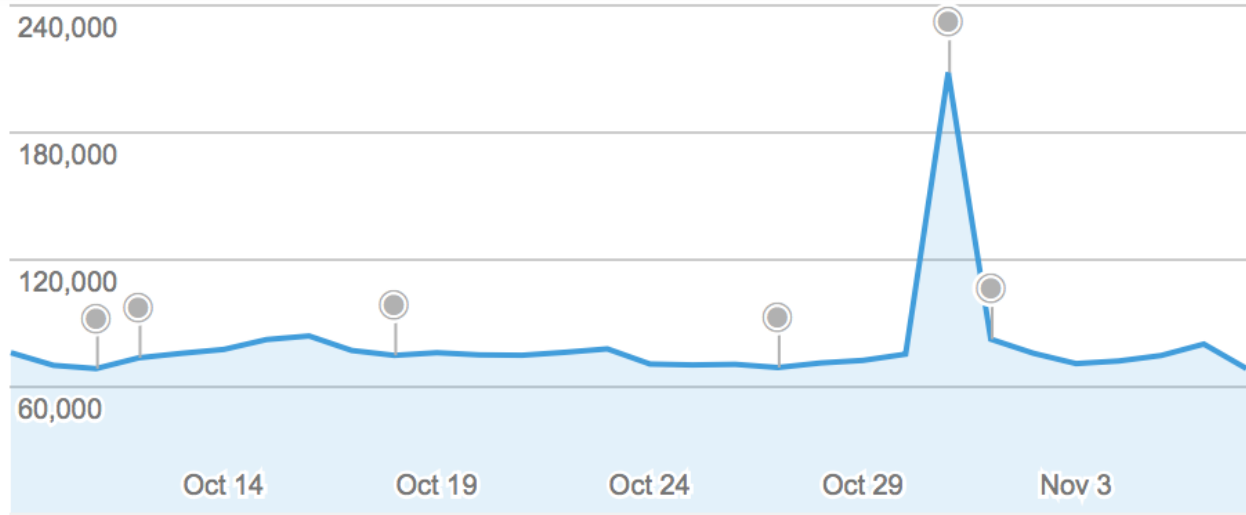
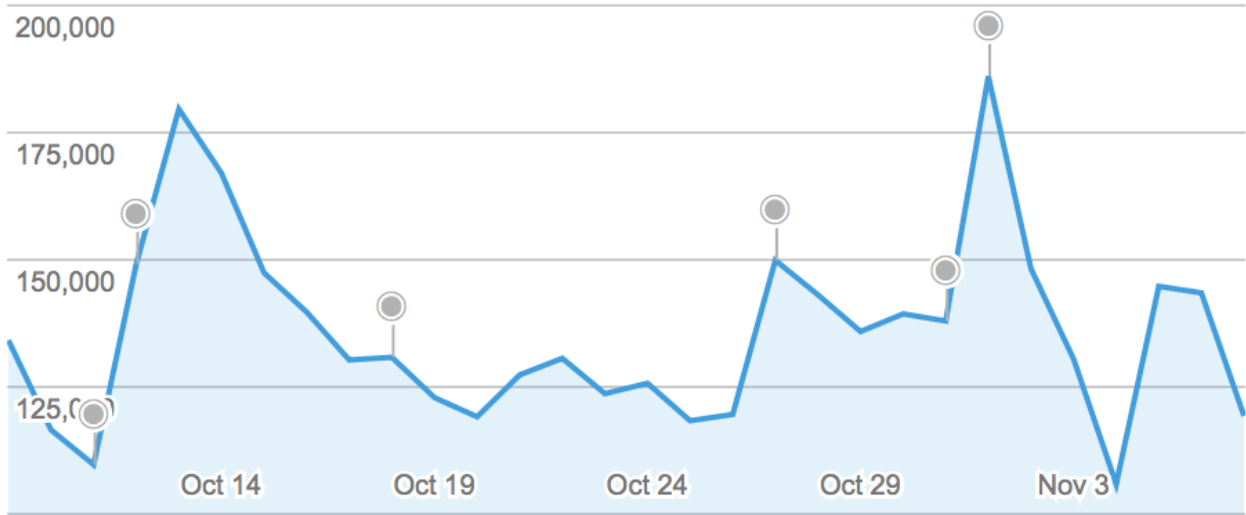
#3 excuse: “There are so many devices and ui tests are flaky that it is futile to test.”





MONITORING

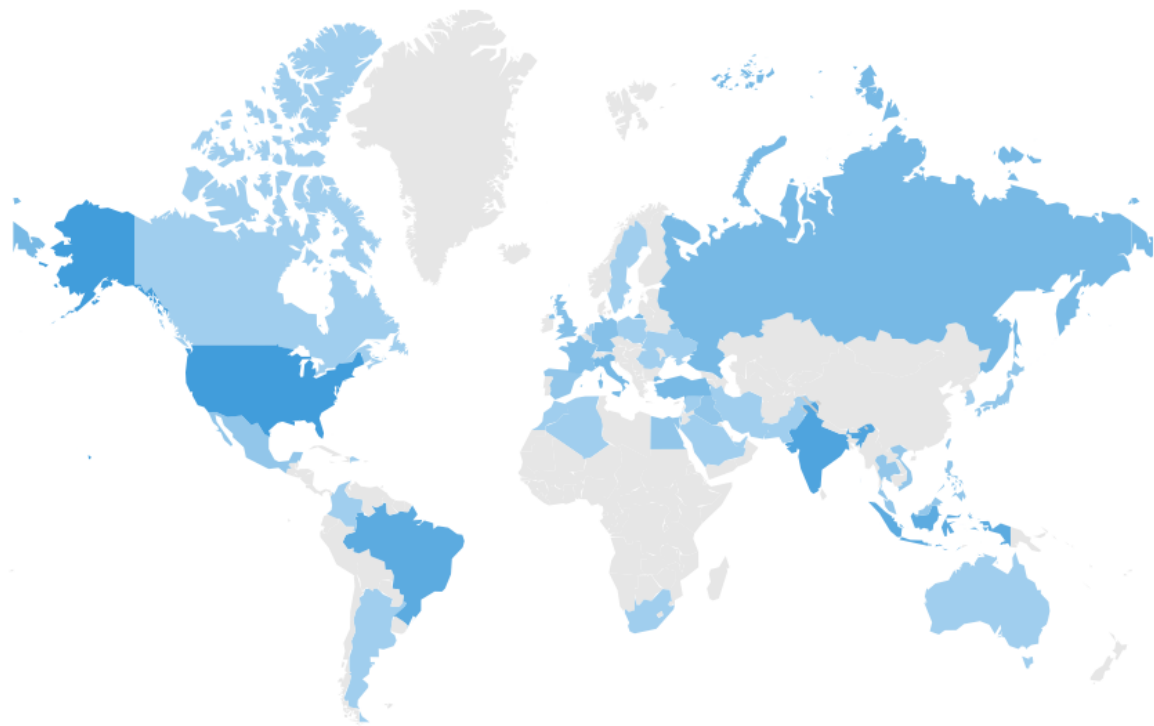
“If it’s worth doing, it’s worth measuring”



INSTALLS BY USER ?

[View details](#)

Top countries



AVERAGE RATING ?

[View details](#)

4.332

Last 30 days

-0.03

vs previous 30 days

CRASHES ?

[View details](#)

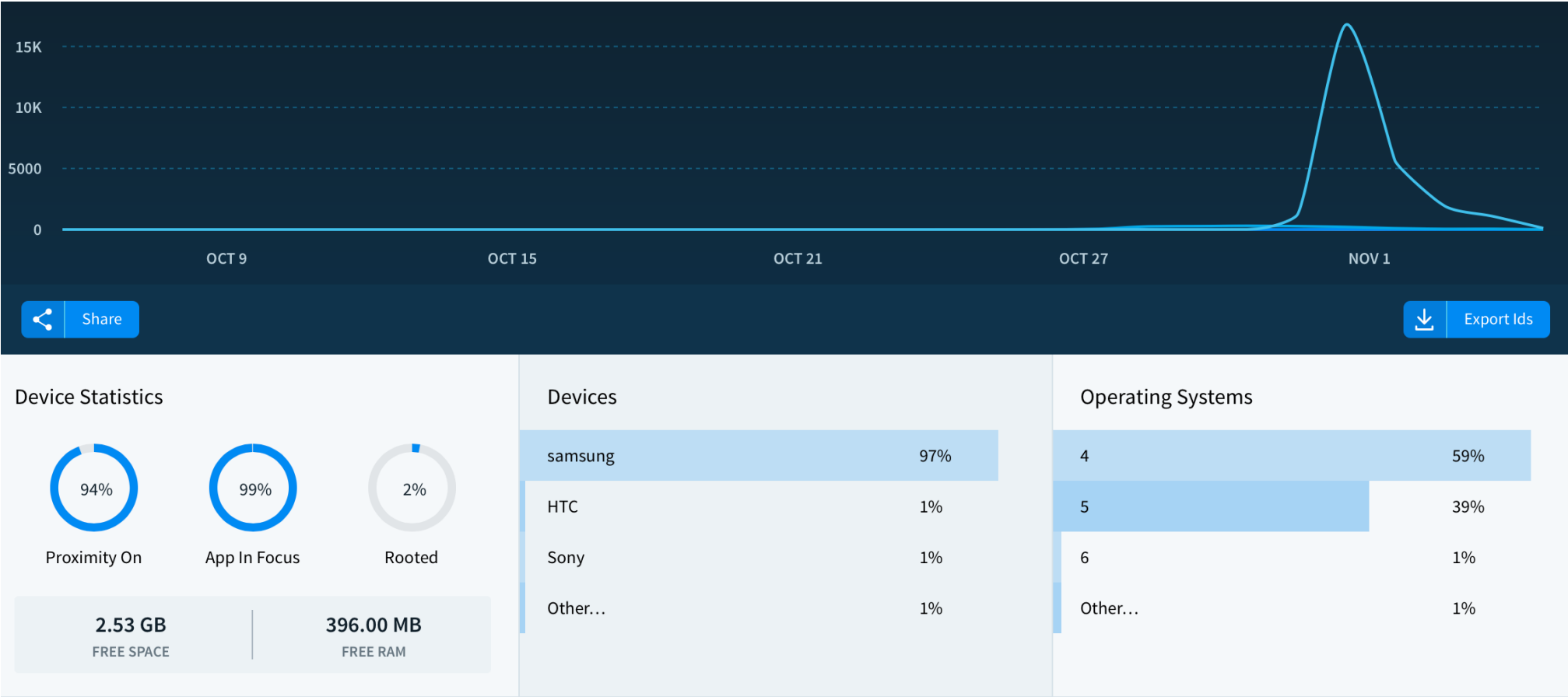
7,625

Last 30 days

+64%

vs previous 30 days

Crashes



Fatal Exception: android.view.InflateException
Binary XML file line #429: Binary XML file line #429: Error inflating class fragment

</> Raw Text

android.view.LayoutInflater.inflate (LayoutInflater.java:539)

android.view.LayoutInflater.inflate (LayoutInflater.java:423)

android.support.v4.app.Fragment.performCreateView (SourceFile:2080)

android.support.v4.app.FragmentManagerImpl.executePendingTransactions (SourceFile:589)

android.os.Handler.handleCallback (Handler.java:739)

com.android.internal.os.ZygoteInit.main (ZygoteInit.java:616)





















Performance

- Time it takes for screens to appear
- Battery consumption
- API latency
- Average response size

```
PerformanceLog performanceLog = ApiLogger.startProfiling(tag, "action");  
ApiLogger.ex(TAG, new Exception("API call failed, throwable was 'null.'));
```

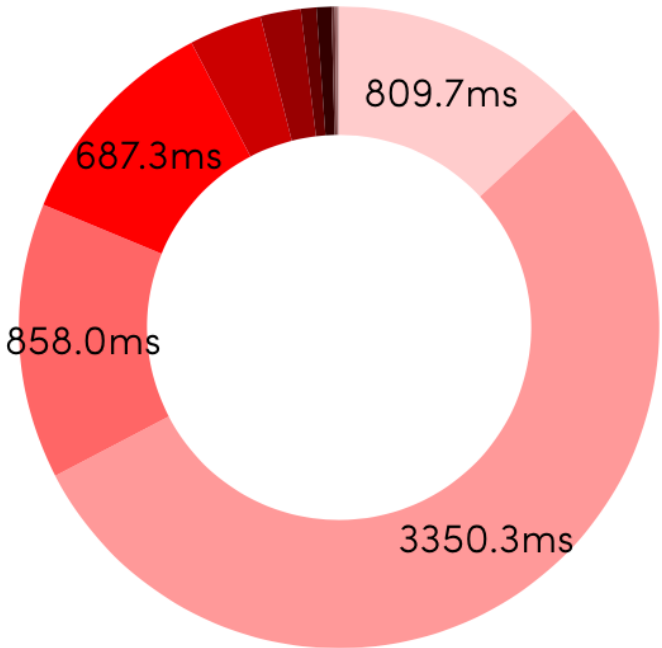
nimbledroid

Scenario		Issues		Measurements					
 Search Bar  DualSearchActivity 		 Slowdowns	 Mem Leaks	 Time	 Memory	 Network		 Disk I/O	
				Real Time	Max Use	Down	Up	Read	Write
		-	-	-	-	-	-	-	-

Scenario		Issues		Measurements					
 Search  HomeActivity 		 Slowdowns	 Mem Leaks	 Time	 Memory	 Network		 Disk I/O	
				Real Time	Max Use	Down	Up	Read	Write
		4	0	0.9s	40.1MB	2KB	5KB	29KB	672KB

CPU Time by Dependency ?

nimbledroid



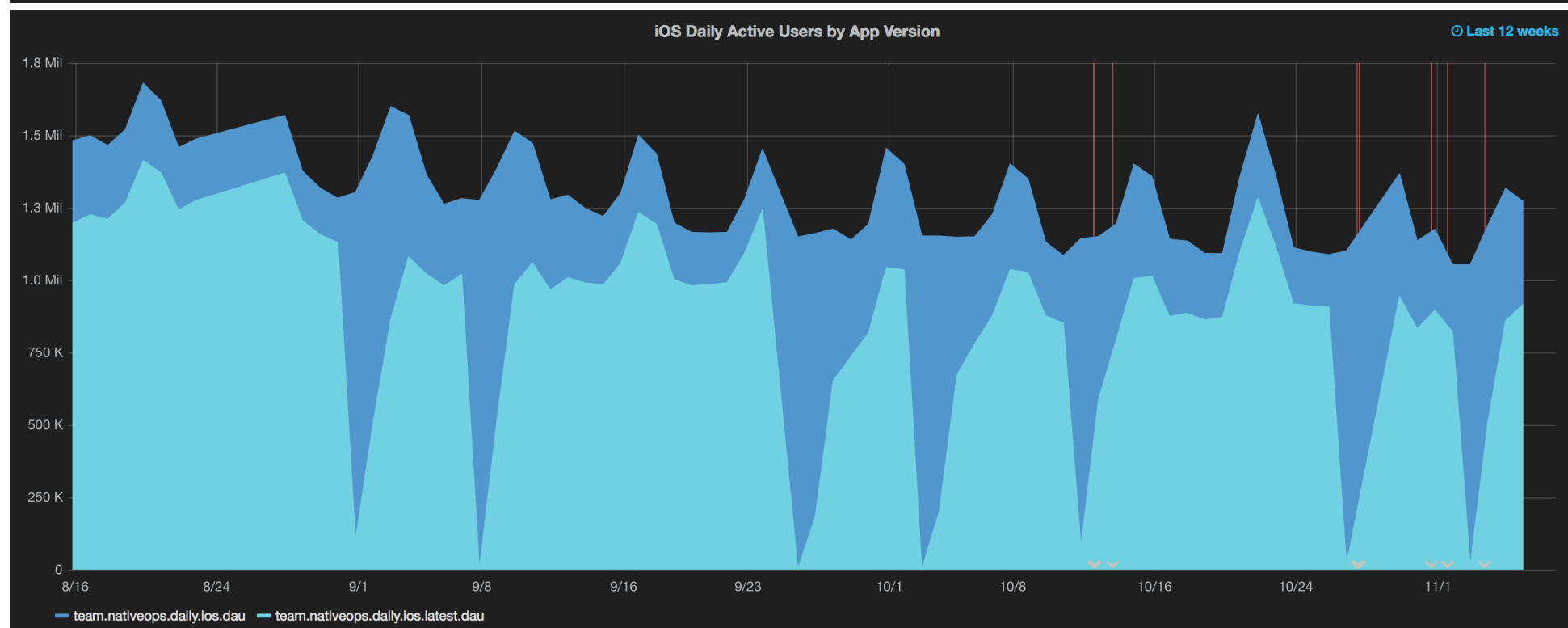
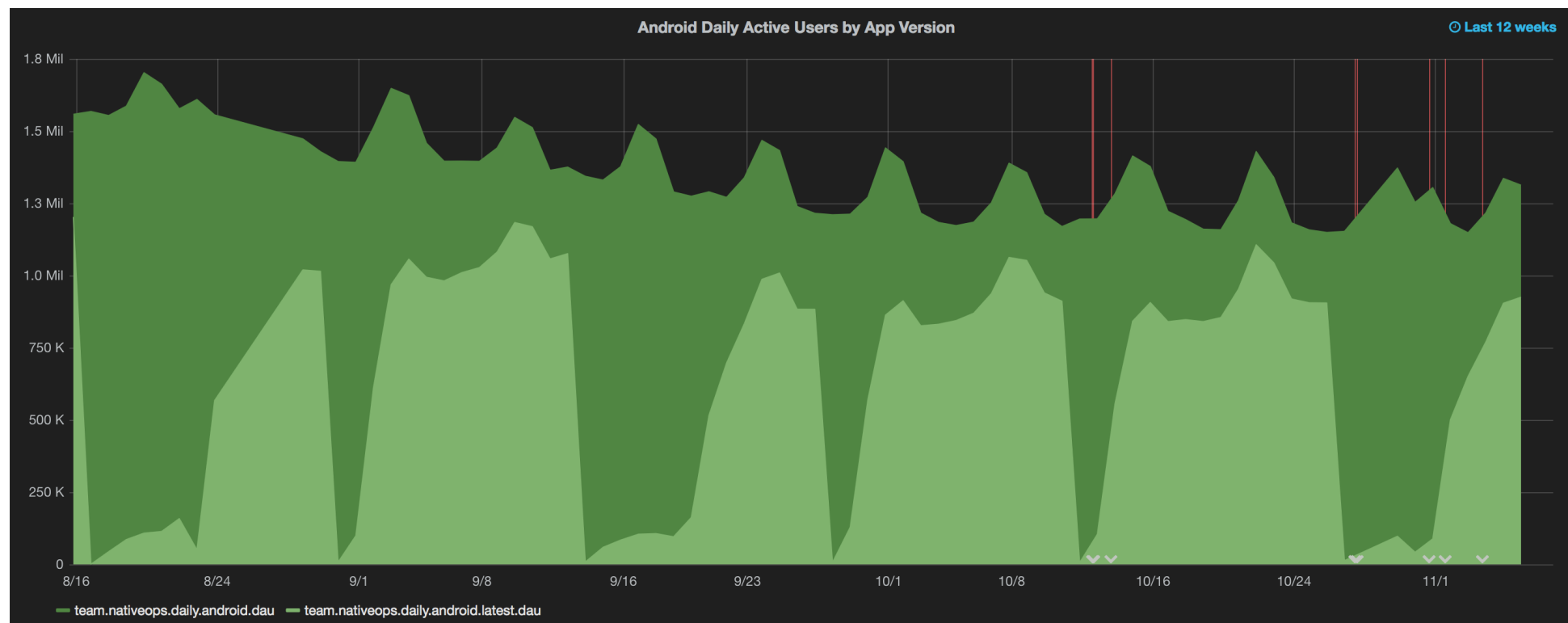
- Application
- Joda-Time
- Jackson JSON Parser
- Fabric
- Android Support
- OkHttp
- Crashlytics
- Google Play Services
- RxJava
- Picasso
- Android Asynchronous Http Client
- Guava Core Libs
- Retrofit
- Dagger

User metrics

- Session length
- Retention rate
- Daily Active Users
- Monthly Active Users
- Average Revenue Per User

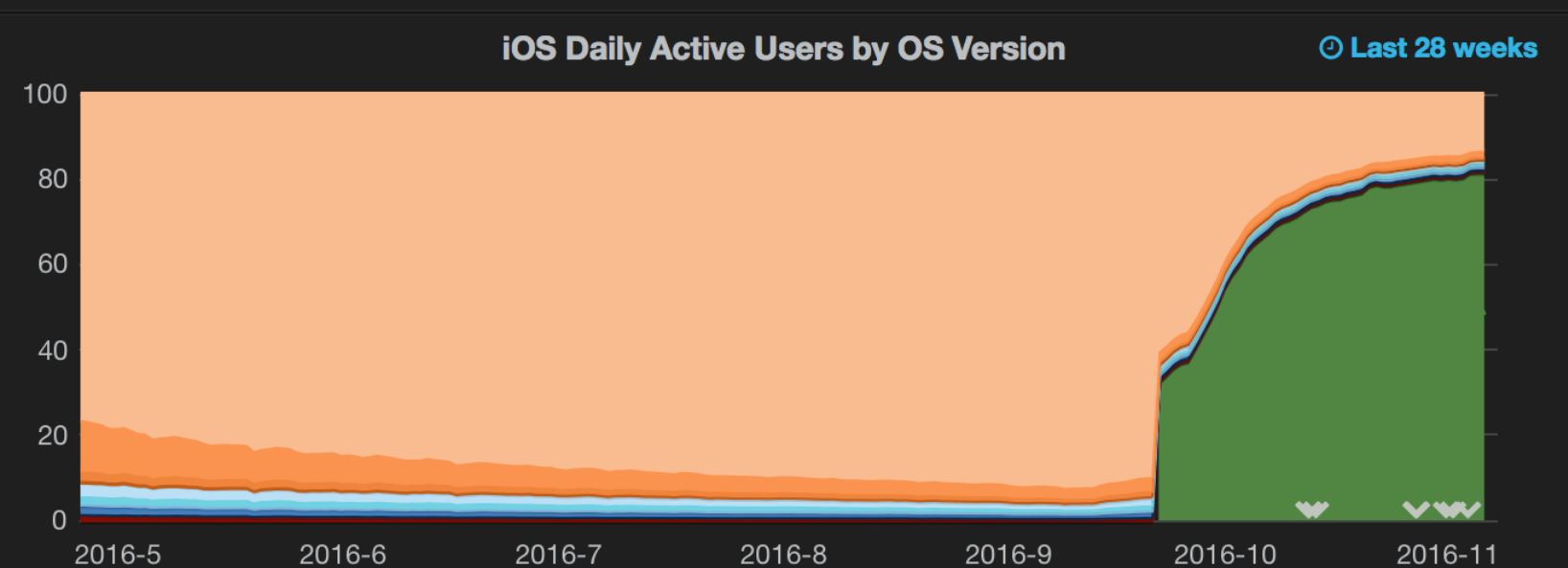
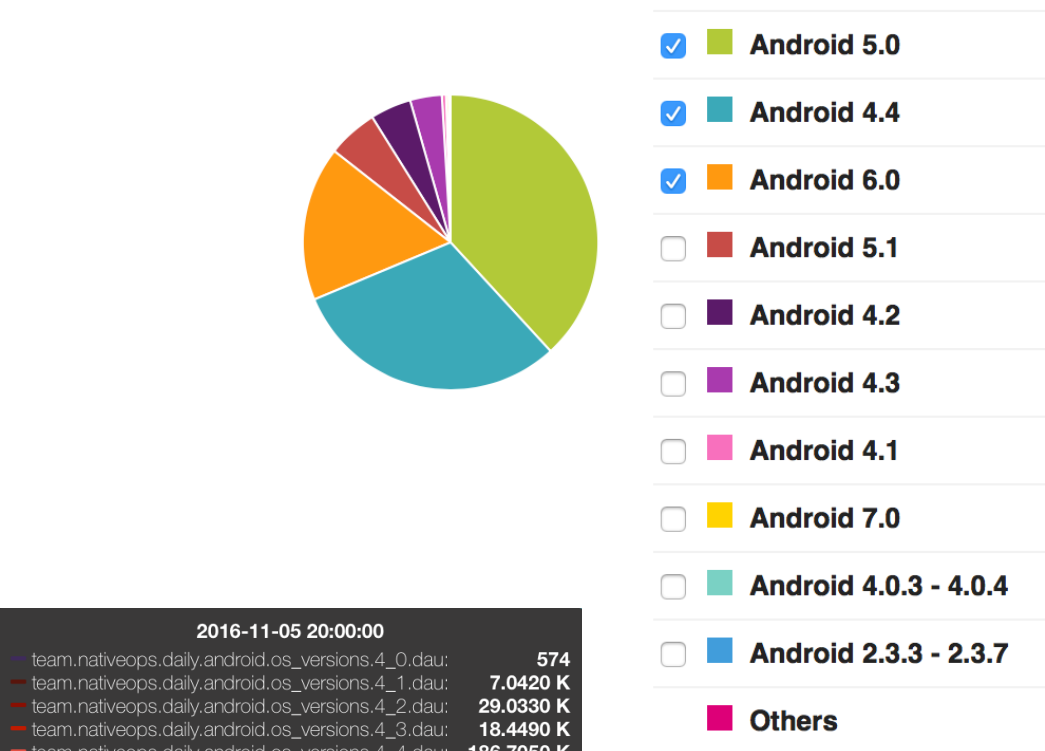
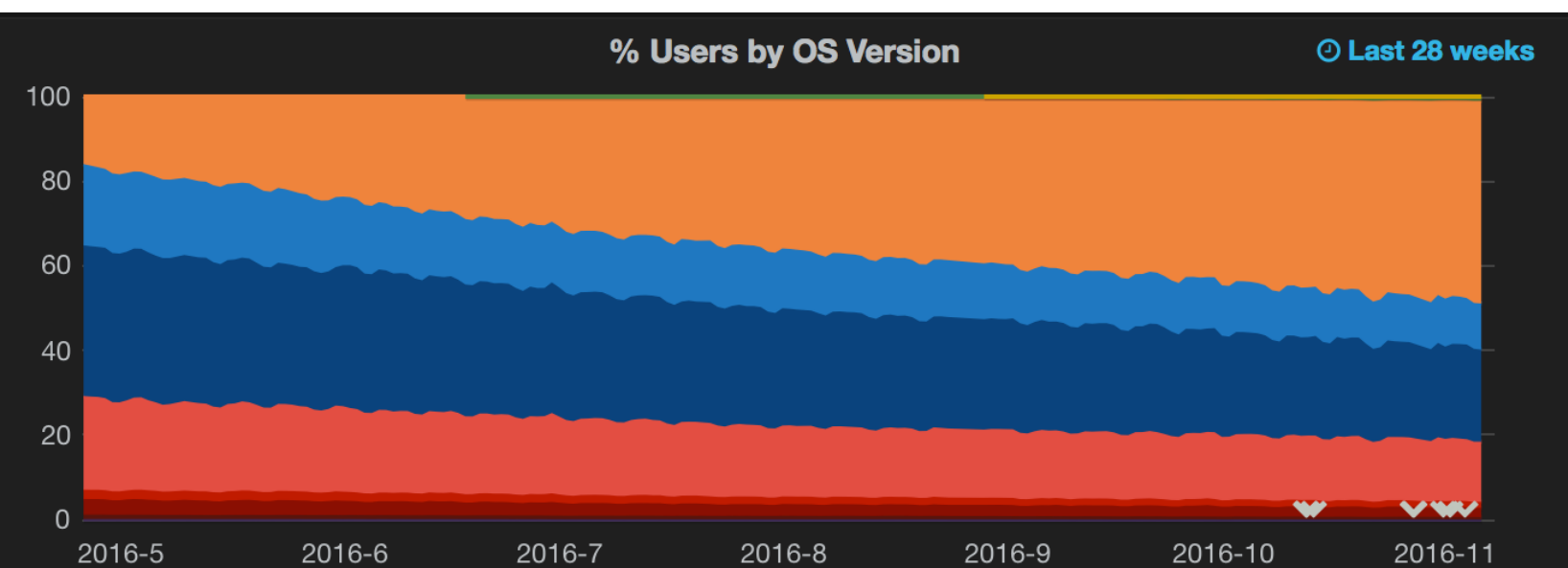


Daily active users



OS adoption rate

INSTALLS ON ACTIVE DEVICES ON NOV 5, 2016



2016-11-05 20:00:00

team.nativeops.daily.android.os_versions.4_0.dau:	574
team.nativeops.daily.android.os_versions.4_1.dau:	7.0420 K
team.nativeops.daily.android.os_versions.4_2.dau:	29.0330 K
team.nativeops.daily.android.os_versions.4_3.dau:	18.4490 K
team.nativeops.daily.android.os_versions.4_4.dau:	186.7050 K
team.nativeops.daily.android.os_versions.5_0.dau:	285.8670 K
team.nativeops.daily.android.os_versions.5_1.dau:	143.3690 K
team.nativeops.daily.android.os_versions.6_0.dau:	630.0090 K
team.nativeops.daily.android.os_versions.7_0.dau:	10.7170 K
team.nativeops.daily.android.os_versions.7_1.dau:	1.7470 K

2016-11-05 20:00:00

team.nativeops.daily.ios.os_versions.10_0.dau:	613.8470 K
team.nativeops.daily.ios.os_versions.10_1.dau:	425.6370 K
team.nativeops.daily.ios.os_versions.10_2.dau:	3.9260 K
team.nativeops.daily.ios.os_versions.6_0.dau:	44
team.nativeops.daily.ios.os_versions.6_1.dau:	348
team.nativeops.daily.ios.os_versions.7_0.dau:	756
team.nativeops.daily.ios.os_versions.7_1.dau:	2.9680 K
team.nativeops.daily.ios.os_versions.8_0.dau:	923
team.nativeops.daily.ios.os_versions.8_1.dau:	7.6530 K
team.nativeops.daily.ios.os_versions.8_2.dau:	2.0510 K
team.nativeops.daily.ios.os_versions.8_3.dau:	7.4730 K
team.nativeops.daily.ios.os_versions.8_4.dau:	9.7700 K
team.nativeops.daily.ios.os_versions.9_0.dau:	3.4730 K
team.nativeops.daily.ios.os_versions.9_1.dau:	7.1800 K
team.nativeops.daily.ios.os_versions.9_2.dau:	19.0640 K
team.nativeops.daily.ios.os_versions.9_3.dau:	169.8970 K

Feature tracking

- Are users interacting with a feature?
- **A/B testing:** Which option is better?

Feature tracking at TA

```
coverPageBtn.setOnClickListener(new View.OnClickListener() {  
    @Override  
    public void onClick(View view) {  
        getTrackingAPIHelper().trackEvent(getLookbackServletName(),  
            TrackingAction.COVER_PAGE_CLICK);  
    }  
});
```

Analytics tools



