

The Value of Release Engineering as a “force multiplier”

John O'Duinn
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20-jun-2014

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15-jun-2014

Force multiplier

"A capability that, when added to and employed by a combat force, significantly increases the combat potential of that force and thus enhances the probability of successful mission."

Defense Technical Information Center
dtic.mil

Force multiplier

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OK... so why Release Engineering?

Release Engineers != Developers

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developers build a **product**

release engineers build a **pipeline**

companies
live or die
by the effectiveness of their
delivery pipeline

Release Engineers
make
entire organizations
more effective

How effective?

Before & After

- How quickly can we ship a chemspill release?
 - ~~4-6 weeks~~ 11 hours
- How long to ship a “new feature” release?
 - ~~12-18 months~~ 6 weeks
- How many active code lines?
 - ~~1-1/2~~ 42
- How many checkins per day?
 - ~~~15 per day~~ 400-600 per day

What “value”?

Who's definition of "value"?

Fixing The Pipeline

Fixing The Pipeline: 1 of 11

Fixing The Pipeline: 1 of 11

People

Before technology, we looked at
people...

Who are your customers?

- Founder(s), CxO
- VP Eng

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- *“what keeps you awake at night?”*
- *“if you had a magic wand...”*

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- VP Eng
- *“what keeps you awake at night?”*
- *“if you had a magic wand...”*
- casual walk around, chat with Dev+QA

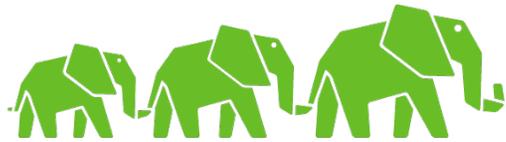
..and what **do** they care about?

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- profitable business models

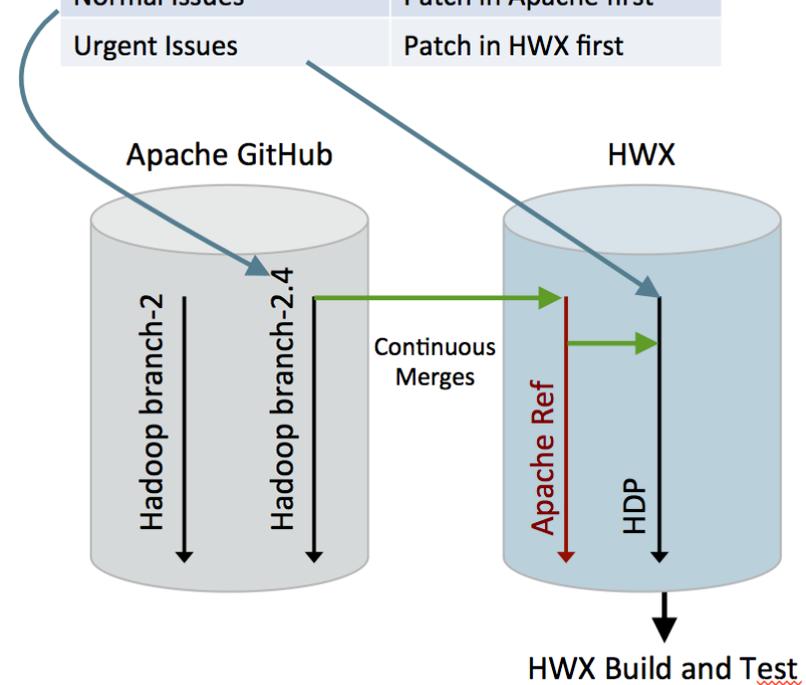
Hortonworks HDP

Commercial support for open source Hadoop



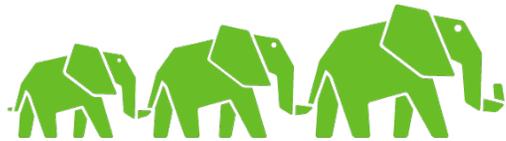
Hortonworks

| Issue Type | Course of Action |
|---------------|-----------------------|
| Normal Issues | Patch in Apache first |
| Urgent Issues | Patch in HWX first |



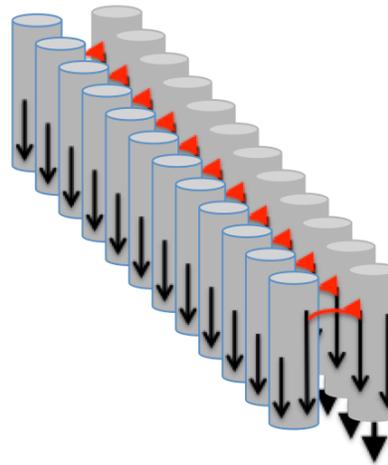
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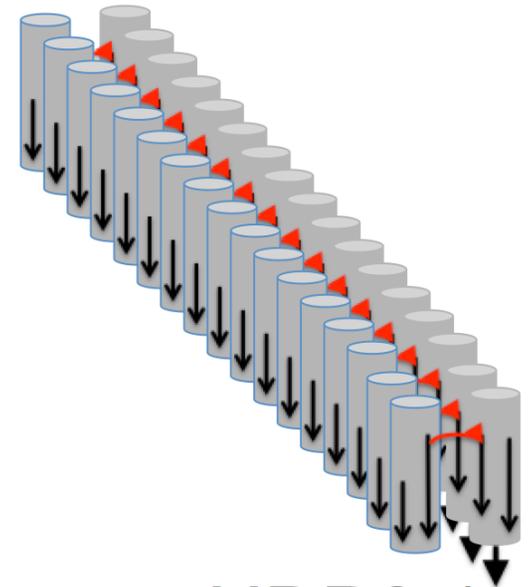
Hortonworks

(12)



HDP2.0

(17)



HDP2.1

..and what **do** they care about?

- profitable business models
- company threatening problems

..and what **do** they care about?

- profitable business models
- company threatening problems
 - fallout from shipping bad release

Mozilla Firefox

- avoid tax days
- avoid MSFT patch tuesday
- throttled updates
- ...

NASA Mars rover



[https://www.computerworld.com/s/article/9244011/
NASA_does_long_distance_software_fix_on_Mars_rover_Curiosity](https://www.computerworld.com/s/article/9244011/NASA_does_long_distance_software_fix_on_Mars_rover_Curiosity)

NASA Mars rover

USD \$2.5B

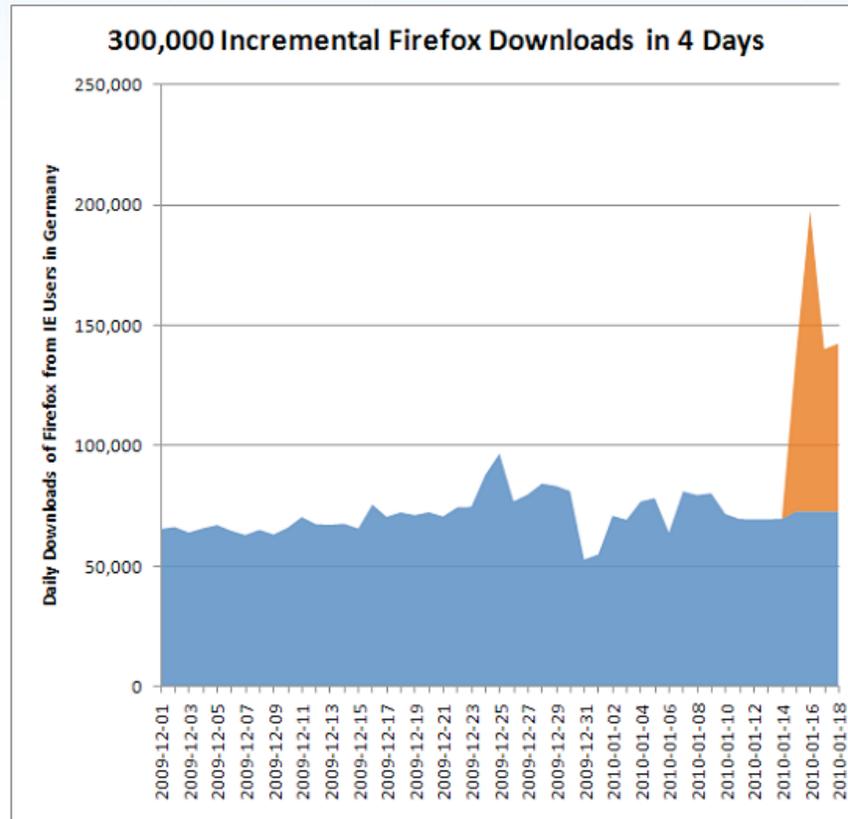
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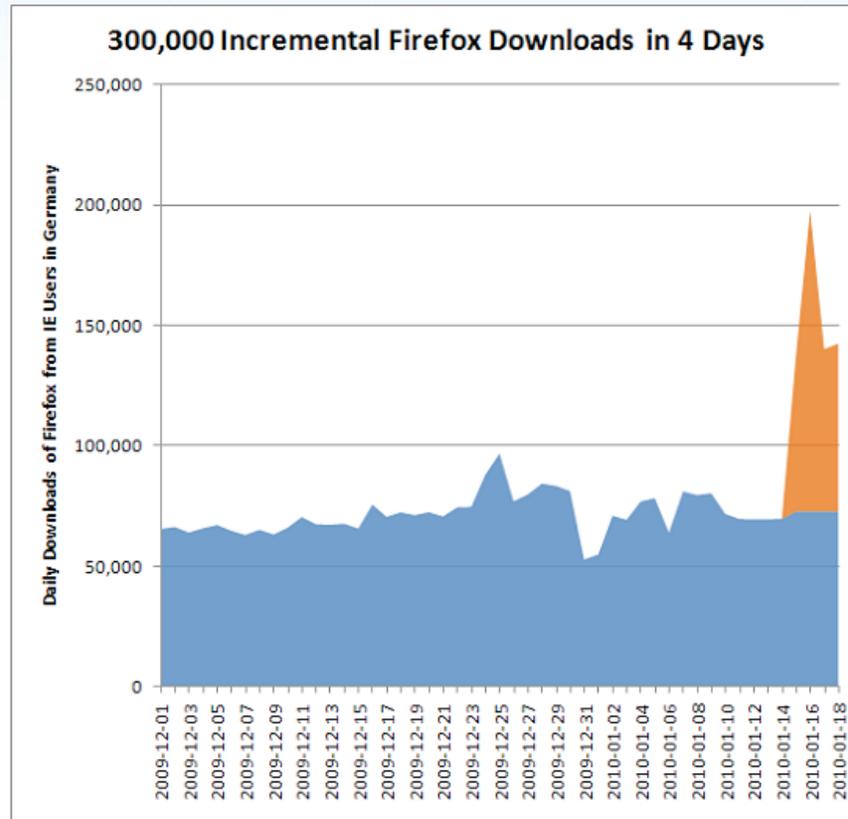
- profitable business models
- company threatening problems
 - fallout from shipping bad release
 - fallout from slow response to security problem

German govt warning



<https://blog.mozilla.org/metrics/2010/01/19/people-in-germany-are-switching-browsers/>

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~~Cost?~~ Value?

THE WALL STREET JOURNAL.

Los Angeles Times

The New York Times

<http://www.gaebler.com/Newspaper-Advertising-Costs.htm>

<http://www.nytimes.com/2007/09/26/us/26moveon.html>

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 - losing customers because of buggy software
 - missing release schedules during feature wars

WebM

- Jun 2010: joint announcement of “beta” WebM

WebM

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- Jul 2010: Opera 10.0 shipped
- Sep 2010: Chrome 6 shipped
- Mar 2011: Firefox 4 shipped

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- company threatening problems
 - fallout from shipping bad release
 - fallout from slow response to security problem
 - losing customers because of buggy software
 - missing release schedules during feature wars
 - turning away potential revenue

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- profitable business models
- company threatening problems
 - fallout from shipping bad release
 - fallout from slow response to security problem
 - losing customers because of buggy software
 - missing release schedules during feature wars
 - turning away potential revenue
 - infrastructure limits to hiring more developers

Congrats - you've been funded!

(...or your company bought another company)

(...or a change in corporate strategy requires a pivot+grow)

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If your company suddenly grew by

5%

could your infrastructure handle it?

Congrats - you've been funded!

(...or your company bought another company)

(...or a change in corporate strategy requires a pivot+grow)

If your company suddenly grew by

50%

could your infrastructure handle it?

Congrats - you've been funded!

(...or your company bought another company)

(...or a change in corporate strategy requires a pivot+grow)

If your company suddenly grew by

an order of magnitude

could your infrastructure handle it?

..and what **don't** they care about?

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- RelEng, DevOps, SCM, Configuration Management, ...
- agile, scrum, pair programming, continuous deployment, continuous integration, code coverage, ...
- jenkins, buildbot, cruisecontrol, dvcs-vs-vcs, github.com, ISOxxx...

..and what **don't** they care about?

- RelEng, DevOps, SCM, Configuration Management, ...
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talk with, and listen to, **all** your
customers

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again...and again...

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solve company-threatening
problems

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Fixing The Pipeline: 1 of 11

People

Fixing The Pipeline: 2 of 11

Communication

Keep your customers informed

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- KPI - make sure everyone agrees on same pain points
 - choose carefully

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- show progress

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- keep it simple

Keep your customers informed

- KPI - make sure everyone agrees on same pain points
 - choose carefully
- show progress
- keep it simple
- show other groups they can help
 - start **company** culture change

an example...

measure: release wall-clock times

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- perception
 - all time was spent in RelEng

measure: release wall-clock times

- perception
 - all time was spent in RelEng
- reality
 - < 50% time in RelEng

measure: release wall-clock times

- perception
 - all time was spent in RelEng
- reality
 - < 50% time in RelEng
 - go/stop/go churn expensive

WARNING!

- people will optimize for what **you** measure

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- people will optimize for what **you** measure
- **don't** measure developer coding time
- **don't** count open bugs, #respins, #releases

WARNING!

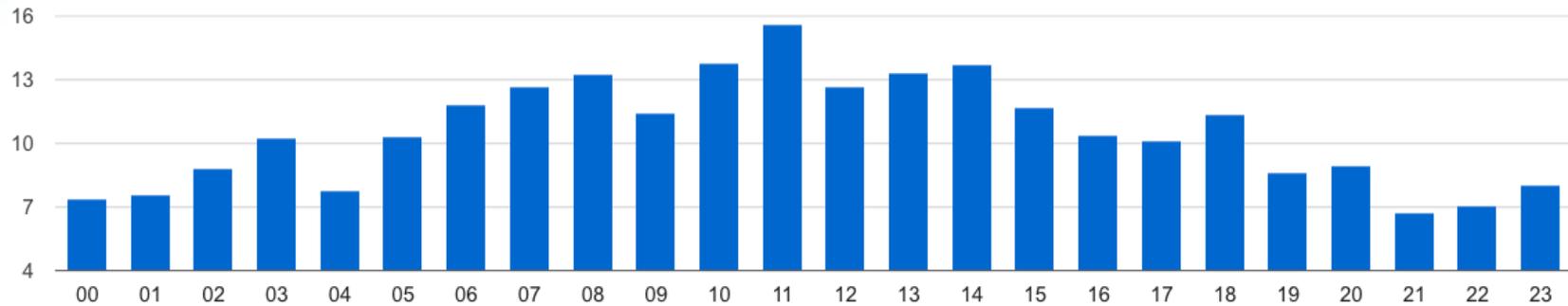
- people will optimize for what **you** measure
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another example...

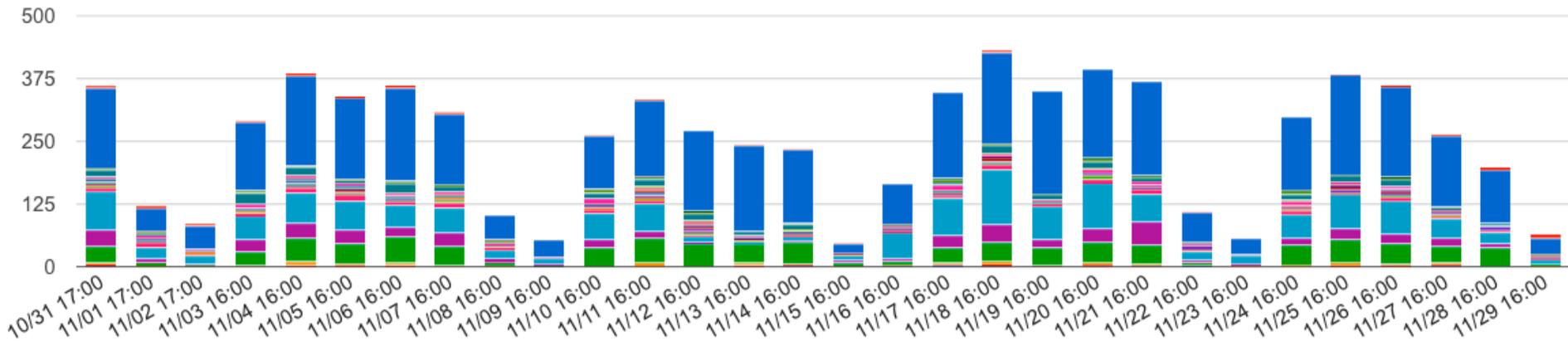
measure #checkins

measure #checkins

Average Number of Pushes by Hour



Pushes



measure #checkins

- **8 x** developers

measure #checkins

- **8 x** developers
- **27 x** checkins

Fixing The Pipeline: 2 of 11

Communication

Fixing The Pipeline: 3 of 11

baby steps



Be optimistic

“Perpetual optimism is a force multiplier”

Colin Powell

Fixing The Pipeline: 3 of 11

baby steps

Fixing The Pipeline: 3 of 11

relentless baby steps

Fixing The Pipeline: 4 of 11

Cross group coordination

anoint a ReleaseCoordinator

annotate a ReleaseCoordinator

- annotate before the release starts

appoint a ReleaseCoordinator

- appoint before the release starts
- makes all go/stop decisions
 - understands product
 - understands marketplace
 - neutral, not in RelEng, Dev, QA

appoint a ReleaseCoordinator

- appoint before the release starts
- makes all go/stop decisions
 - understands product
 - understands marketplace
 - neutral, not in RelEng, Dev, QA
- if anyone else wants to start/stop release, redirect them to RelCoordinator

setup cross-group email list

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- use for all official release traffic
 - formalize group handovers
 - reduce confusion during fast chemspills
 - use email timestamps for postmortems

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Fixing The Pipeline: 4 of 11

Cross group coordination



Fixing The Pipeline: 5 of 11

Draining the swamp

Fixing The Pipeline: 5 of 11

Draining the swamp

“draining the swamp”

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- find something small to fix - and fix it today
 - one day off limits after every release

“draining the swamp”

- find something small to fix - and fix it today
 - one day off limits after every release
- focus on
 - biggest time-wins
 - simplifying
 - making more robust

“draining the swamp”

- expect surprises
 - fix one problem, uncover new problems

“draining the swamp”

- expect surprises
 - fix one problem, uncover new problems
- **every** release is slightly better
- give **hope**

“Perpetual optimism is a force multiplier”

Colin Powell

Fixing The Pipeline: 5 of 11

Draining the swamp

Fixing The Pipeline: 5 of 11

Draining the swamp

Fixing The Pipeline: 5 of 11

Draining the swamp

Fixing The Pipeline: 6 of 11

Build on checkin

- build-continuously

- ~~build-continuously~~
- build-on-checkin

- ~~build-continuously~~
- build-on-checkin
 - build-**and-test**-on-checkin
 - less confusing for regression hunting

- ~~build-continuously~~
- build-on-checkin
 - build-**and-test**-on-checkin
 - less confusing for regression hunting
- arrange results so easier to understand

178e532e810 Ryan VanderMeulen - Merge fx-team to m-c. a=merge
9f10f484bb26 Ryan VanderMeulen - Merge m-c to b2g-inbound on a CLOSED TREE. a=merge
fd66c8f60ecb Shashank Sabniveesu - Bug 1024120 - Create new member to hold Rect object. r=luкасr
ed2985b53467 David Rajchenbach-Teller - Bug 1008944 - Expose AsyncShutdown barriers for OS.File. r=froydnj
748d9c5a8516 Jared Wein - Bug 1025195 - switchToTabHavingURI should have an option to ignore URL hashes when looking for already opened tabs. r=dao
bd63a8720a1b Eddy Bruel - Bug 1014141 - Fix a regression in the remote debugger;r=mar.castelluccio;r=past
599ccafa98bc Carsten "Tomcat" Book - Merge mozilla-central to fx-team
6e4e98a74850 Carsten "Tomcat" Book - Backed out changeset bd48de0a468d (bug 1023957) for bc1 test bustage
1140b6e20b84 Patrick Brosset - Bug 1020291 - Rework the way tooltips and highlighters are added to the style inspector; r=harth
bd48de0a468d Jared Wein - Bug 1023957 - Disable the in-content preferences for Firefox 32. r=unfocused
cdfb7d000d95 Heather Arthur - Bug 1025521 - Only update @media rule list once per update. r=bgrins
543ea357d9c2 Panos Astithas - Remove closed connection targets from scratchpad and request a new one on evaluation (bug 949262). r=fitzgen

Linux Opt **B N M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** M-e10s (1 2 3 4 5) R(C Clpc J R Ripc Ru) Cpp Jit2 Jit1 Mn X T(c d o s tp)
Linux PGO **B M (1 2 2 3 3 4 4 5 5 bc1 bc2 bc3 dt oth oth)** M-e10s (1 2 2 3 3 4 4 5 5) R(C C Clpc J J R R Ripc Ripc Ru Ru) Cpp Cpp Jit1 Jit2 Jit1 Jit2 Mn Mn X X X T(c d d o o s s tp tp)
Linux Debug **B M (1 2 3 4 5 bc1 bc2 bc3 dt1 dt2 dt3 oth)** R(C J R) Cpp Jit2 Jit1 Mn X
Linux x64 Opt **B Bn SM (Hf) N V M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** M-e10s (1 2 3 4 5) R(C J R) Cpp Jit2 Jit1 Mn X T(c d o s tp)
Linux x64 PGO **B M (1 2 2 3 3 4 4 5 5 bc1 bc2 bc3 bc3* bc3 dt dt oth oth)** M-e10s (1 2 2 3 3 4 4 5 5) R(C C J J R R) Cpp Cpp Jit2 Jit1 Jit1 Jit2 Mn Mn X X T(c d d o o s s tp* tp)
Linux x64 ASAN **Bo Bd No Nd M (1 2 2 3 3 4 4 5 5 bc1* bc1 bc2 bc2 bc3 bc3 dt dt oth oth)** R(C C J J R R) Cpp Cpp Jit2 Jit1 Jit2 Jit1 X X
Linux x64 Debug **B Bn S M (1 2 3 4 5 bc1 bc2 bc3 dt1 dt2 dt3 oth)** R(C J R) Cpp Jit1 Jit2 Mn X
OS X 10.6 Opt **M (1 2 2 3 3 4 4 5 5 bc1 bc1 bc2 bc2 bc3 bc3 dt dt oth oth)** R(C C J J R R) Cpp Cpp Jit Jit X X T(c d d o o s s tp tp)
OS X 10.6 Debug **M (1 2 3 4 5 bc1 bc2 bc3 dt1 dt2 dt3 oth)** R(C J R) Cpp Jit Mn X
OS X 10.8 Opt **B Bn N M (1 2 2 3 3 4 4 5 5 bc1 bc1 bc2* bc2 bc3 bc3 dt dt oth oth)** R(C C J J R R) X X T(c d d o o s s tp tp)
OS X 10.8 Debug **B Bn M (1 2 3 4 5 bc1 bc2 bc3 dt1 dt2 dt3 oth)** R(C J R) Mn X
Windows XP Opt **B Bn N M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** R(C J R) Cpp Jit Mn X T(c o s tp)
Windows XP PGO **B* B M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** R(C J R) Cpp Jit Mn X T(c o s tp)
Windows XP Debug **B Bn M (1 2 3 4 5 bc1* bc2 bc3 dt1 dt2 dt3 oth)** R(C J R) Jit Mn X
Windows 7 Opt **M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** R(C J R Ru) Cpp Jit Mn* X T(c d o s tp x)
Windows 7 PGO **M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** R(C J R Ru) Cpp Jit Mn X T(c d o s tp x)
Windows 7 Debug **M (1 2 3 4 5 bc1 bc2 bc3 dt1 dt2 dt3 oth)** R(C J R) Jit Mn X
Windows 8 Opt **M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** R(C J R Ru) Cpp Jit Mn X T(c d o s tp)
Windows 8 PGO **M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** R(C J R Ru) Cpp Jit Mn X T(c d o s tp)
Windows 8 Debug **M (1 2 3 4 5 bc1 bc2 bc3 dt1 dt2 dt3 oth)** R(C J R) Cpp Jit Mn X
Android 2.2 Armv6 Opt **B N M (1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 rc1 rc1 rc2 rc2)** R(C C J1 J1 J2 J2 J3 J3 R1 R1 R2 R2 R3 R3 R4 R4) X X
Android 2.2 Opt **B Bn N M (2 2 3 3 4 4 rc1 rc1* rc2 rc2)** T(cm cm rck2 rck2 rp rp rpr rpr s s tpn tpn tsp tsp)
Android 2.2 Debug **B Bn**
Android 2.3 Opt **M (1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 gl gl rc1 rc1 rc2 rc2 rc3 rc3 rc4 rc4)** R(C1 C1 C2 C2 J1 J1 J2 J2 J3 J3 J4 J4 J5 J5 J6 J6 R1 R1 R2 R2 R3 R3 R4 R4 **R5* R5 R6 R6 R7 R7 R8 R8 R9 R9 R10 R10 R11 R11 R12 R12 R13 R13 R14 R14 R15 R15 R16 R16)** X3 X2 X1 X3 X2 X1
Android 4.0 Opt **M (1 2 2 3 3* 4 4 5 5 6 6 7 7 8 8 gl gl rc1 rc1 rc2 rc2 rc3 rc3 rc4 rc4 rc4 rc4 rc5 rc5)** R(C C C J1 J1 J1 J1 J2 J2 J3 J3 **R1 R1 R1 R2 R2 R2* R2 R3 R3 R4 R4 R5 R5 R5 R6 R6 R7 R7 R8 R8 R8 R7 R7 R8 R8)** Cpp Cpp Cpp Cpp Cpp X X T(rck2 rck2 rp rp rpr rpr s s tpn tpn tsp tsp)
Android 4.0 Debug **M (1 2 3 4 5 6 7 8)** R(j1 J2 J3)
Android 4.2 x86 Opt **B N Sets (S4 S4)**
B2G Desktop Linux Opt **B N N L10n (N N)** M(1 1 1) R(R R R)
B2G Desktop Linux Debug **B**
B2G Desktop Linux x64 Opt **B N N L10n (N N)** M(1 1 1*) R(R R R) G G G Gb Gb Gu Gu* Gu Li Li Li
B2G Desktop Linux x64 Debug **B**
B2G Desktop OS X Opt **B N N L10n (N N)** Gu Gu Gu
B2G Desktop OS X Debug **B**
B2G Desktop Windows Opt **B N N L10n (N N)**
B2G Desktop Windows Debug **B**
B2G ICS Emulator Opt **B Bn N N M (1 1* 1 2 2 2 3 3 4 4 4 5 5 6 6 6 7* 7* 8 8 8 9 9 9)** R(C1 C1 C1 C2 C2 C2 C3 C3 R1 R1 R2 R2 R3 R3 R3 R4 R4 R4 R5 R5 R5 R6 R6 R6 R7 R7 R8 R8 R8 R9 R9 R9 R10 R10 R10 R11 R11 **R12 R12 R12 R12 R13 R13 R13 R14 R14 R14 R15 R15 R16 R16 R17 R17 R17 R18 R18 R19 R19 R20 R20)** Mnw Mnw Mnw X X X
B2G ICS Emulator Debug **B Bn N N M (1 1 2 2 2 3 3 3 4 4 4 5 5 6 6 6 7 7 8 8 8 9 9 9 10 10 10 11 11 11 12 12 12 13 13 13 14 14 14 15 15)** X X X
B2G JB Emulator Opt **B Bn N N**
B2G JB Emulator Debug **B Bn N N**
B2G KK Emulator Opt **B Bn N N**
B2G KK Emulator Debug **B Bn N N**
B2G Device Image Opt **Buri/Hamachi (B Be N N Ne Ne) Helix (B N N) Nexus 4 (B Be N N Ne Ne) Wasabi (B N N)**

00d973a0bdbf Ryan VanderMeulen - Merge b2g-inbound to m-c. a=merge
1d2f78a76197 Sam Penrose - Bug 1025309 - Fire FXA onlogout for RPs such as FMD. r=jedp
f818c8089b45 Carmen Jimenez - Bug 1014517 - Execute the single variant customization the first time a configured SIM is inserted. r=fejrn
05377e8cffe Shawn Huang - Bug 989976 - [bluedroid] Hit SIGBUS on unaligned access while doing AdapterPropertiesChangeCallback. r=chou
c6404fbb85f0 Ryan VanderMeulen - Merge m-c to b2g-inbound on a CLOSED TREE. a=merge
05143b1a7f98 B2G Bumper Bot - Bumping manifests a=b2g-bump

Linux Opt **B M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** M-e10s (1 2 3 4 5) R(C Clpc J R Ripc Ru) Cpp Jit2 Jit1 Mn X T(c d o s tp)
Linux Debug **B M (1 2 3 4 5 bc1* bc2 bc3 dt1 dt2 dt3 oth)** R(C J R) Cpp Jit1 Jit2 Mn X
Linux x64 Opt **B M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** M-e10s (1 2 3 4 5) R(C J R) Cpp Jit2 Jit1 Mn X
Linux x64 Debug **B M (1 2 3 4 5 bc1 bc2 bc3 dt1 dt2 dt3 oth)** R(C J R) Cpp Jit2 Jit1 Mn X
OS X 10.6 Opt **M (1 2 3 4 5 bc1 bc2 bc3 dt oth)** R(C J R) Cpp Jit X T(c d o s tp)

<https://tbpl.mozilla.org/>

Fixing The Pipeline: 6 of 11

Build on checkin

Fixing The Pipeline: 7 of 11

pools of machines

86 unique machines

86 unique machines

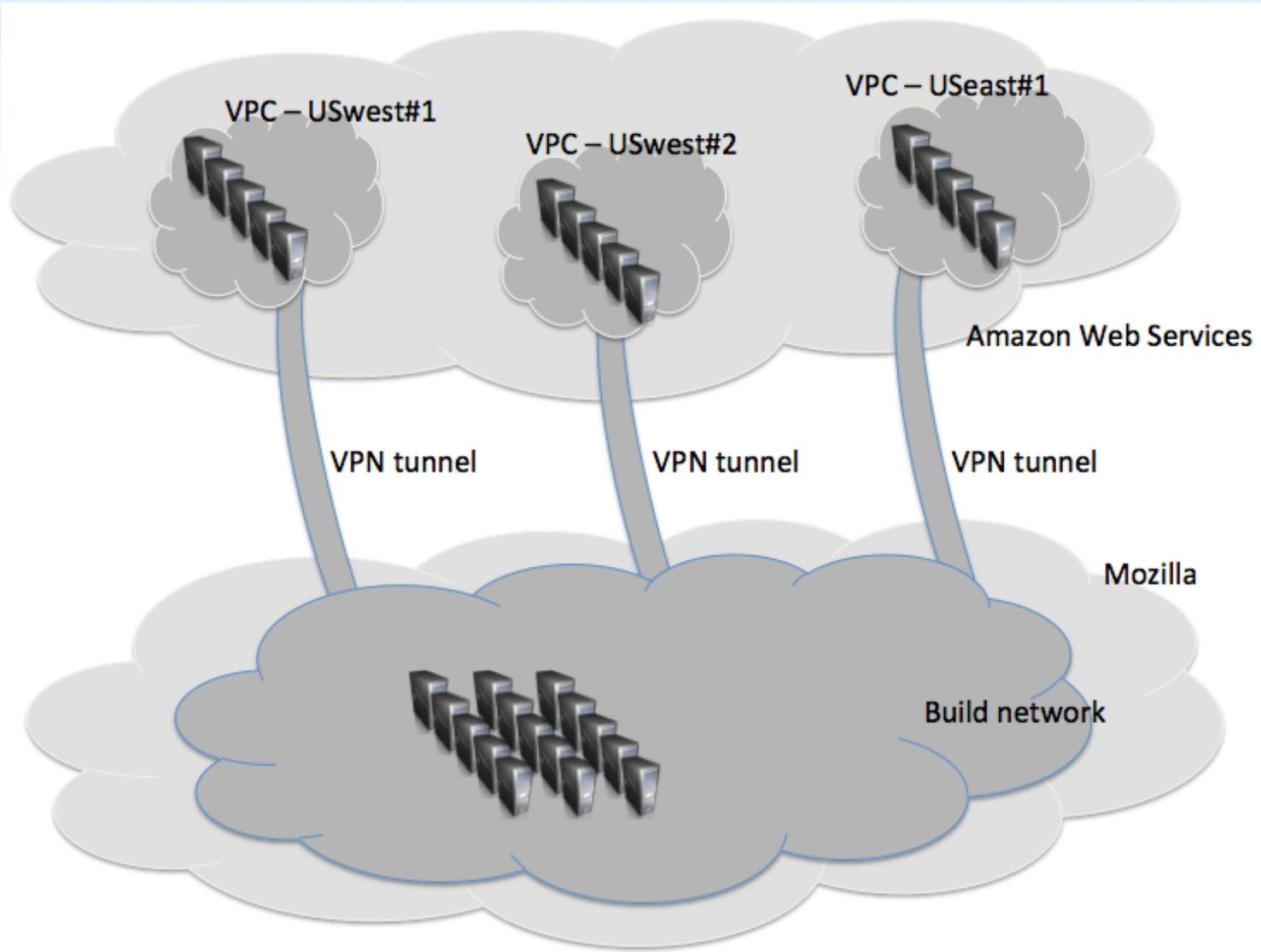
5,400+ pooled machines

5,400+ pooled machines

(~60% physical, ~40% virtual)

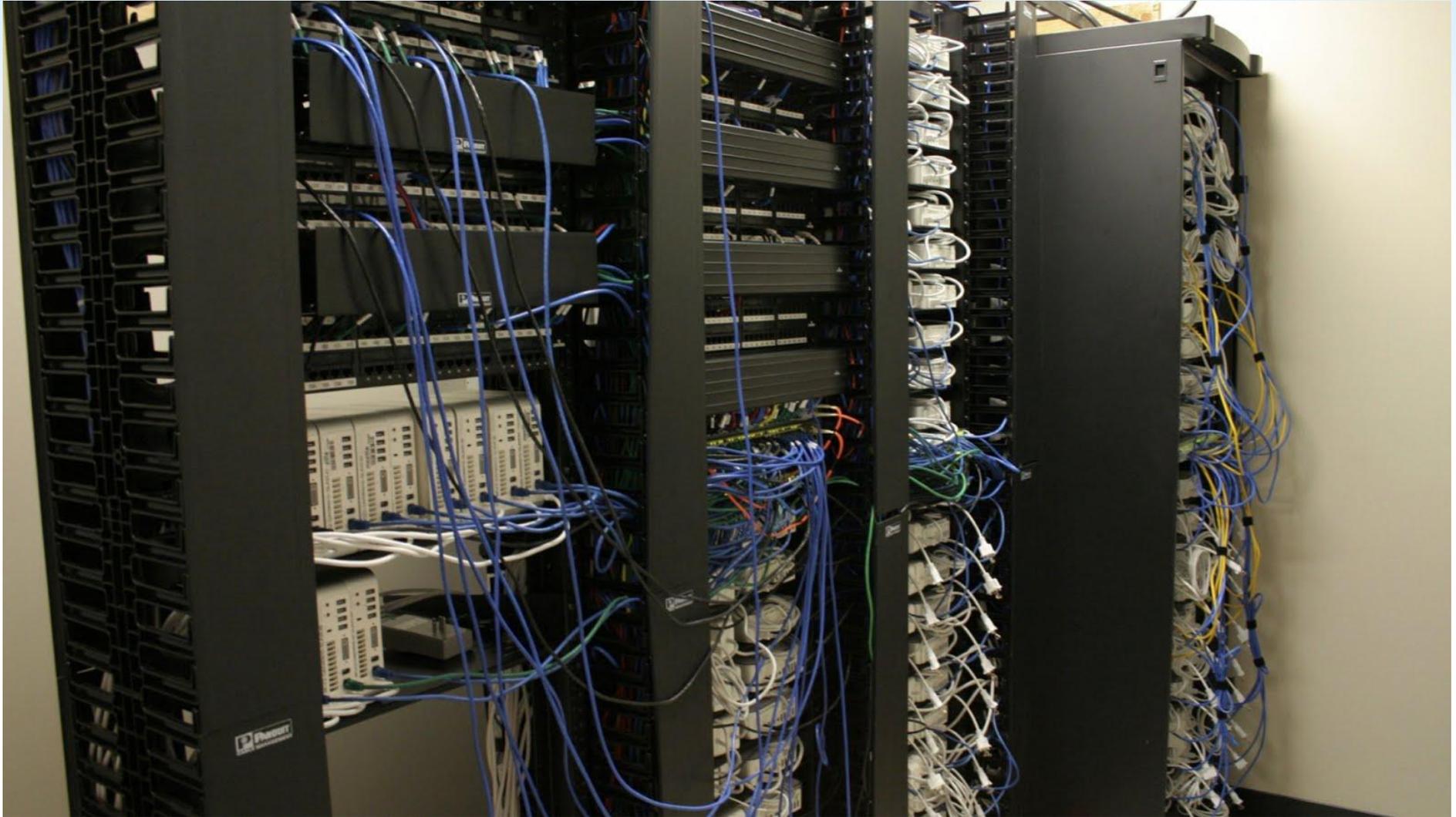
5,400+ pooled machines

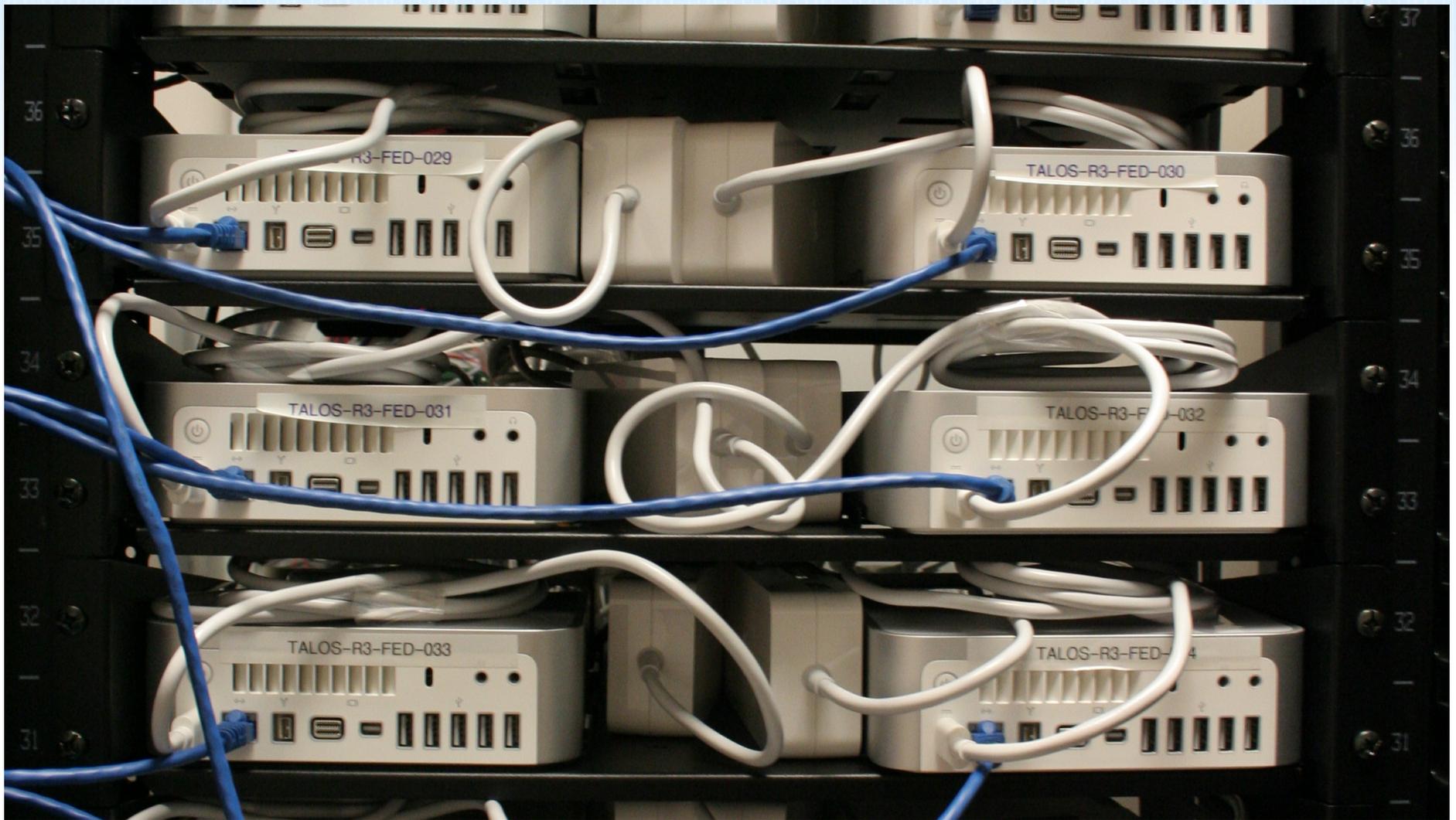
(~60% physical, ~40% virtual)







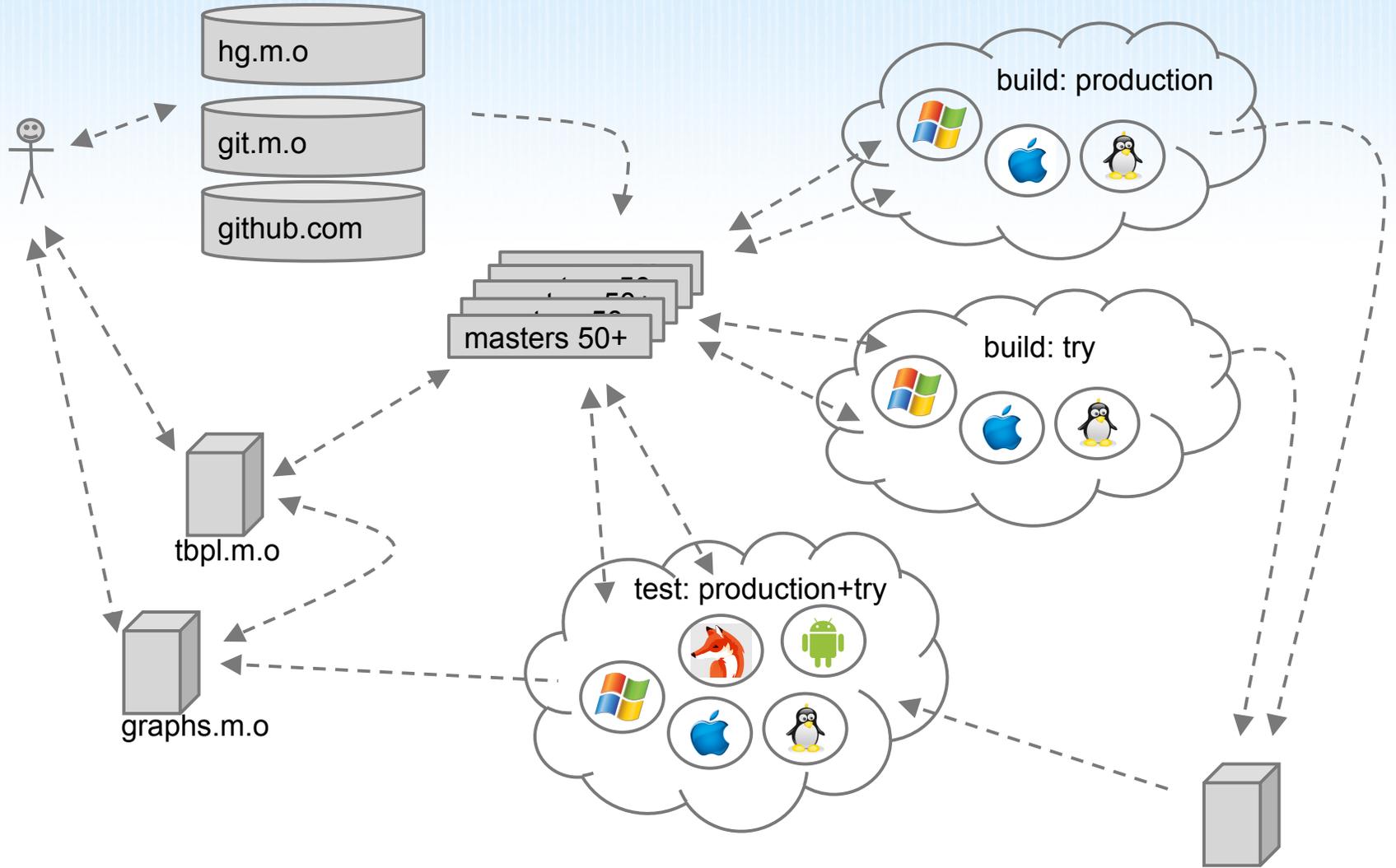












Fixing The Pipeline: 7 of 11

pools of machines

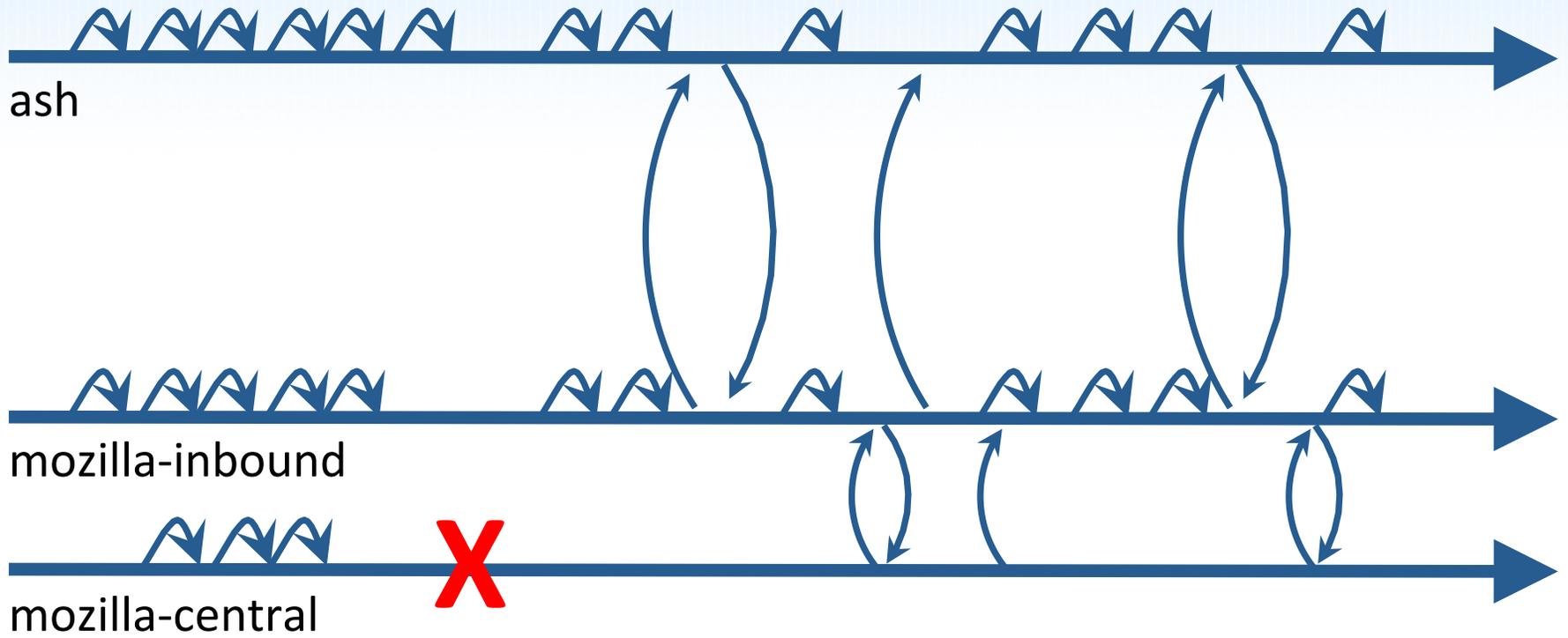


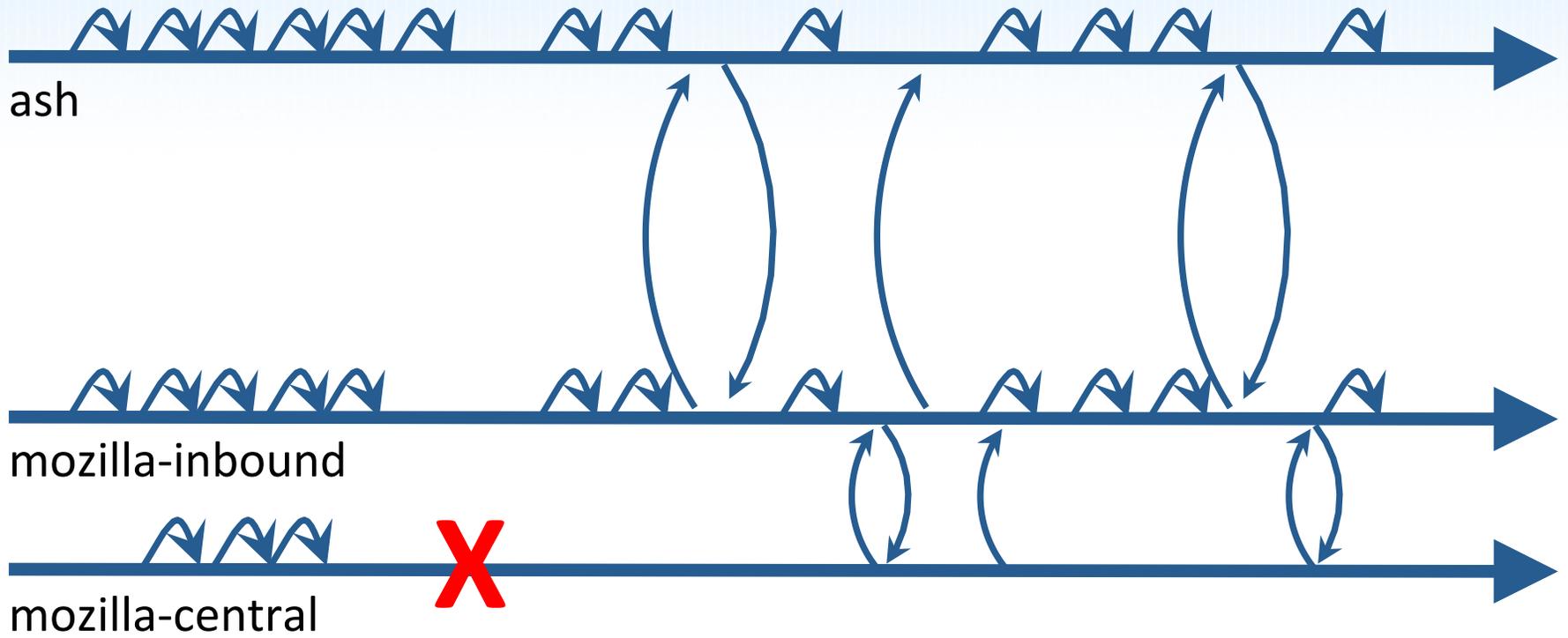
Fixing The Pipeline: 8 of 11

project branches









Fixing The Pipeline: 8 of 11

project branches

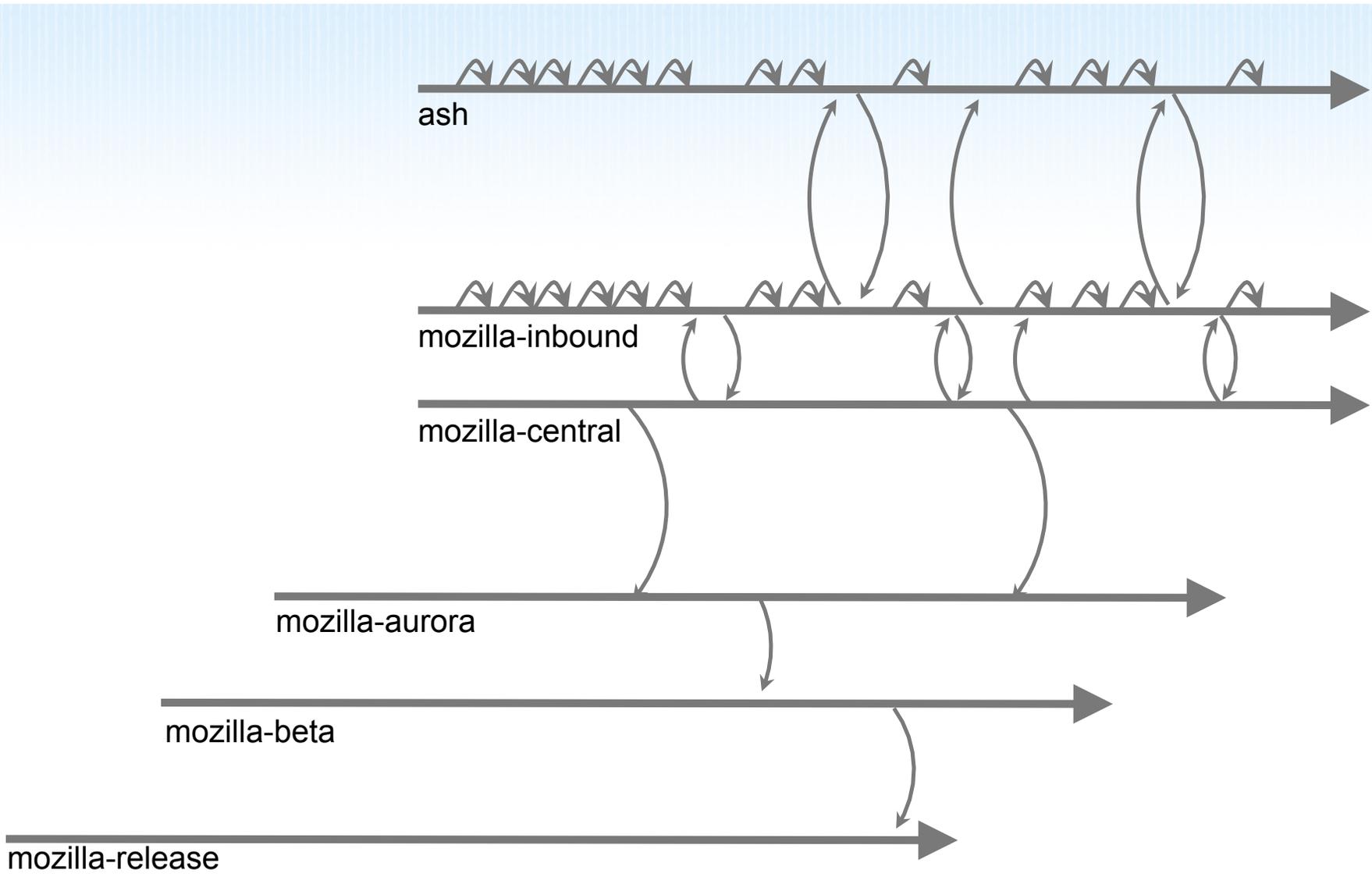
Fixing The Pipeline: 9 of 11

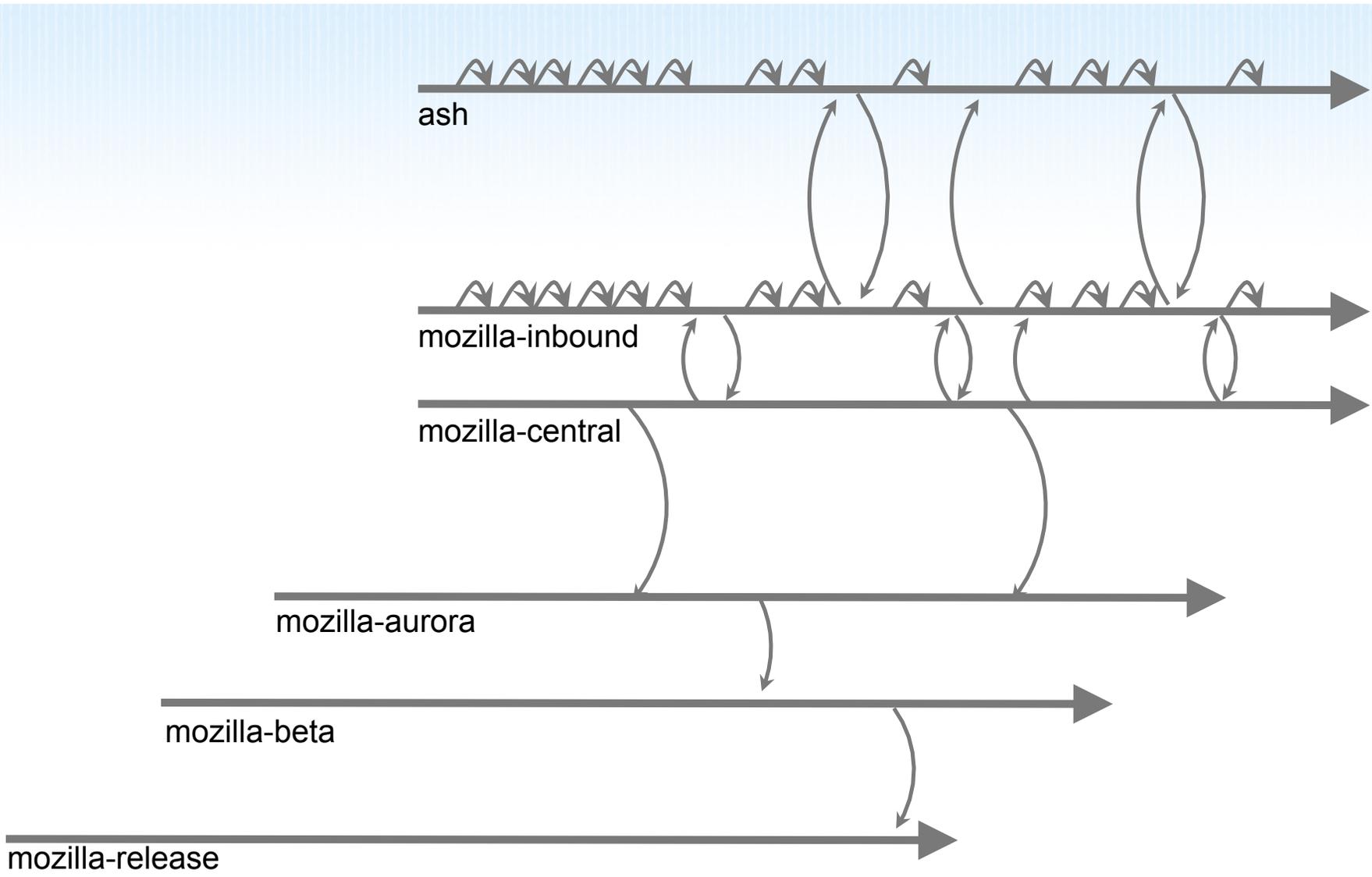
release trains

- single track
 - release schedule is as predictable as your riskiest project

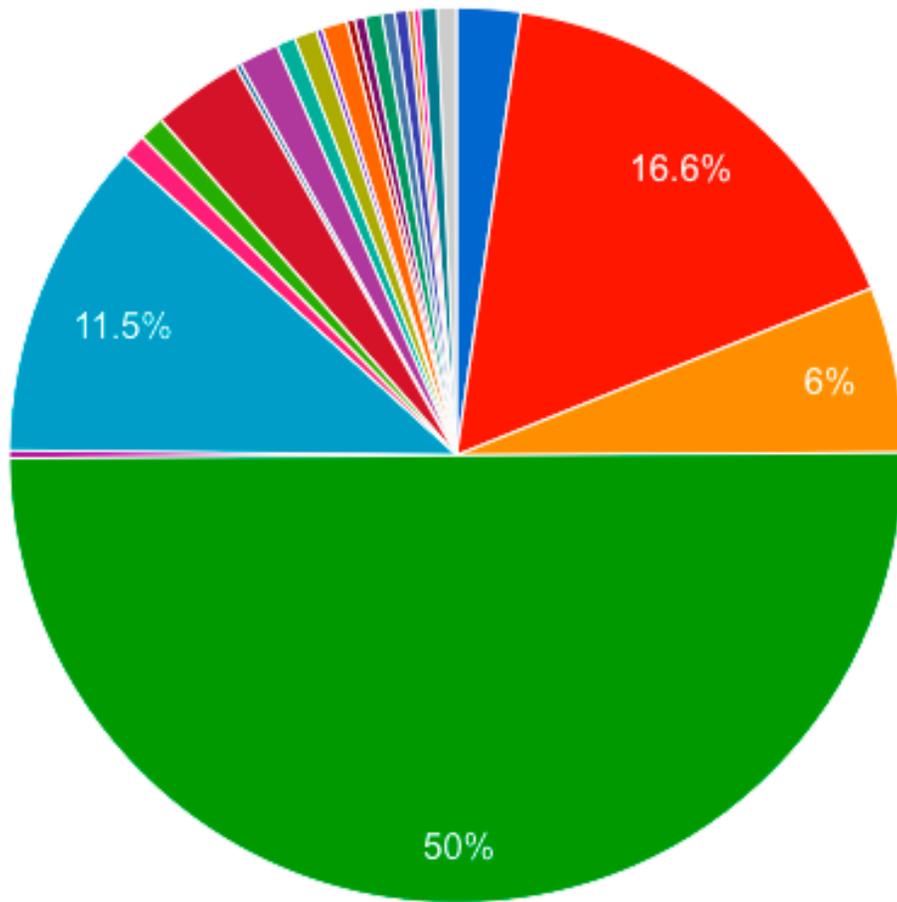
- single track
 - release schedule is as predictable as your riskiest project
- project branches
 - completed projects ship on schedule
 - late/risky project slip to next release

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 - late/risky project slip to next release



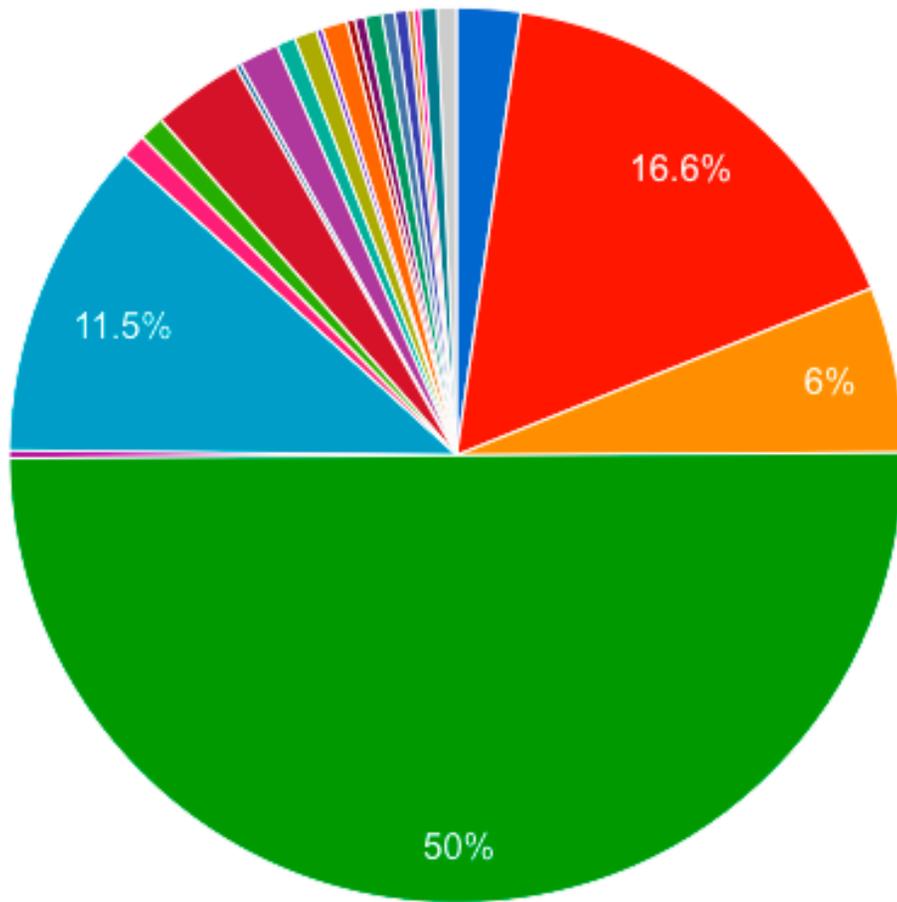


Number of Pushes by Branch



- mozilla-central
- integration/mozilla-inbound
- integration/fx-team
- try
- birch
- integration/b2g-inbound
- try-comm-central
- comm-central
- releases/mozilla-b2g26_v1_2
- projects/profiling
- releases/mozilla-aurora
- projects/pine
- projects/ux
- releases/comm-beta

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Fixing The Pipeline: 9 of 11

release trains



Fixing The Pipeline: 10 of 11

Fixing The Pipeline: 10 of 11

updates

updates

- many user complaints were already fixed in later release
 - user “just” needed to update

updates

- make updates as easy as possible
 - manual check-for-updates should **always** work

updates

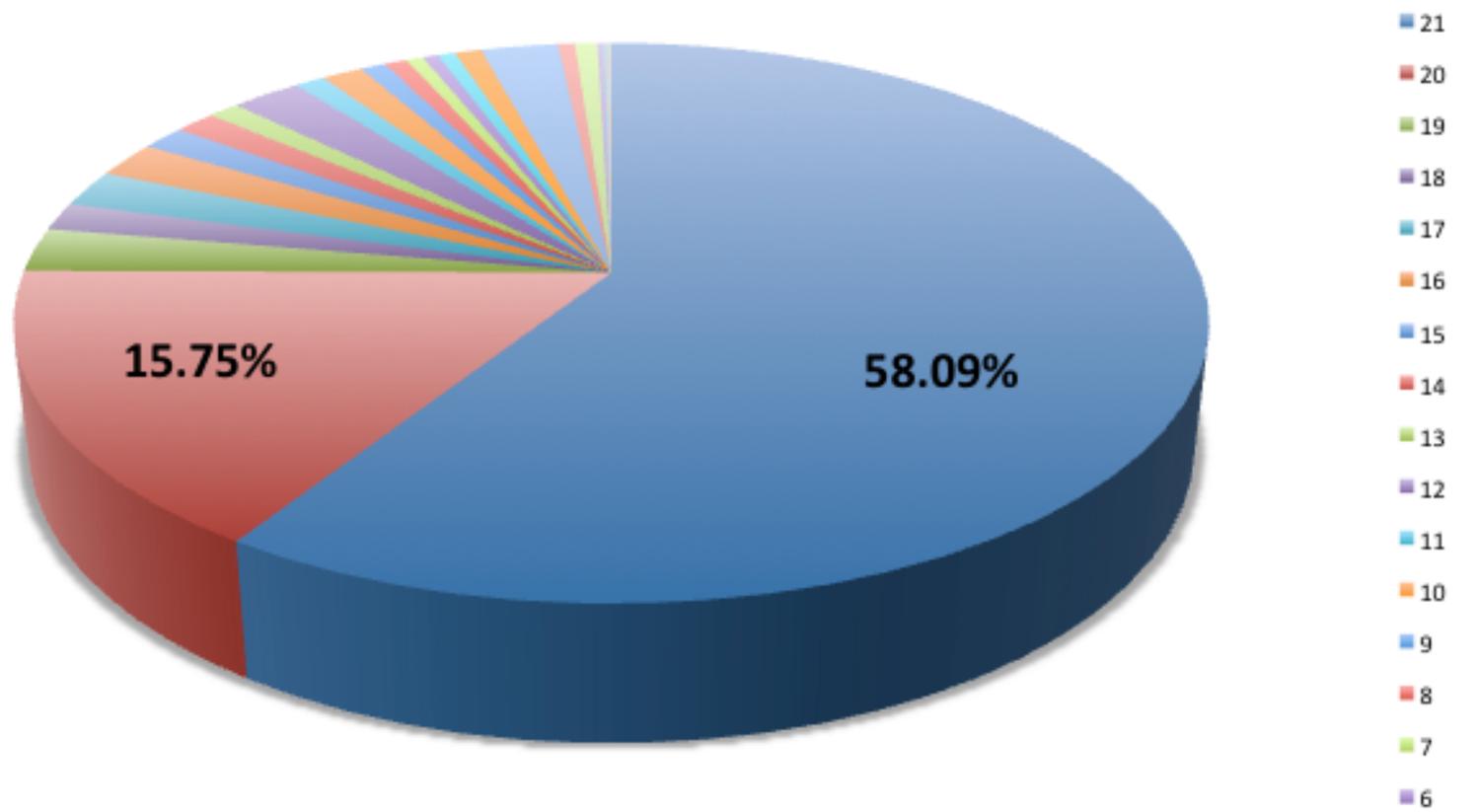
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 - throttle background-updates at first... just in case
 - one-click



updates

- prompt users from specific old versions to newest version
 - avoid update fatigue for users on new-ish versions

updates

- prompt users from specific old versions to newest version
 - avoid update fatigue for users on new-ish versions
- download size
 - partial vs complete
 - developing world / slow internet connection

Fixing The Pipeline: 10 of 11

updates

Fixing The Pipeline: 11 of 11

localization

localization

- all humans are equal

localization

- all humans are equal
- all locales ship on same changeset, on same day.
 - Harder to setup initially
 - Easier to ship security fixes later

localization

- I10n nightly builds

localization

- I10n nightly builds **AND** I10n nightly updates
 - easier to find code/localization problems
 - easier to recruit and retain localizers

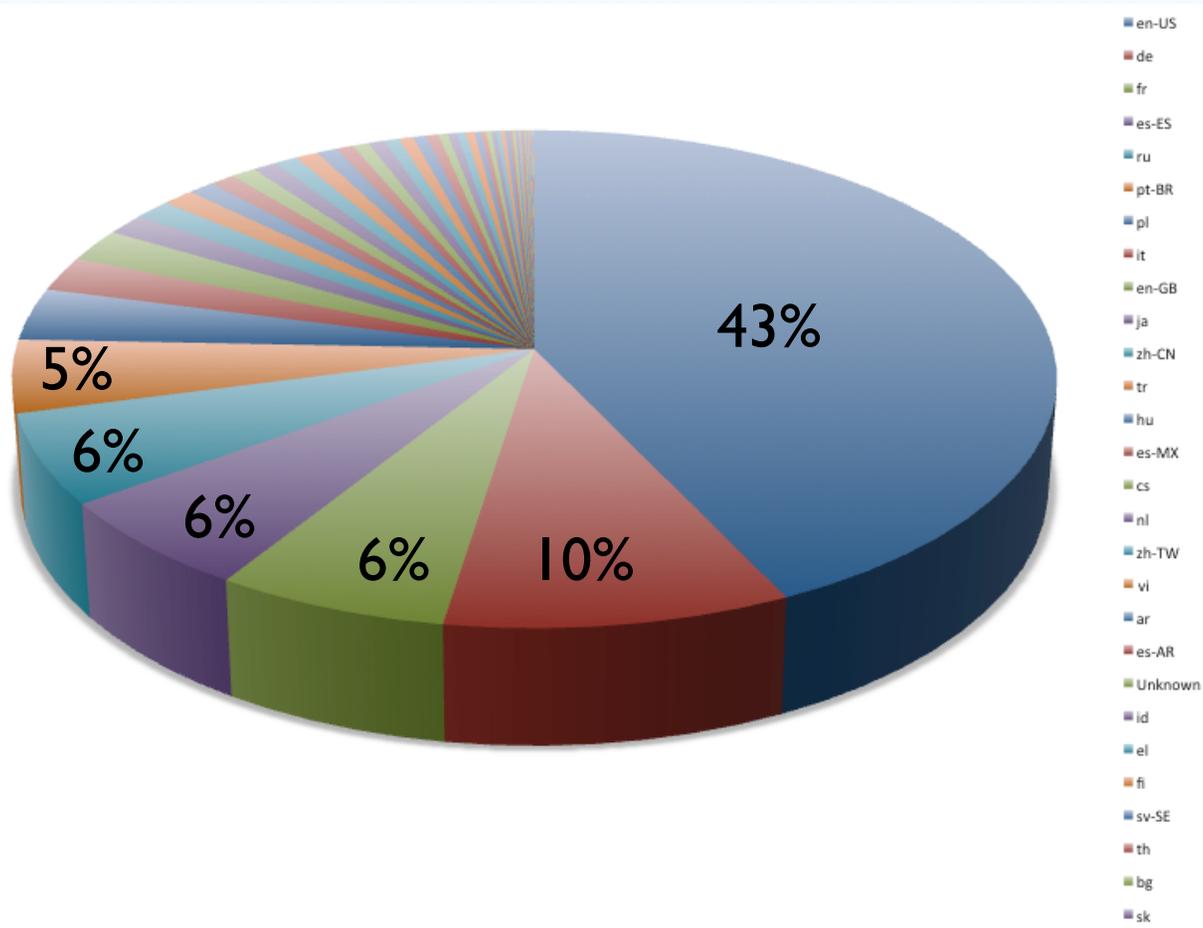
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localization

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- may2007: **34** locales
- may2013: **94** locales



Fixing The Pipeline: 11 of 11

localization

Fixing The Pipeline: 11 of 11

localization

Fixing The Pipeline: 11 of 11

localization

companies
live or die
by the effectiveness of their
delivery pipeline

Release Engineers != Developers

developers build a **product**

release engineers build a **pipeline**

Release Engineers
make
entire organizations
more effective

Release Engineers
as
Force Multipliers
are valuable

Before & After

- How quickly can we ship a chemspill release?
 - ~~4-6 weeks~~ 11 hours
- How long to ship a “new feature” release?
 - ~~12-18 months~~ 6 weeks
- How many active code lines?
 - ~~1-1/2~~ 42
- How many checkins per day?
 - ~~~15 per day~~ 400-600 per day

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