



Tales from Making Mobile Games

Jesper Richter-Reichhelm (@jrirei)

goto;

conference



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to rate sessions
and ask questions



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A True Story

The Launch of Agent Alice on iOS



Cushions

Fedora

Corpse

Sunglasses





Concept start August 2013



Production start March 2014

Internal release October 2014

The background of the image is a close-up, slightly blurred photograph of a desk. On the left, a white coffee cup sits on a saucer. In the center, a large sheet of paper with a detailed architectural blueprint is spread out. A blue pen with a gold-colored tip lies diagonally across the right side of the blueprint. The blueprint features various lines, shapes, and some handwritten notes. Two semi-transparent dark grey rectangular boxes are overlaid on the blueprint, each containing white text.

Launch at February 26th

Both iOS & Android

February 2015



No SIM

Settings

Notifications

Control Center

Do Not Disturb

General

Display & Brightness

Wallpaper

Sounds

Touch ID & Passcode

Privacy

iCloud

itunesjrr@richter-reichhelm.de

iTunes & App Store

Mail, Contacts, Calendars


Mail, Contacts, Calendars

13:03

98%

< Manage Storage

Info

 **Jesper's iPad**
This iPad


Latest Backup03/03/15


Backup Size59,6 MB


BACKUP OPTIONS


Choose the data you want to back up.


Next Backup Size61,2 MB


 **Photo Library**
12,1 MB


 **TWD2**
6,2 MB

 **Real Racing 3**
4,8 MB

 **Heros Charge**
78,1 KB

 **Agent Alice**
54,5 KB

 **Keyboard Data (Chinese & Japanese)**
4,4 KB

 **iMovie**

4,4 GB available of 5,0 GB on iCloud

4,4 GB available of 2,0 GB on iCloud

Hints Energy Cash

+60

€1,99

+150

+10 FOR FREE

MOST POPULAR

€4,99

+300

+30 FOR FREE

€9,99

+7

February 2015



The background of the slide is a photograph of a desk. In the top left, there is a white coffee cup. In the top right, a blue pen lies diagonally. In the bottom left, a game box is visible with a red circle and a red question mark on its cover. The desk surface is covered with a large, detailed architectural drawing or map. Three dark grey rectangular text boxes are overlaid on the image.

3 million downloads on weekend

Top 1 game in UK, DE, FR

Top 2



What we have learned

Test with TestFlight

HockeyApp is not sufficient anymore

Expect to be rejected

Don't rely on previous results

Have a fallback version ready for launch

Finish development 4 weeks before launch



Making Mobile Games

mobile network massive scale
two platforms max download size
Google Play paid user acquisition
ad publishing long term retention
cheating Facebook mobile operation
Game Center
continuous development free 2 play
game as a service complex configuration
low latency
offline mode thousands of devices
multi device handling

mobile network massive scale
two platforms max download size
Google Play paid user acquisition
ad publishing long term retention
cheating Facebook **mobile operation**
Game Center
continuous development free 2 play
game as a service complex configuration
offline mode thousands of devices
multi device handling
low latency

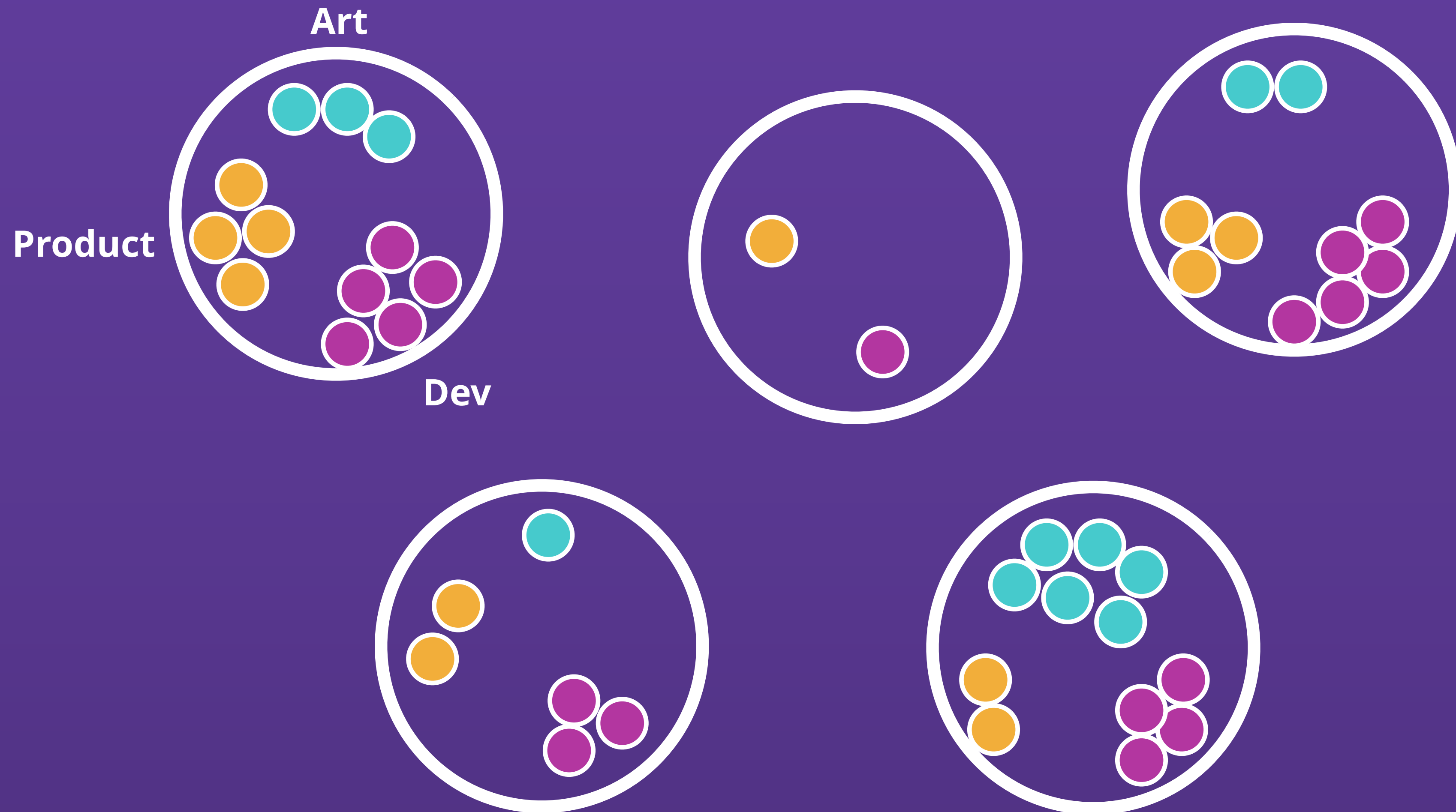
A word cloud of various challenges and concepts in mobile game development, set against a solid purple background. The words are in different sizes, colors (white and light purple), and orientations. The most prominent words are 'mobile operation' and 'thousands of devices' in large white font. Other notable words include 'massive scale', 'paid user acquisition', 'long term retention', 'free 2 play', 'complex configuration', 'low latency', 'multi device handling', 'game as a service', 'offline mode', 'cheating', 'Facebook', 'Game Center', 'ad publishing', 'Google Play', 'mobile network', 'two platforms', 'max download size', 'continuous development', and 'multi device handling'.

mobile network massive scale
two platforms max download size
Google Play paid user acquisition
ad publishing long term retention
cheating Facebook mobile operation
Game Center
continuous development free 2 play
game as a service complex configuration
offline mode thousands of devices
multi device handling

Two Platforms

iOS and Android

Independent Teams



The Flash logo is a square divided horizontally into a red top half and a dark red bottom half. A white stylized 'F' is centered, with its top bar in the red section and its bottom bar in the dark red section. A small white registered trademark symbol (®) is located in the bottom right corner of the dark red section. The logo has a 3D effect with a light gray shadow on the left and bottom edges.

Flash on Facebook

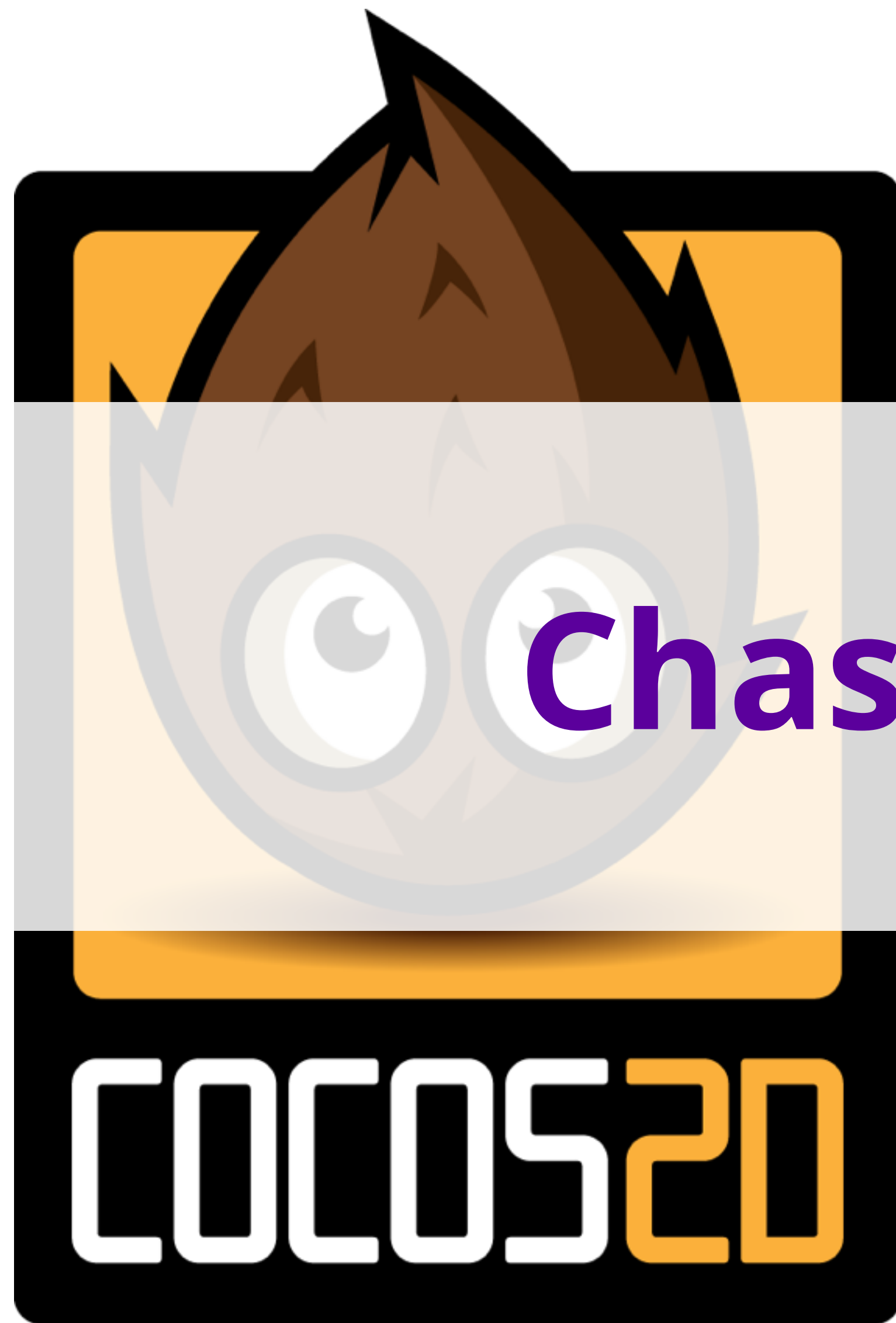
HTML



Cross Platform
Development



COCOS2D



Chase Ports





Cross Compilation



Cross Platform Development

PS3



Wii U



iOS





What we have learned

HTML5 is not good enough

... for complex games

Chase ports

... are a good way to kill team morale

True cross platform development rocks

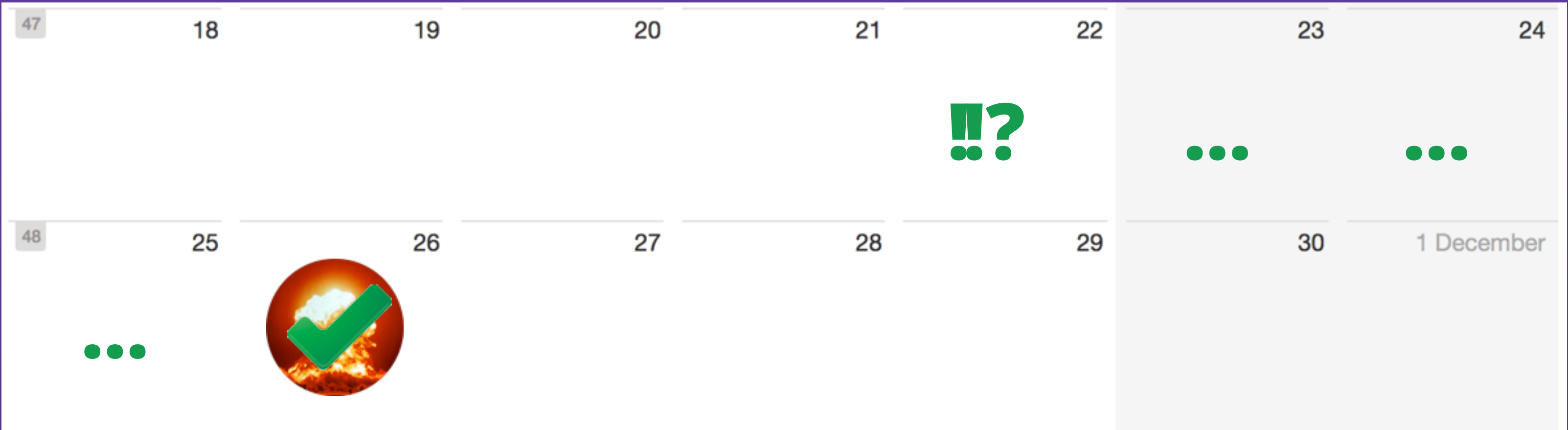
... even with Unity

Mobile Operation

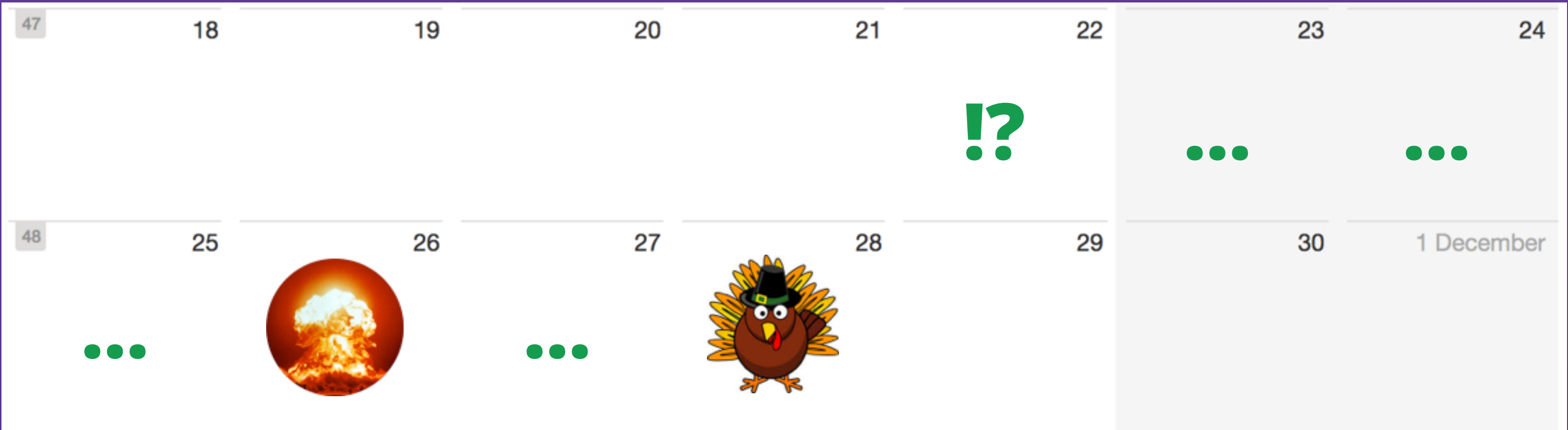
The Art of Running an App



November 2013



November 2013

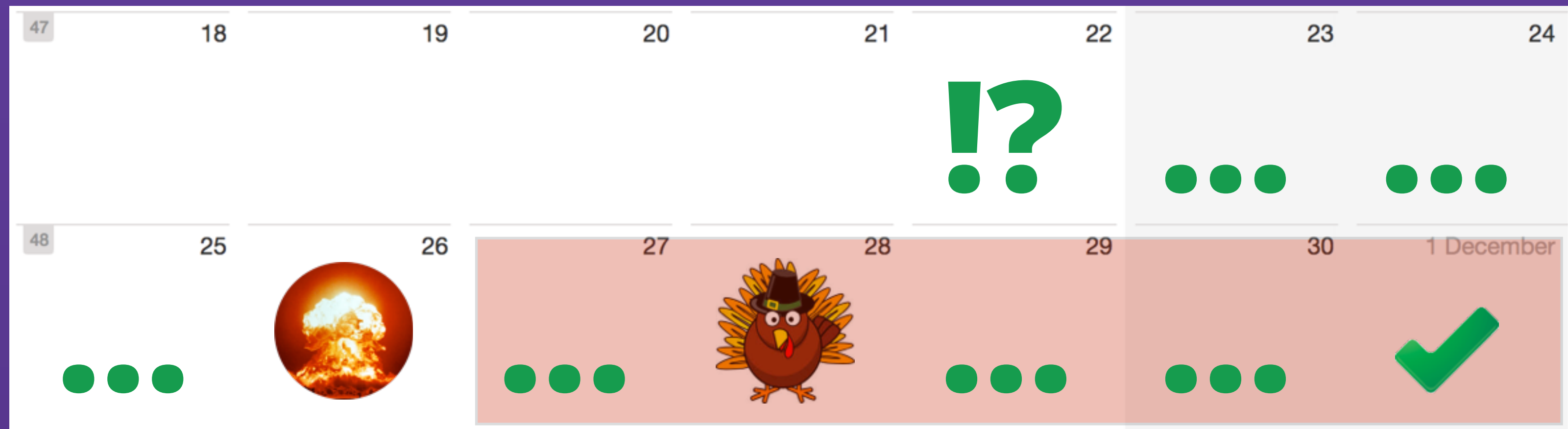


“In recognition of your incredible efforts and achievements, I’m happy to announce that we’re **extending** the **Thanksgiving holiday** this year.”

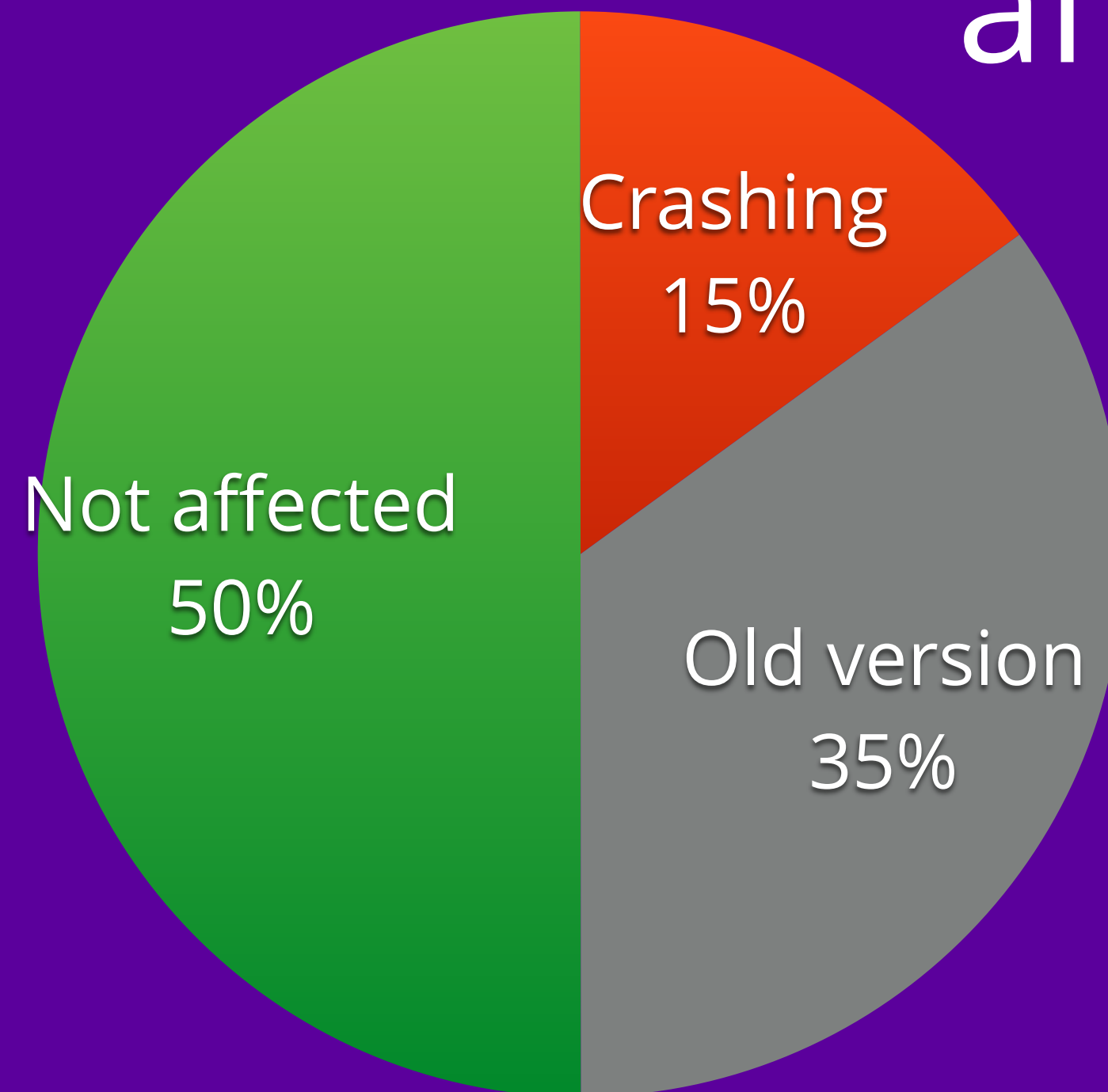
- Tim Cook



November 2013



>200,000 users
affected



AppsCrashesDevicesFeedbackUsers

Krzysztof SzafranekSign Out

Jelly Splash iOS | LiveVersion 1.7.0 (21)

OverviewCrashes2214621

Upload CrashManage Crashes

102550

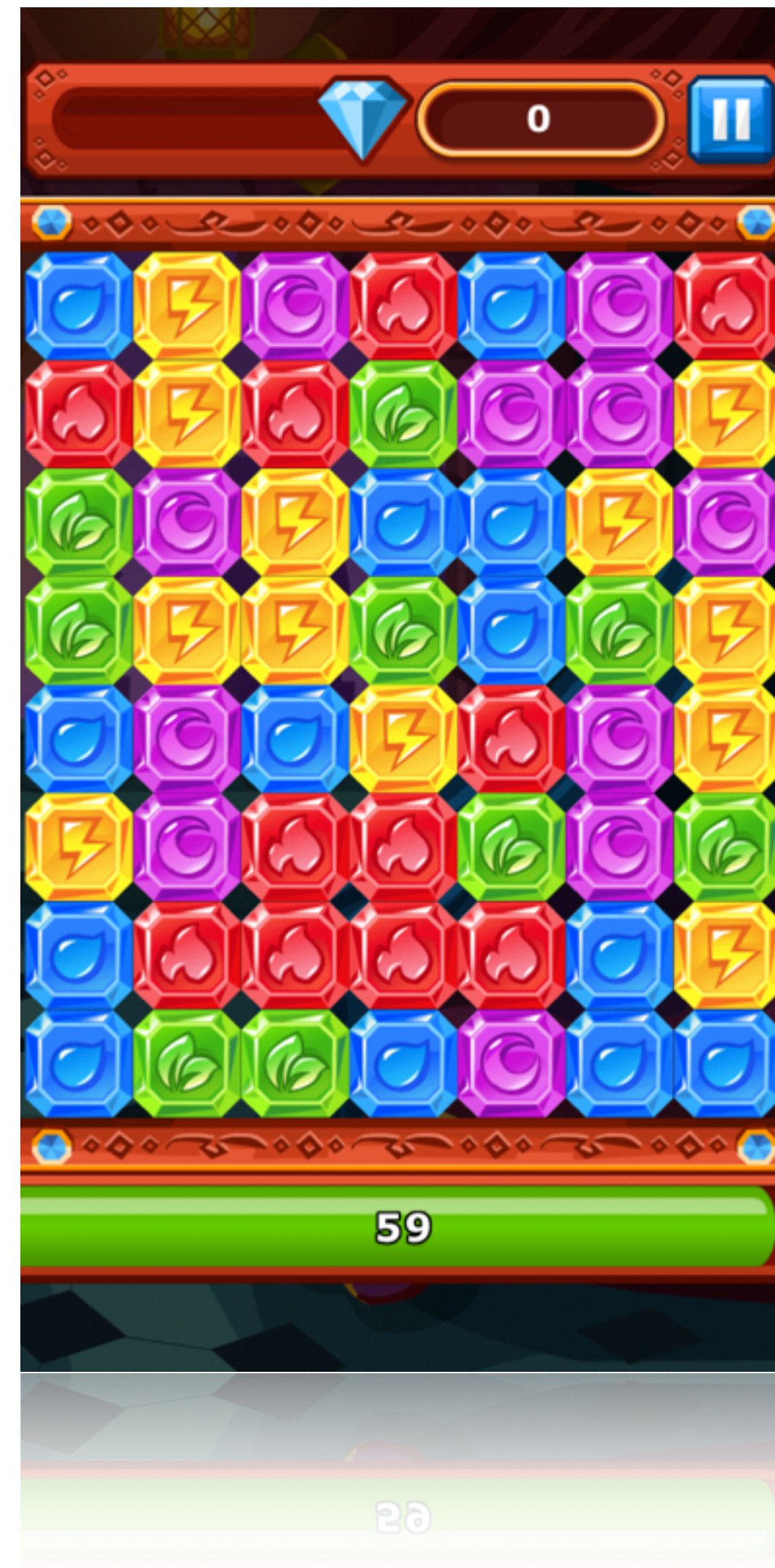
AllUnresolvedResolvedIgnored

Found 403 crash groups on 17 pages.

Count	Description	Last Crash	Actions
2191200 resolved	- [PLViralGatesService getGateForWorld:] line 82 SIGABRT - 'NSRangeException', reason: '**** -[__NSArrayM objectAtIndex:]: index 8 beyond bounds [0 .. 7]'	17 Mar 2014, 02:05	View Delete
4447 open	- [CCSprite draw] SIGSEGV	16 Mar 2014, 21:12	View Delete
2829 resolved	0x002994fb 0x0012a3ab 0x0017c8ad 0x00118d2d 0x000ad3c7 SIGABRT - 'NSRangeException', reason: '**** -[__NSArrayM objectAtIndex:]: index 8 beyond bounds [0 .. 7]'	17 Mar 2014, 02:05	View Delete
2498 open	- [CCGLView swapBuffers] SIGSEGV	16 Mar 2014, 09:42	View Delete
open	SIGSEGV		Delete
3488	- [CCGLView swapBuffers]	16 Mar 2014, 09:42	View
2191200	SIGABRT - 'NSRangeException', reason: '**** -[__NSArrayM objectAtIndex:]: index 8 beyond bounds [0 .. 7]'		Delete



Control: 50%



Test A: 50%



2011





Config Service



Variable config

Offline mode

Environments















AB testing


Config Service

Configurations


Ci ▾

SBS-ID: ckkkbk31ekq916wv1nwmint2

Configuration Name ▾	Version	Last Deployed	Size	 Show Deleted
board_changes	16	about 1 month ago	5.01 Kb	 Edit
difficulty_levels	11	30 days ago	0.44 Kb	 Edit
feature_switching	32	7 days ago	0.34 Kb	 Edit
hard_currency_shop	2	4 months ago	0.03 Kb	 Edit
iap_product_info	10	4 months ago	0.98 Kb	 Edit
iap_product_info_sales	3	4 months ago	0.25 Kb	 Edit
iap_product_info_v2	2	3 months ago	0.98 Kb	 Edit
iap_products	7	4 months ago	0.65 Kb	 Edit
ingame_boost_config	12	14 days ago	0.87 Kb	 Edit
interstitials_config	2	8 months ago	0.07 Kb	 Edit
level_changes	6	9 days ago	163.87 Kb	 Edit
level_changes	6	9 days ago	163.87 Kb	 Edit
interstitials_config	2	8 months ago	0.07 Kb	 Edit

























Spine Services ▾

 Jelly Splash iOS ▾

Admin ▾

Jesper Richter-Reichhelm

023_churn_prevention_v4_prod	Concluded	29					Show	
025_sales_events_prod	Concluded	34					Show	
026_events2_prod	Concluded	35					Show	
027_sale_2015-01	Concluded	38					Show	
028_ingame_iteration1	Concluded	3					Show	
000_sandbox_staging	Preparing	39	<input type="checkbox"/>	<input type="checkbox"/>	Publish		Edit	
029_rebalancing_2015_001	Production	24	<input type="checkbox"/>	<input type="checkbox"/>	Conclude		Edit	
030_sale_2015-02	Concluded	12					Show	
031_event_valentines_2015	Concluded	14					Show	
032_starterpack_segmentation	Production	36	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Conclude		Edit	
033_new_pricepoint	Preparing		<input type="checkbox"/>	<input type="checkbox"/>	Publish		Edit	
034_event_easter_2015	Production	40	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Conclude		Edit	
035_sale_2015-03	Preparing	41	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Publish		Edit	

A/B Test Name...

+ Add A/B Test

A/B Test Name...

+ Add A/B Test

A/B Tests

Edit A/B Test '029_rebalancing_2015_001'

Danger

You are editing on the *Live* environment. Any change will affect live users instantly. Do not make changes unless you know what you are doing :)

Modulo

499

Stats url

http://abtest.wooga.com/games/15-jsi/ab_tests/661-rebalancing-2015_001

Test Group	Changes	Remainders	Ratio	
control		0-4, 380-498	24.8%	
easy	2 🔍	256-379	24.8%	<div>Clone🗑</div>
medium	2 🔍	129-255	25.5%	<div>Clone🗑</div>
hard	2 🔍	5-128	24.8%	<div>Clone🗑</div>

Group Name...

+ Add Test Group

Group Name...

+ Add Test Group



```
"0120": [
  {
    "x": 0,
    "y": 6,
    "piece": "G40M"
  },
  {
    "x": 6,
    "y": 8,
    "piece": "P40M"
  }
],
"0130": [
  {
    "x": 3,
    "y": 4,
    "piece": "*80"
  }
],
"0140": [
  {
    "x": 3,
    "y": 1,
    "piece": "*85M"
  }
],
"0150": [
  {
    "x": 3,
    "y": 4,
    "piece": "*130"
  }
],
"0160": [
  {
    "x": 1,
    "y": 0,
    "piece": "*105M"
  }
],
],
"-----": [
]
}

"big66": "*J02W"
"λ": 0
"X": 1
```

```

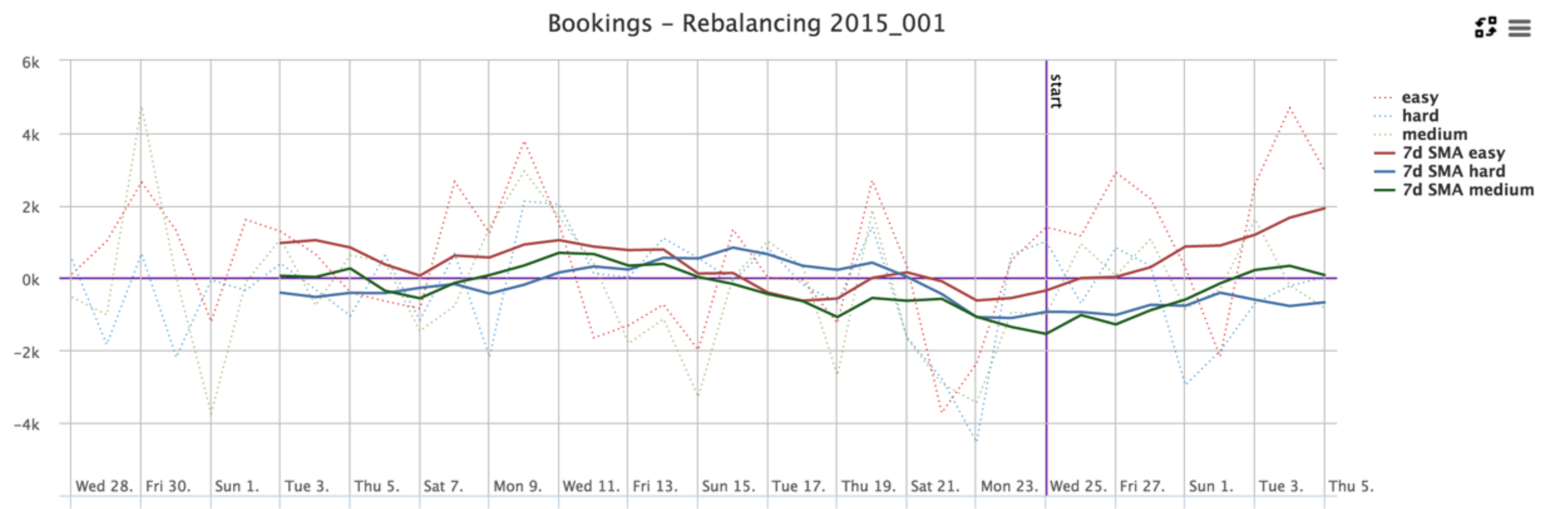
  • enabled 1
  • preBoostThreeMoves
  • enabled 0
  • gemSpawnChance
    • B 0 20
  • levelMasteryScore1 5000 2000
  • levelMasteryScore2 7500 4000
  • levelMasteryScore3 10000 6000
  • moveLimitObjective
    • moveLimit 18 11
  • name "0004"
  • scoreObjective • targetScore 6000
◦ 0005
  • levelMasteryScore2 21000 31000
  • levelMasteryScore3 28000 38000
  • moveLimitObjective
    • moveLimit 9 11
  • gemSpawnChance
    • Y 0
    • P 20
    • G 20
    • B 20
    • R 20
◦ 0006
  • gemSpawnChance
    • P 20 0
  • levelMasteryScore2 40000 45000
  • levelMasteryScore3 50000 55000
  • moveLimitObjective
    • moveLimit 16 14
◦ 0007
  • levelMasteryScore2 25000 30000
  • levelMasteryScore3 35000 40000
  • moveLimitObjective
    • moveLimit 8 9
  • gemSpawnChance
    • R 20
    • B 20
    • G 0
    • P 0
    • Y 20
◦ 0009
  • gemSpawnChance
    • R 10 0
  • levelMasteryScore3 40000 45000
  • B 10 0
  • gemSpawnChance
◦ 0000
  • A 50
  • B 0
  • C 0
```


Bookings

Total amount of bookings per testgroup

This report is normalized. All values are scaled up to show how the numbers would look like if the test/control group would include 100% of our players.

Chart Showing Difference to Control Group



Tip: Zoom in by clicking and dragging mouse from start to end in the graph. Show or hide groups by clicking on them in the legend.

Differences

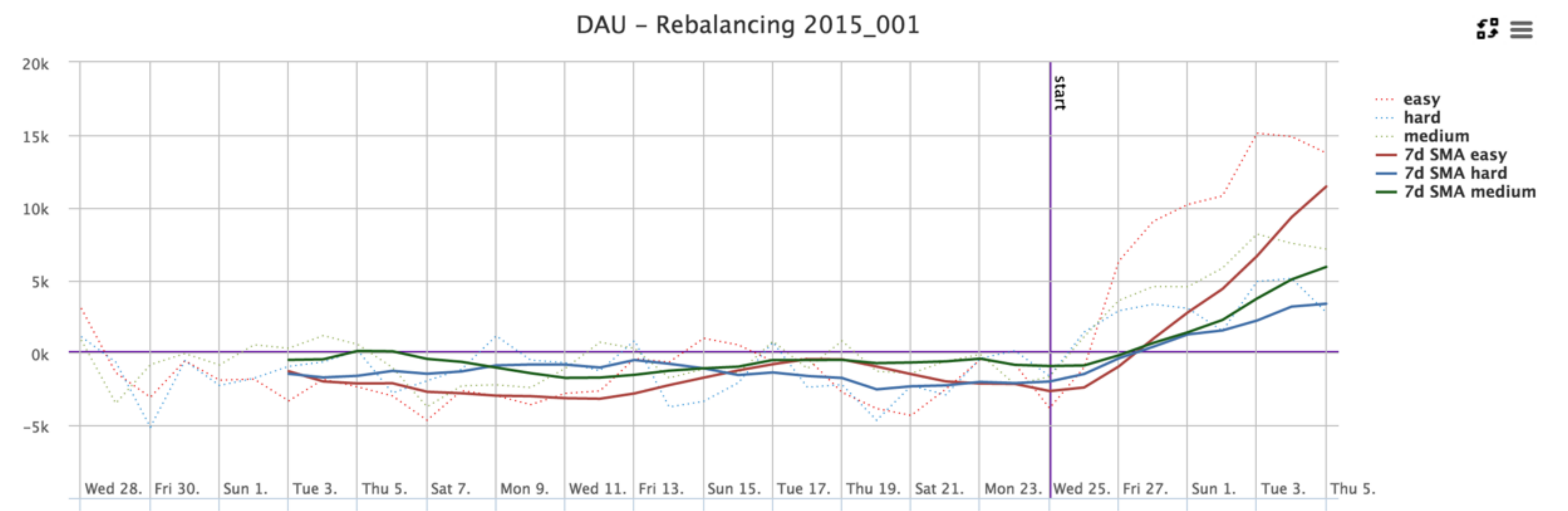
easy vs control	
Week 1	Week 2
+4.1%	🕒
+6.2%	
+0.50%	
+0.50%	🕒
Week 1	Week 2

DAU

Daily Active Users

This report is normalized. All values are scaled up to show how the numbers would look like if the test/control group would include 100% of our players.
The significance calculation only takes into account the last 14 days of data.

Chart Showing Difference to Control Group



Tip: Zoom in by clicking and dragging mouse from start to end in the graph. Show or hide groups by clicking on them in the legend.

Differences















easy vs control	
Week 1	Week 2
+0.9%	⌚
+0.000%	⌚
1M66K 1	1M66K 5

Config Service

Configurations

Ci ▾

SBS-ID: ckkkbk31ekq916wv1nwmint2

Configuration Name ▾	Version	Last Deployed	Size	 Show Deleted
board_changes	16	about 1 month ago	5.01 Kb	 Edit
difficulty_levels	11	30 days ago	0.44 Kb	 Edit
feature_switching	32	7 days ago	0.34 Kb	 Edit
hard_currency_shop	2	4 months ago	0.03 Kb	 Edit
iap_product_info	10	4 months ago	0.98 Kb	 Edit
iap_product_info_sales	3	4 months ago	0.25 Kb	 Edit
iap_product_info_v2	2	3 months ago	0.98 Kb	 Edit
iap_products	7	4 months ago	0.65 Kb	 Edit
ingame_boost_config	12	14 days ago	0.87 Kb	 Edit
interstitials_config	2	8 months ago	0.07 Kb	 Edit
level_changes	6	9 days ago	163.87 Kb	 Edit
level_changes	6	9 days ago	163.87 Kb	 Edit
ingame_boost_config	12	14 days ago	0.87 Kb	 Edit

[Config Service](#)[Configurations](#)[CI ▾](#)

Edit 'feature_switching' - rev. 32

```
1 {  
2   "boosts": false,  
3   "continueBar": false,  
4   "videoAds": true,  
5   "cagedJellys": false,  
6   "ratings" : true,  
7   "churnPrevention" : true,  
8   "churnPreventionV2": true,  
9   "inGameBoosts" : true,  
10  "post_boost":false,  
11  "interstitials": false,  
12  "videoads_in_shop": true,  
13  "timedEvents" : false,  
14  "offers": false  
15 }
```

[🗑 Delete Configuration](#)[⬇ Save to Test - rev. 33](#)[⬆ Save to Test - rev. 33](#)

Edit 'feature_switching' - rev. 32

```
1 {  
2   "boosts": false,  
3   "continueBar": false,  
4   "videoAds": true,  
5   "cagedJellys": false,  
6   "ratings" : true,  
7   "churnPrevention" : true,  
8   "churnPreventionV2": true,  
9   "inGameBoosts" : true,  
10  "post_boost":false,  
11  "interstitials": false,  
12  "videoads_in_shop": true,  
13  "timedEvents" : false,  
14  "offers": false  
15 }
```



What we have learned

MTTR > MTBF

You will always have bugs, no matter what you do

Make sure they don't kill you

Be always able to react

Build tools if necessary

All those Devices...

How I learned to love Android...

The background of the slide is a blurred image of a desk. On the left, there is a white coffee cup. In the center, there are architectural drawings or blueprints spread out. A blue pen lies on the right side of the drawings. The text is overlaid on three dark gray rectangular boxes.

Emphasis on Android came late

Only 4 months of 'real' effort

8 weeks of soft launch

February 2015



February 2015

6	2	3	4	5	6	7	8
					0.8.2		
7	9	10	11	12	13	14	15
8	16	17	18	19	20	21	22
9	23	24	25	26	27	28	1 Mar
	1.0.13	1.0.18					

The background of the slide is a blurred image of a desk. On the left, there is a white coffee cup. In the center, a blue pen lies diagonally. Below the pen, a map or architectural drawing is spread out, showing various buildings and streets. On the far left, a small portion of a smartphone is visible, displaying a game scene with a red circle and a red question mark overlaid on it.

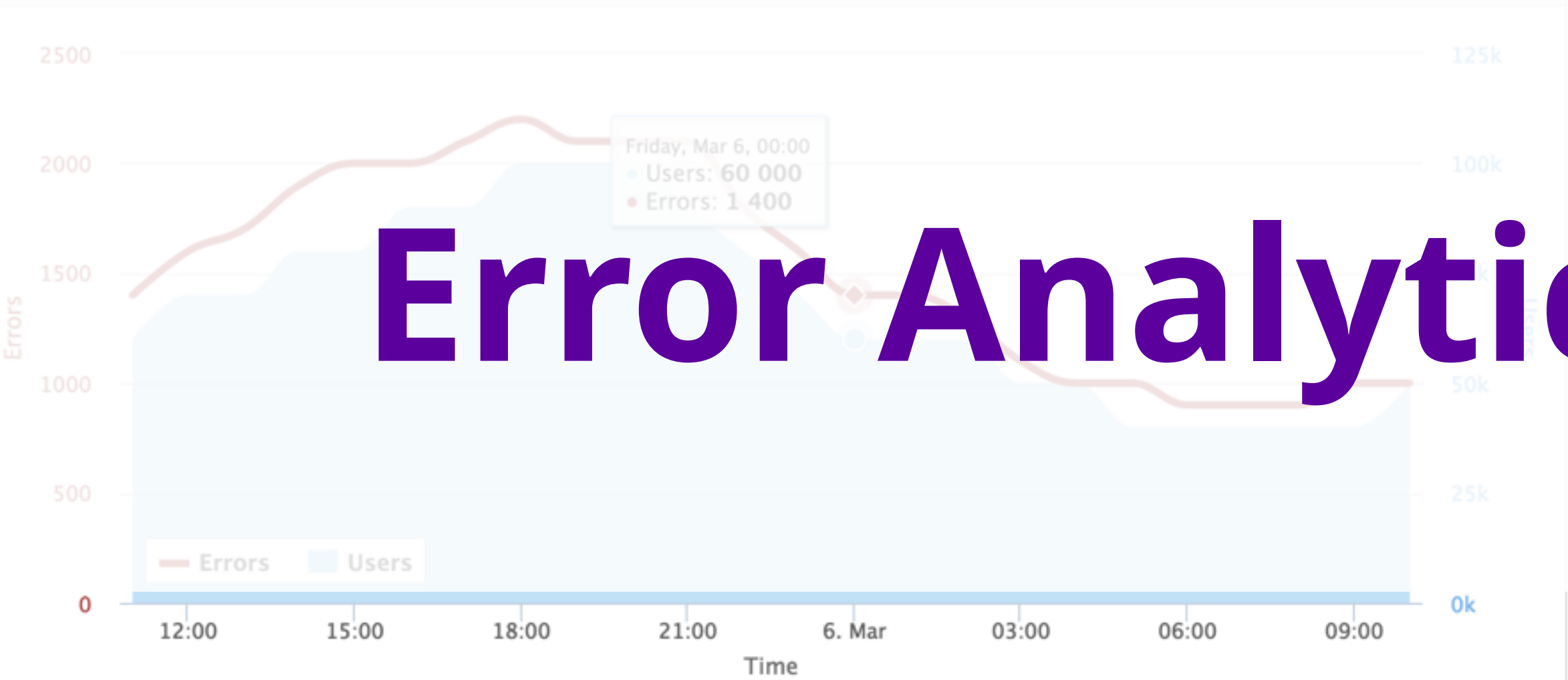
19 Android staged rollouts

up to 30K daily users

seen 3000 unique

Home

Error & User Count



Users with Error

4.1% -0.4 ↗
Version 1.0.32

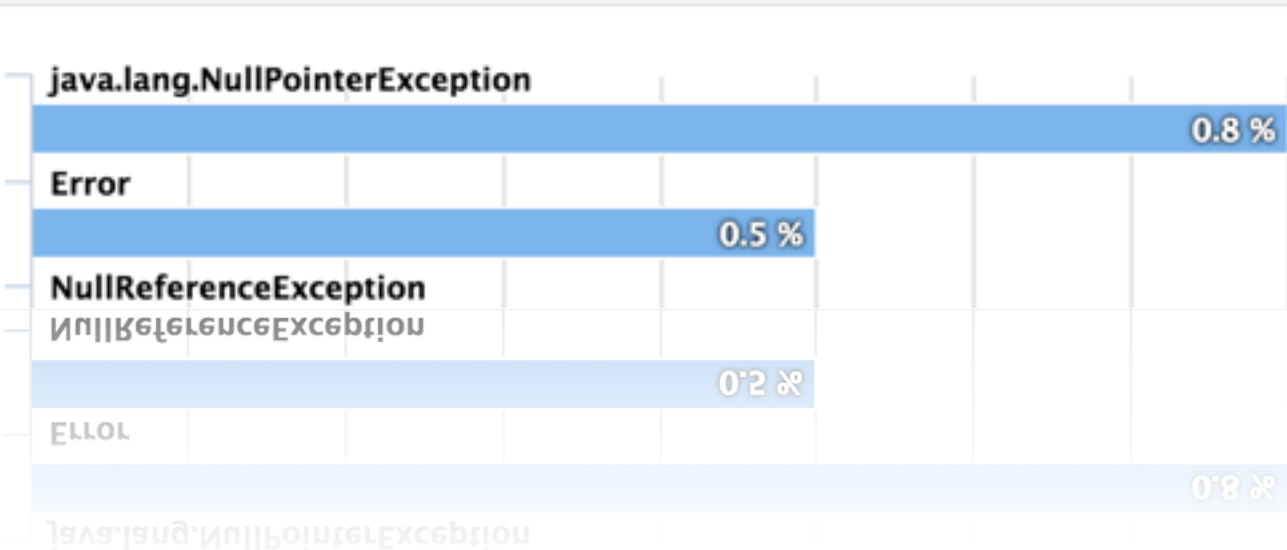
4.5%
Version 1.0.13

Total Users

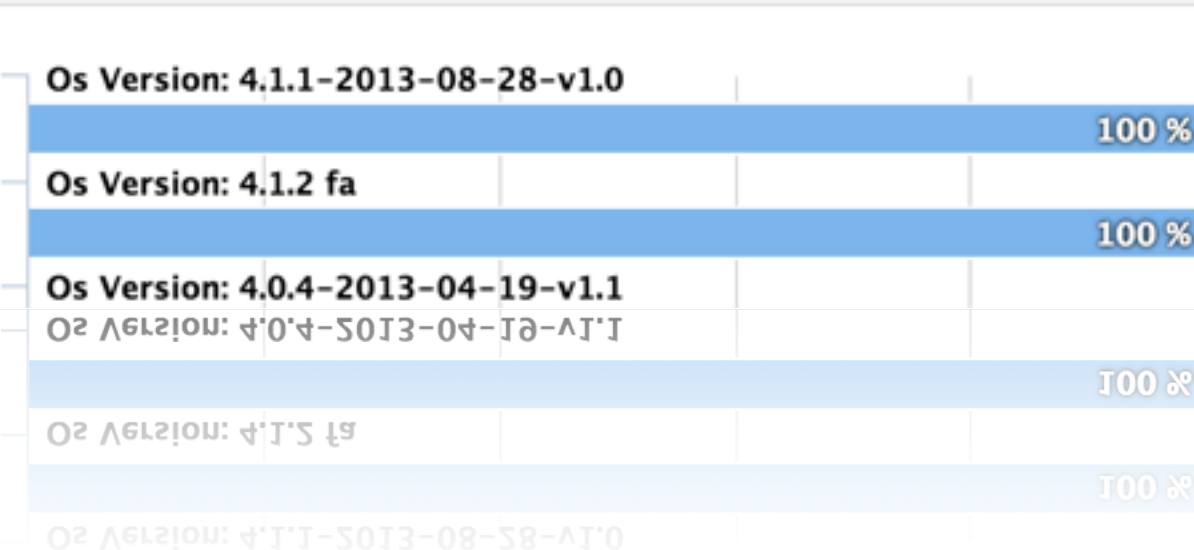
24,658
Version 1.0.32

900K
Version 1.0.13

Top 5 Errors



Top 5 Groups with Errors

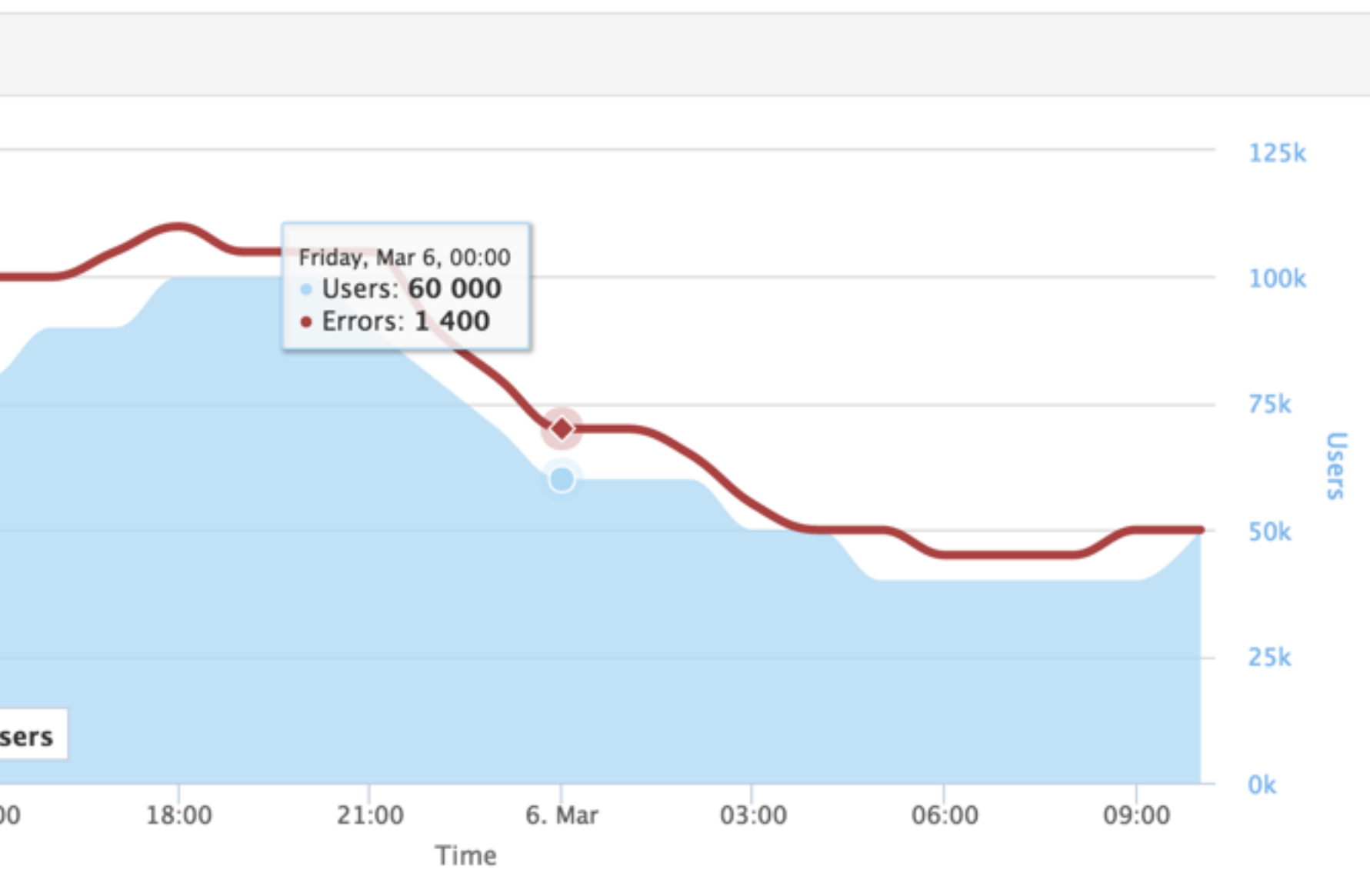


Compare

Last Day ▾

Error & Fatal ▾

Production ▾



Users with Error

4.1% -0.4 ↓

Version 1.0.32

4.5%

Version 1.0.13

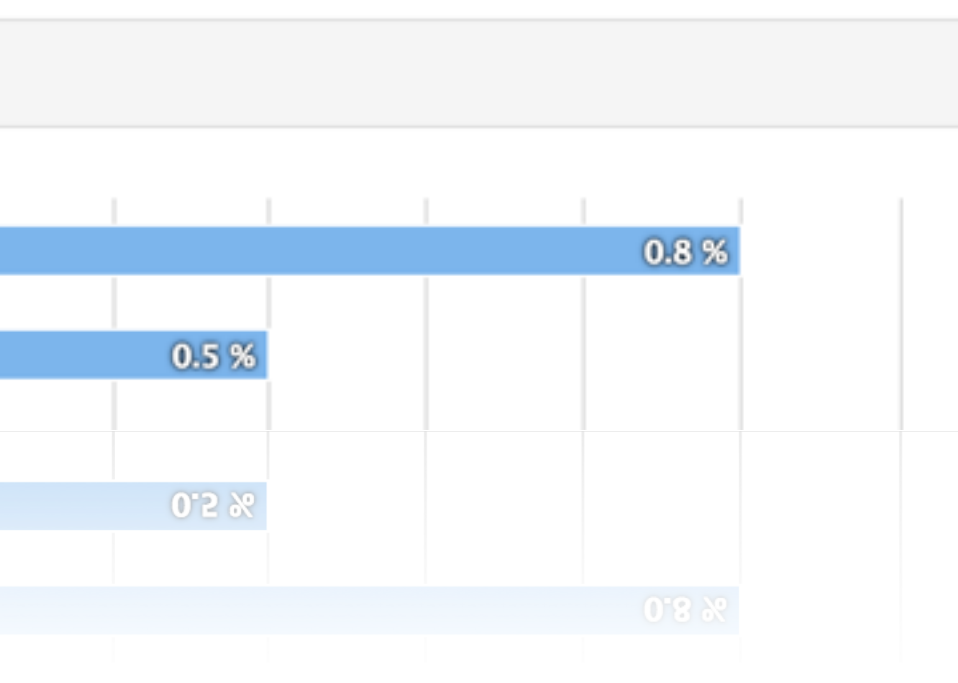
Total Users

24,658

Version 1.0.32

900K

Version 1.0.13

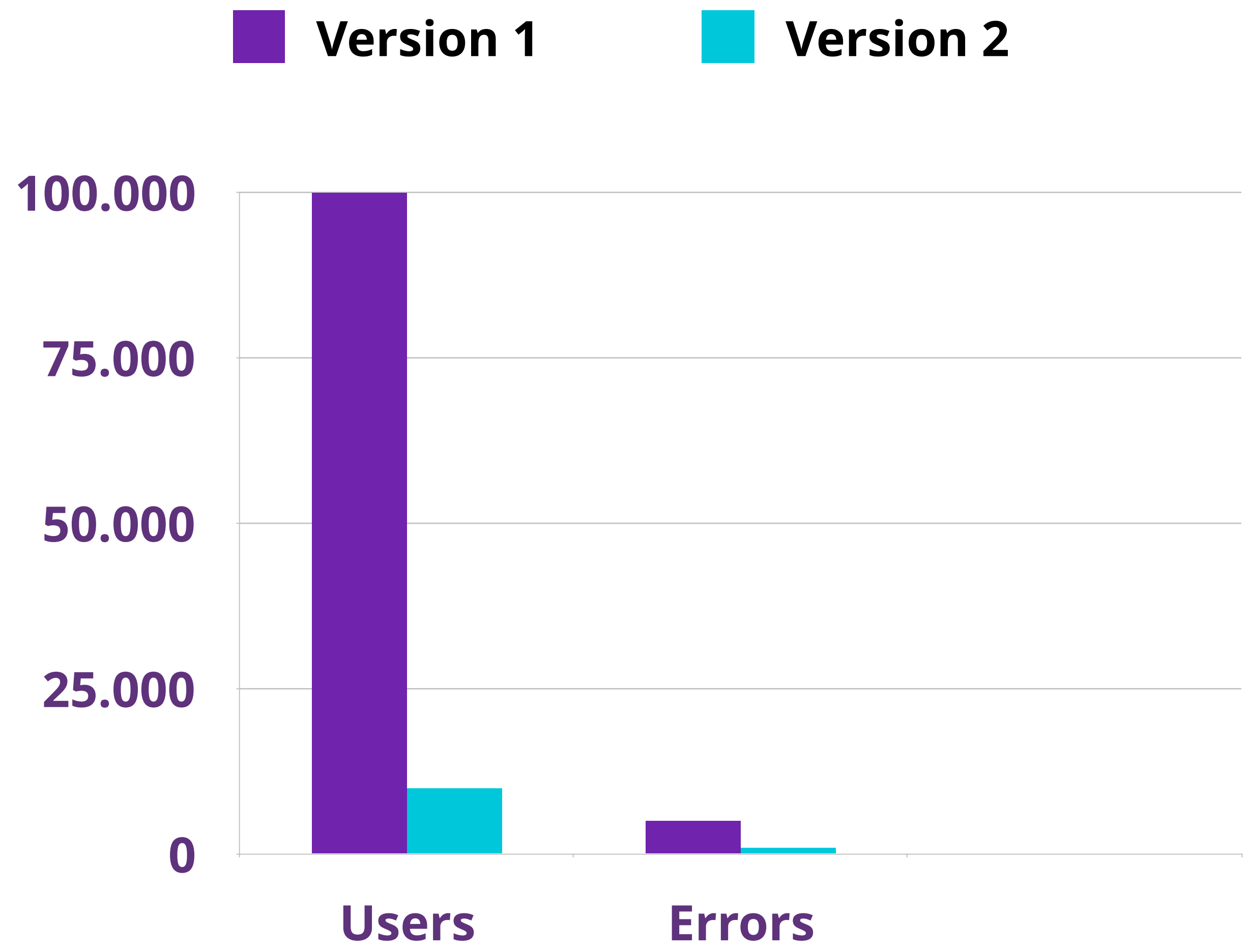


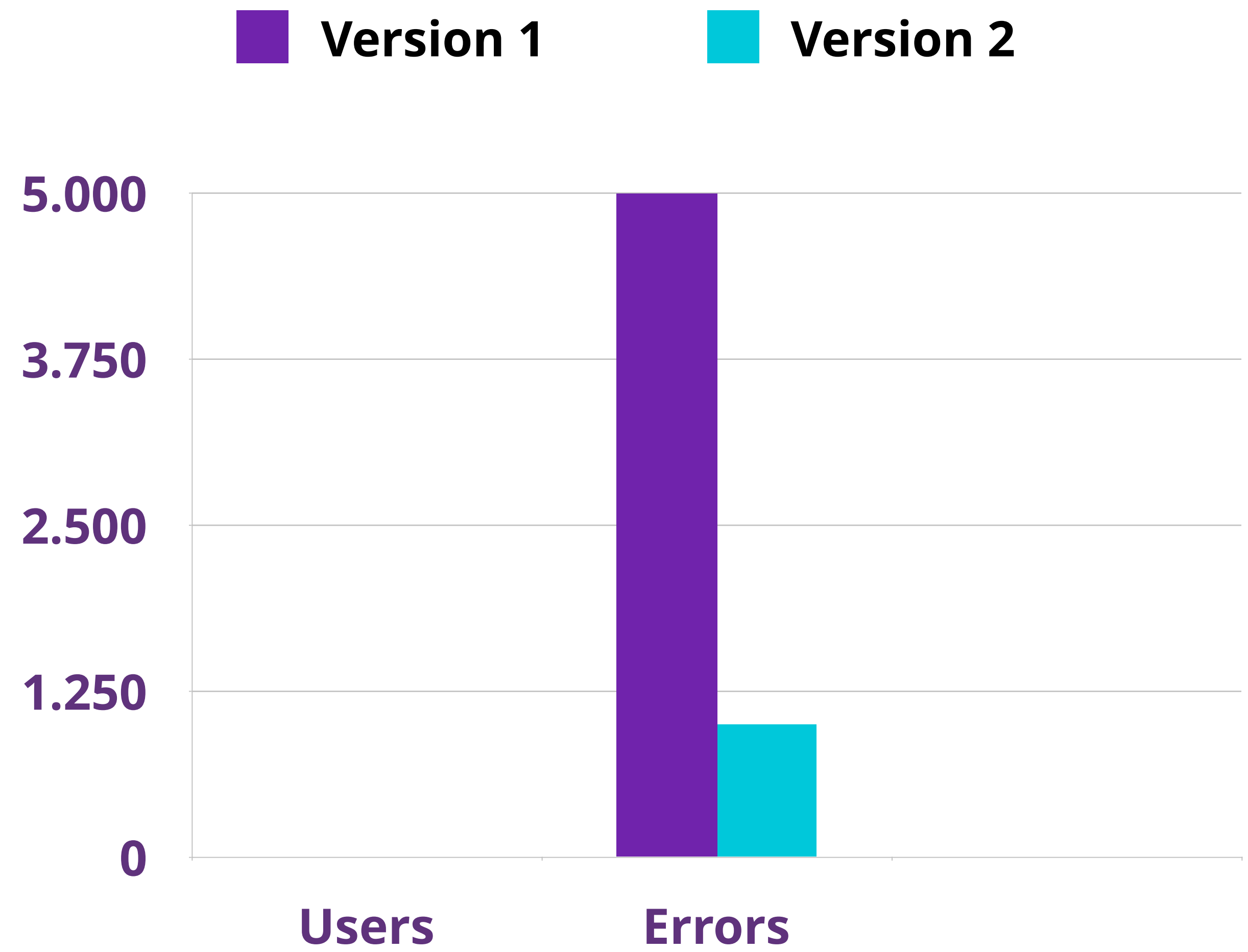
Top 5 Groups with Errors	
Os Version: 4.1.1-2013-08-28-v1.0	100 %
Os Version: 4.1.2 fa	100 %
Os Version: 4.0.4-2013-04-19-v1.1	100 %
Os Version: 4.1.1-2013-08-28-v1.0	100 %
Os Version: 4.1.2 fa	100 %
Os Version: 4.0.4-2013-04-19-v1.1	100 %

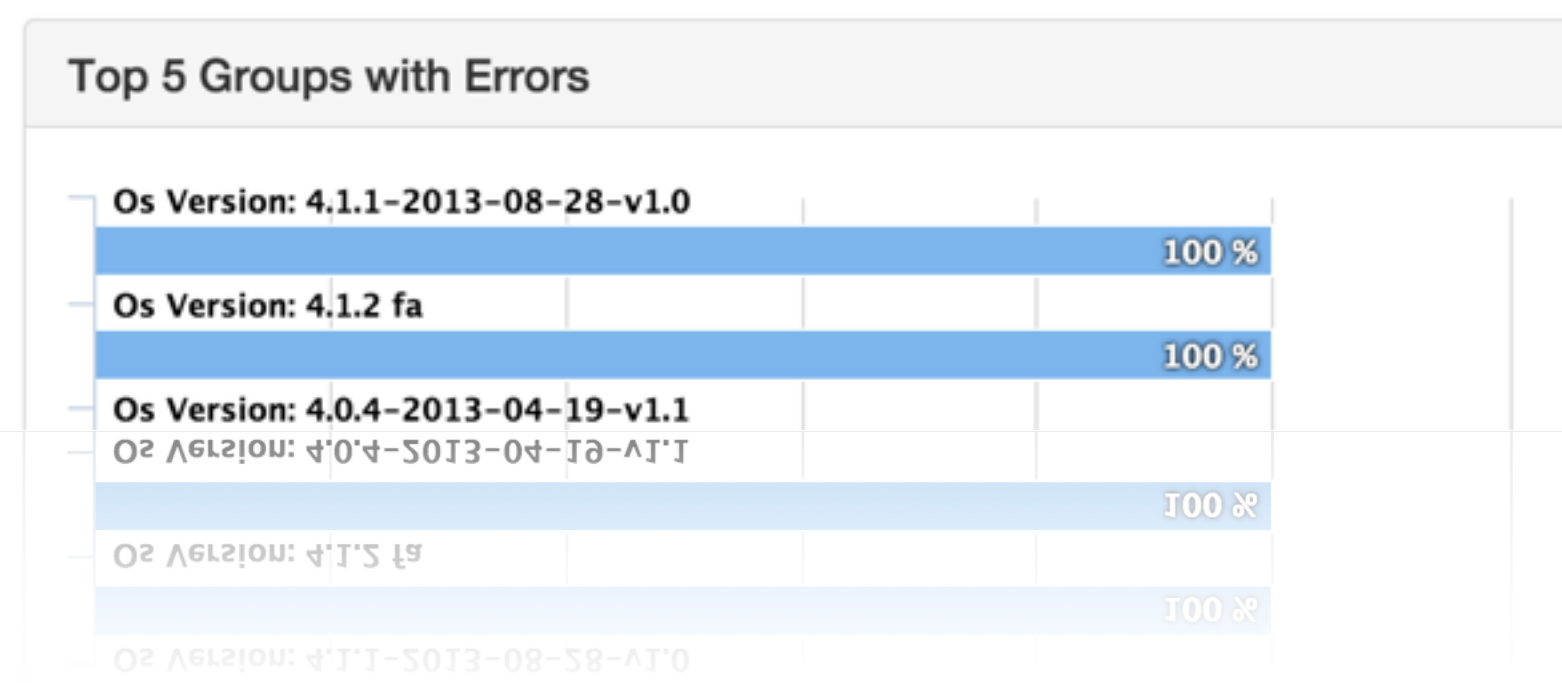
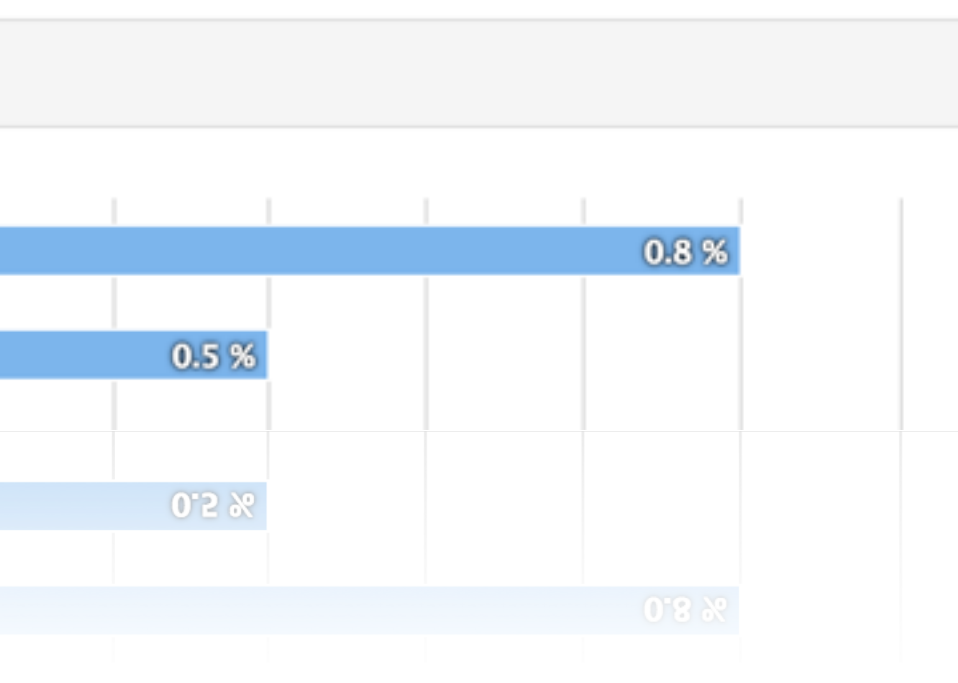
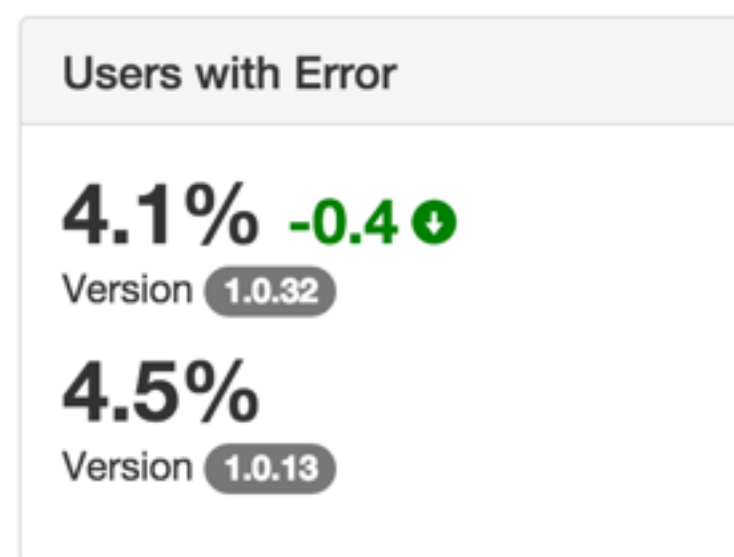
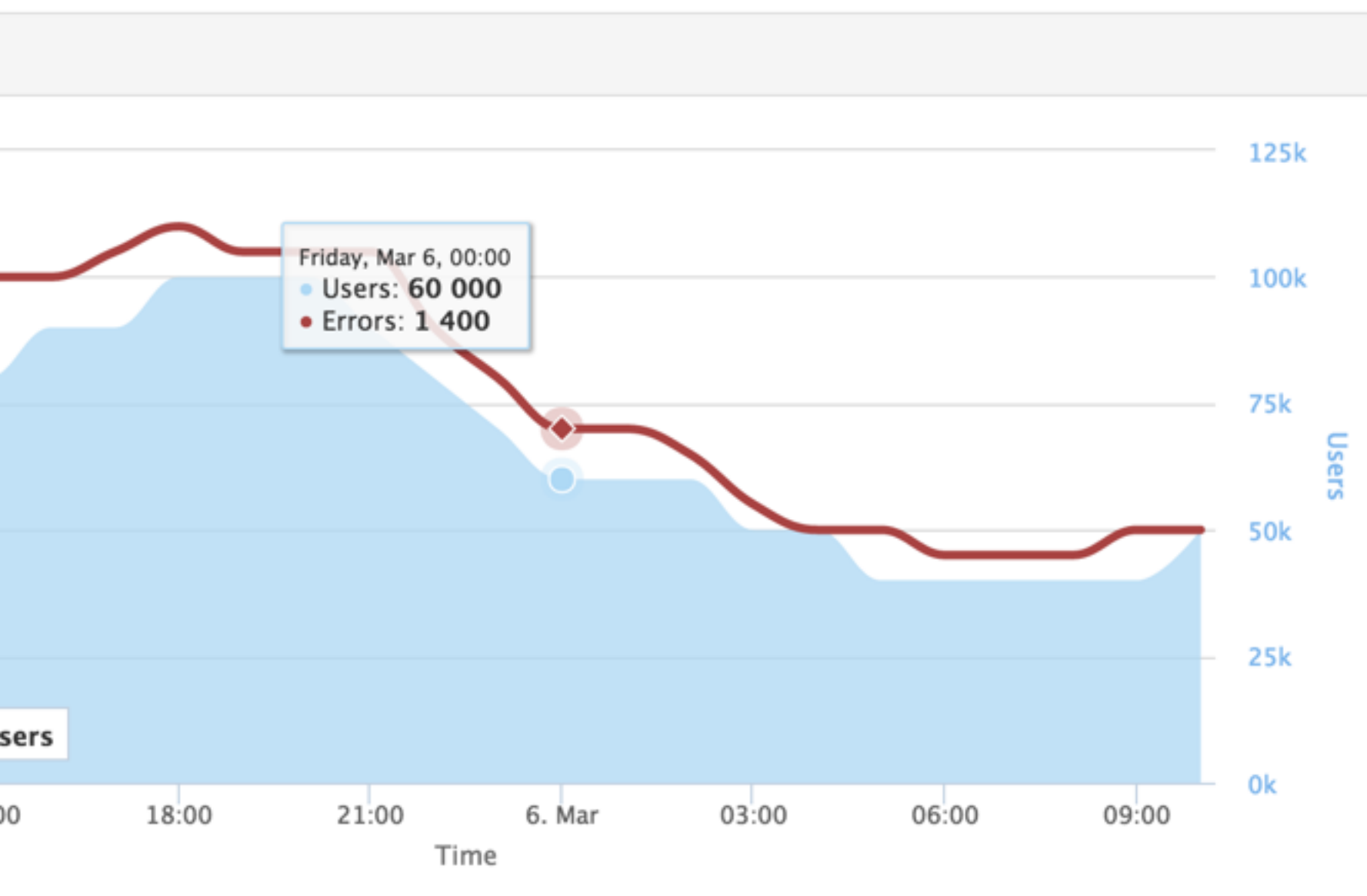
Real time

Error reports

Segmentation





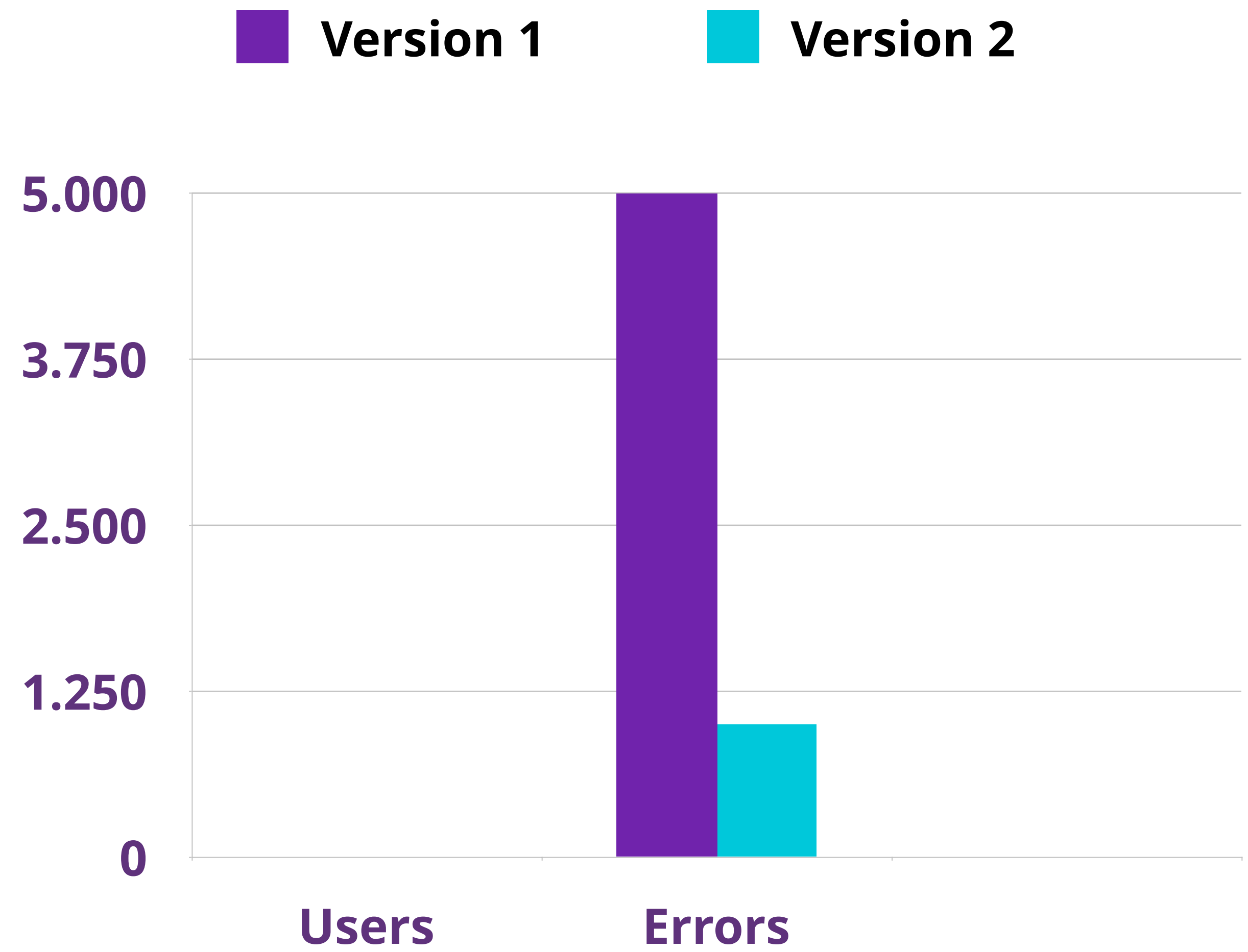


Real time

Error reports

Segmentation

Normalisation





Technical Version

▸

Version

▸




Os Version

▸


Model


▸


Reset


	Error Name	Errors	Users	%	Occurrence over time
Warn	Raycaster disabled for GenericPopup: ConfirmQuit Raycaster should be enabled as long as popup is active!	25,951	21,215	2.4	
Error	java.lang.NullPointerException storage == null 94c2edba87415f8e23540f9aae2e2a1	7,404	6,742	0.8	
Fatal	Error [Too long string, max 100 chars]	7,067	4,178	0.5	

Fatal	NullPointerException Object reference not set to an instance of an object 3c6d5ea5f941ff68f4e09b73a9f6b19e	6,649	3,985	0.4	
-------	--	-------	-------	-----	---

Fatal	NullPointerException Object reference not set to an instance of an object 6fae0ad07ab34584ed93766a1a70af4d	4,951	3,729	0.4	
-------	--	-------	-------	-----	---

Warn	ProductQueryState.Failed: Store returned 0 products [Too long string, max 100 chars] ffa030ed603077583b48ea2fd84d8b8e	5,991	2,929	0.3	
------	---	-------	-------	-----	---

Error	java.lang.Error [Too long string, max 100 chars] ebb55bc62c35717f14d1d143f74063c9	3,110	2,503	0.3	
-------	---	-------	-------	-----	---




Error	java.lang.Error [Too long string, max 100 chars] ebb55bc62c35717f14d1d143f74063c9	3,110	2,503	0.3	
-------	---	-------	-------	-----	---

[Error Analytics](#)[Errors](#)[Compare](#)

Last Day ▾

All Severities ▾

Production ▾[Home](#) / [Errors](#)

	Error Name	Errors	Users	%	Occurrence over time
Warn	Raycaster disabled for GenericPopup: ConfirmQuit Raycaster should be enabled as long as popup is active!	25,951	21,2	2.4	
Error	java.lang.NullPointerException storage == null 94c2edbaf87415f8e23540f9aae2e2a1	7,404	6,742	0.8	
Fatal	Error [Too long string, max 100 chars]	7,067	4,178	0.5	

Fatal**NullPointerException**Object reference not set to an instance of an object
6fae0ad07ab34584ed93766a1a70af4d

4,951 3,729 0.4

**Warn****ProductQueryState.Failed: Store returned 0 products**[Too long string, max 100 chars]
ffa030ed603077583b48ea2fd84d8b8e

5,991 2,929 0.3

**Error****java.lang.Error**[Too long string, max 100 chars]
ebb55bc62c35717f14d1d143f74063c9

3,110 2,503 0.3

**Fatal****java.lang.Error**[Too long string, max 100 chars]
ebb55bc62c35717f14d1d143f74063c9

3,110 2,503 0.3





What we have learned

Android is a tough platform

- Low end devices, lot's of devices

- You need the right tooling

But operation is much easier

- No launch day risks

- Staged rollouts

- Quick iterations possible

Summary

What we have learned

Two platforms

True cross platform development is the best

Mobile operation

MTTR > MTBF

All those devices

Android is hard but allows quick iteration

I love Apple

but ...



Develop and test features

1%, 5%, 10% rollout on Android

Rollout for rest and iOS

I love Apple

but I'm starting to love Android even more

Thank you

Questions?

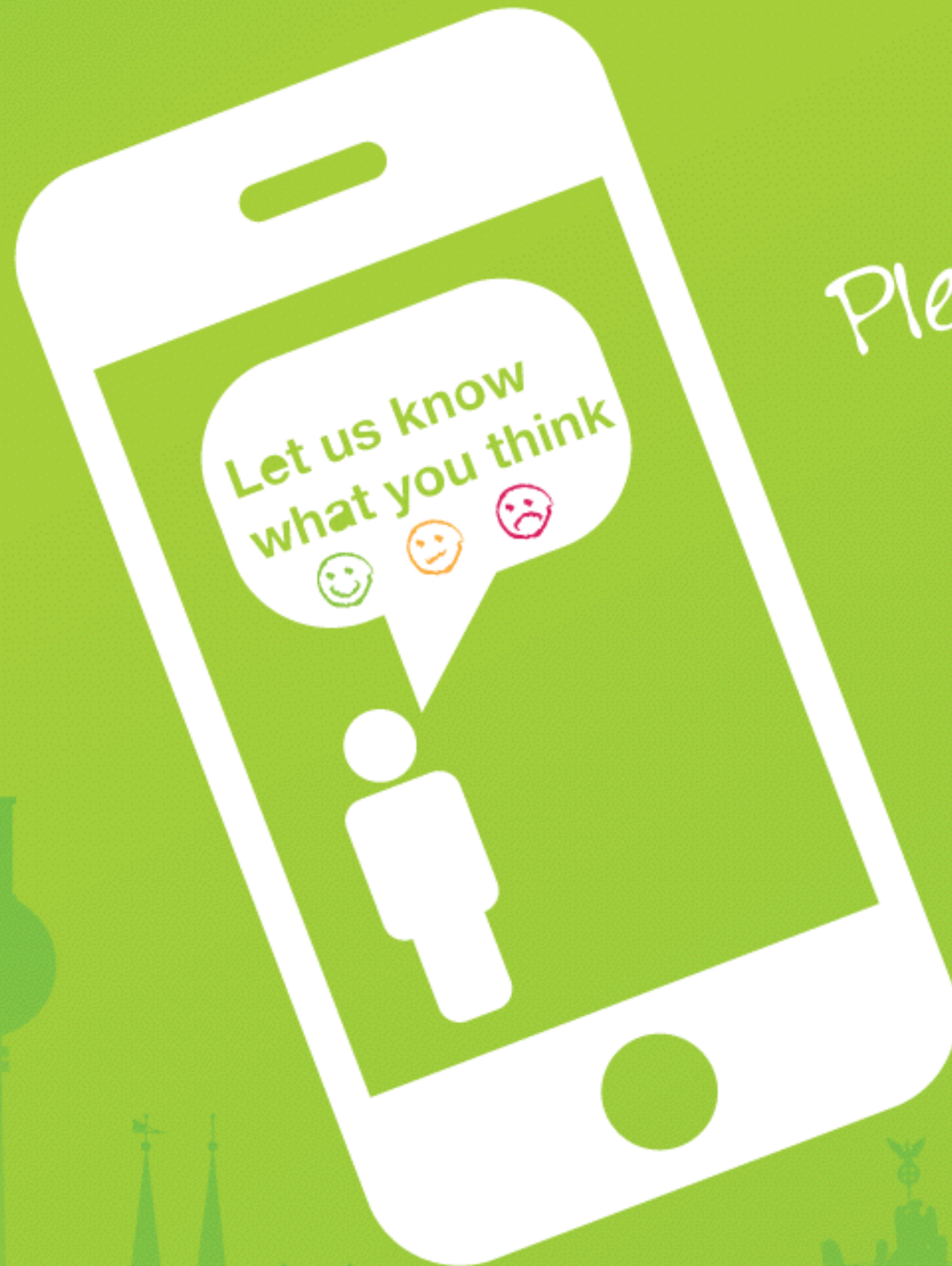
Jesper Richter-Reichhelm (@jrirei)

Questions?

Jesper Richter-Reichhelm (@jrirei)

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