DevOps @ GitHub Speed
How we collaborate across departments

Johannes Nicolai (@jonico)
DEVOPS
DEVOPS EVERYWHERE
DevOps Definition

DevOps: A culture where people, regardless of title or background, work together to imagine, develop, deploy and operate a system.

Source: https://kenmugrage.com/2017/05/05/my-new-definition-of-devops/
A long time ago, in a galaxy far, far away....
r867654 | glasser | 2007-11-03 00:24:07 -0500 (Sat, 03 Nov 2007)

* subversion/svn/main.c
  (svn_cl__cmd_table): Customize documentation of --force-log in 'svn
  look', just like we do for -m and -F, to refer to lock comment and
  not log message.

Found by: Johannes Nicolai <Johannes.Nicolai@student.hpi.uni-potsdam.de>

r867556 | kfo guel | 2007-10-30 00:02:24 -0500 (Tue, 30 Oct 2007)

* build/ac-macros/apr.m4
  (SVN_DOWNLOAD_APR): Improve instructions for getting and building apr.

* build/ac-macros/aprutil.m4
  (SVN_DOWNLOAD_AFRUTIL): Same for apr- util.

Patch by: Johannes Nicolai <Johannes.Nicolai@student.hpi.uni-potsdam.de>
LOGICAL AWESOME

My Codes Are Perfect

We're the people behind GitHub. Get in touch.
GitHub Facts

- **Founded**: 2008
- **Users**: 26M+
- **Universities**: 1200+
- **Global Rank**: 50
- **Projects**: 67M
- **Monthly Visitors**: 52M+
- **Fortune 50**: 52%
- **Corporate Customers**: 75k+
- **Offices**: San Francisco, Tokyo, Amsterdam, Boulder

"the best way to build and ship software"
The world's innovators choose GitHub

<table>
<thead>
<tr>
<th>OPEN SOURCE</th>
<th>TECHNOLOGY</th>
<th>FORWARD THINKING ENTERPRISES</th>
</tr>
</thead>
<tbody>
<tr>
<td>TensorFlow</td>
<td>Microsoft</td>
<td>Techniker Krankenkasse</td>
</tr>
<tr>
<td>node.js</td>
<td>IBM</td>
<td>Deutsche Börse</td>
</tr>
<tr>
<td>docker</td>
<td>Intel</td>
<td>PayPal</td>
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<tr>
<td>MySQL</td>
<td>SAP</td>
<td>zalando</td>
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<tr>
<td>Jenkins</td>
<td>Apple</td>
<td>XING</td>
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<td></td>
<td>Facebook</td>
<td>solarisBank</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R+V</td>
</tr>
</tbody>
</table>
German GitHub Giants (GGG)
German GitHub Giants (GGG)

Approval checks for GitHub pull requests.
- build
- passing
- code climate
- 3.6 dependencies
- insource
- chat
- on github

Zappr is a GitHub integration built to enhance your project workflow. Built by open-source enthusiasts, it's aimed at helping developers to increase productivity and improve open-source project quality. It does this primarily by removing bottlenecks around pull request approval and helping project owners to halt "rogue" pull requests before they're merged into the master branch.

Setup, FAQ and further information
Please refer to our documentation.

Development
Zappr needs a database during development and testing. For this reason there's a `docker-compose.yml` for your convenience, with which you can either start a database for development (postgres-dev):

```
# starts postgres docker container
docker-compose up postgres-dev
```

If you would like to run a complete Zappr locally, you can do it like this:

1. Export your Github credentials and docker-machine IP:
what's in it for ME?
What’s the secret?
The (very shortened) recipe

- COMMON PHILOSOPHY
- ASYNCHRONOUS COMMUNICATION
- CHATOPS
- CONTINUOUS DELIVERY
The Zen of GitHub

- Responsive is better than fast
- It’s not fully shipped until it’s fast
- Anything added dilutes everything else
- Practicality beats purity
- Approachable is better than simple
- Mind your words, they are important
- Speak like a human
- Half measures are as bad as nothing at all
- Encourage flow
- Non-blocking is better than blocking
- Favor focus over features
- Avoid administrative distraction
- Design for failure
- Keep it logically awesome
The (very shortened) recipe

- Common Philosophy
- Asynchronous Communication
- ChatOps
- Continuous Delivery
the best way to build and ship software
the best way to build and ship software
GitHub Flow
Create a Feature Branch
On this hallowed machine Ryan Tomayko, Kyle Neath, and Chris Wanstrath collaborated to create Pull Requests, one of GitHub’s most beloved and distinctive features. Pull Requests revolutionized the way that developers contribute to projects.

Tomayko only relinquished this well-loved laptop when the protective plastic coating was so worn that it could no longer protect him from painful electric shock. It has been preserved here for posterity.
Discuss and Review Code
Get CI status back in Pull Request

- **All checks have passed**
  - 15 successful checks

- **enterprise** — Build #3351587 succeeded in 153s
- **enterprise-lint-schema** — Build #3351588 succeeded in 72s
- **enterprise-setup** — Build #3351589 succeeded in 171s
- **enterprise2-github** — Build #3351590 succeeded in 341s
- **github** — Build #3351591 succeeded in 178s
- **github-all-features** — Build #3351592 succeeded in 214s

- **This branch has no conflicts with the base branch**
  - Merging can be performed automatically.

- **Merge pull request** You can also open this in GitHub Desktop or view command line instructions.
Peer code reviews in Pull Request

- **Changes approved**
  - 2 approved reviews. Learn more.

- **Approved reviews**
  - nplasterer approved these changes
  - jessicard approved these changes

- **All checks have passed**
  - 3 successful checks

- **This branch has no conflicts with the base branch**
  - Merging can be performed automatically.

You can also open this in GitHub Desktop or view command line instructions.

Merge pull request
Deployment API

- Tooling
- GitHub
- 3rd Party
- Your Server

Create Deployment → Deployment Created

Deployment Event → SSH+Deploys

Deployment Status

Deploy Completed
The (very shortened) recipe

- COMMON PHILOSOPHY
- ASYNCHRONOUS COMMUNICATION
- CHATOPS
- CONTINUOUS DELIVERY

the best way to build and ship software
hubot
The Most Important Startup’s Hardest Worker Isn’t a Person

Sam Lambert, the director of systems at GitHub, calls Hubot “the hardest working GitHubber.” That’s a company-wide in-joke. Hubot isn’t really a GitHubber. He’s a bit of software that plugs into the GitHub chat system. About five years ago, a guy named Ryan Tomayko built Hubot as an easier way for the company’s engineers to manage and modify all the hardware and software underpinning GitHub.com. Simply by sending a message to Hubot—much as they’d send a message to anyone else from inside the GitHub chat client—engineers could update the operating systems driving GitHub’s servers, delete data from the databases, or take
Hubot

the best way to build and ship software
the best way to build and ship software

helaili 09:53
truck me

hubot  BOT 09:53

★★★★☆ Tacos El Tuca — Mexican food truck
★★★★★ Izzy’s Cheesest... — We make chee
Under the freeway on 2nd street you will find.
★★★★☆ Phat Thai — Thai food truck
★★★★☆ Munch India — Gourmet Indian Fc
★★★★☆ Mayo & Mustard — Sandwich truc
★★★★☆ LeiFeng Ramen — Japanese Rame
★★★★☆ GBar & Cafe — Coffee, beer, wine

helaili 09:54
.animate crazy

hubot  BOT 09:54

(965KB)
What do you mean, “devops”?

WORKED FINE IN DEV

OPS PROBLEM NOW
What do you mean, “devops”?

No one talks to each other

Welcome to operations. Place new work here.
CHATOPS AS THE CULTURAL GLUE

DevOps

APPLICATION AUTOMATION

INFRASTRUCTURE AUTOMATION

%-40

CHA TOPS AS THE CULTURAL GLUE

DevOps

APPLICATION AUTOMATION

INFRASTRUCTURE AUTOMATION

%-40
The best way to build and ship software.

---

**Jonah Berquist** 6:46 PM
.mysq1proxy disable github

**Hubot** BOT 6:46 PM
Disabling github-

```
git hub: force push master
disabled server mysql/github-
```
Show more...

**Tom Krouper** 6:47 PM
Do we want to re-up durability on a couple replicas to make sure that is fine?

**Sam Lambert** 6:47 PM
.status green

**Hubot** BOT 6:47 PM
Sam Lambert: Status updated to green

Sam Lambert: I updated GitHub Chat’s status, too.

**Zerowidth** 6:48 PM
.graph me -l alias(alpha(secondYAxis(github passthroughDelayThrottling[0.5]"called") + aliasByNode(maximumAbove(github passthroughDelayThrottling[0.3]) + title=Replication+Delay+Throttling+ +mysql1+cluster&hideLegend=false&template=plain&lineMode=staircase

**Jnunemaker** 6:48 PM
deploying doubling the threshold for user session writes

**Hubot** BOT 6:48 PM

**Graph Me**
(30KB)▼

---

GitHub
What is Hubot?

Hubot is your company’s robot. Install him in your company to dramatically improve and reduce employee efficiency.

No seriously, what is Hubot?

Hubot is a way of life. I didn’t really invent Hubot as much as he spawned into our existence, nay, to take it over like a ten-year-old cybernetic CounterStrike hacker. I wouldn’t be surprised if Hubot could come up with the cure for cancer. And then he would disgrace it in an animated GIF with the cryptic caption Y U NO CANCER? I’m actually pretty frightened of the damn thing, now that
hubot technicalpickles
A simple helpful robot for your Company

hubot-joelgparks-hubot-marvinconvoo joelgparks
A hubot script for testing bot to bot conversations.

hubot-hubot-blackfire michael-hopkins
Have hubot profile websites for you with blackfire via curl!

hubot-device-wall izerop
A hubot interface to update device endpoints
The (very shortened) recipe

1. COMMON PHILOSOPHY
2. ASYNCHRONOUS COMMUNICATION
3. CHATOPS
4. CONTINUOUS DELIVERY
Deployments to production

The best way to build and ship software
Where Can I Deploy?

jonico 10:42 AM

.where can I deploy

hubot BOT 10:42 AM

production: unlocked

production/canary: your first port of call for a production deployment
branch-lab: always available
lab: blocked by josh 12 hours ago: blocked lab on force-deploy
garage: locked 1 day ago by jamesmartin: testing the transition-issue-event-attrs
branch
spider-skull-island: locked 12 hours ago by kdaigle: testing the gaze-into-my-stars-interface-edition branch
machine-room: locked 9 hours ago by fabianperez: testing the fabianperez/inbox-bundles branch
slowtown: unlocked

Nobody is in the queue.

https://github.com/github/github/blob/master/docs/deployment.md
Deploy to test

@mdo 05:44
.deploy! github/mobile_nav_experiment to branch-lab

hubot BOT 05:44
@mdo is deploying github/mobile_nav_experiment to branch-lab. Review the deployment checklist before deploying to production.

hubot BOT 05:47
@mdo's branch-lab deployment of github/mobile_nav_experiment (402acbe) is done! (171s)

@mdo: your branch-lab is available at https://mobile-nav-experiment.branch.github.com
Get deployment status back in PR

- mdo added some commits 12 days ago
  - Merge branch 'master' into mobile_nav_experiment
  - clearer active state

- mdo deployed to branch-lab 11 days ago
  - Active now

- mdo added some commits 11 days ago
  - forgot display property
  - remove unused css

- mdo deployed to branch-lab 11 days ago
  - Active now
Deploy to production

**tarebyte** 15:43
.queue for github

**hubot** BOT 15:43

  tarebyte: mclark is testing in production. Queue for github (1): MikeMcQuaid

**tarebyte** 15:43
.qmtd github/tarebyte/integrations-2/audit-for-integration-installations

**hubot** BOT 15:43

  tarebyte: Okay, I've queued you to deploy github/tarebyte/integrations-2/audit-for-integration-installations. There is 1 person ahead of you.
Deploy to production - canary

@tarebyte: You're up to deploy github/tarebyte/integrations-2/audit-for-integration-installations!

tarebyte 15:54
.deploy github/tarebyte/integrations-2/audit-for-integration-installations to prod/canary

@tarebyte: Looks like queue-prep-tarebyte/integrations-2/audit-for-integration-installations-01e1f23-97445b1-a58f594 is green and equivalent to your branch; deploying.

Hubot BOT 15:54
Build #3343118 (a53fb07) of enterprise/tarebyte/integrations-2/audit-for-integration-installations was skipped: #3342961 was successful and has the same git tree
Deploy to production - canary

@tarebyte is deploying github/tarebyte/integrations-2/audit-for-integration-installations (a58f594..a53fb07) to production. Check out the deployment confidence dashboard or haystack firehose so you're the first to know if you've broken anything.

@tarebyte's production deployment of github/tarebyte/integrations-2/audit-for-integration-installations (a53fb07) is done! (32s)

@tarebyte, make sure you watch for exceptions in haystack and perf issues at graphme
No animals were harmed during GitHub Production
Deploy to production - everywhere

*tarebyte* 15:59
.deploy github/tarebyte/integrations-2/audit-for-integration-installations to prod

*hubot* BOT 15:59
@tarebyte is deploying github/tarebyte/integrations-2/audit-for-integration-installations (a53fb07) to production. Check out the deployment confidence dashboard or haystack firehose so you're the first to know if you've broken anything.

*hubot* BOT 16:02 ✨
@tarebyte's production deployment of github/tarebyte/integrations-2/audit-for-integration-installations (a53fb07) is done! (165s)

@tarebyte, make sure you watch for exceptions in haystack and perf issues at graphme
Deployment confidence

Welcome to the deployment confidence dashboard! This will help you have confidence your deploy hasn’t broken anything.

The following graph shows a blue line for each deployment. Use your deployments as a comparison point.

The following graph shows the number of exceptions in each of the latest buckets in GitHub’s Haystack. You’re looking to make sure there haven’t been a major, sustained spike in any of these buckets since you deployed. When a spike hits “critical” it will page the person on call for github-deploy-oncall.

Click through to the Haystack buckets quickly with: github, github-standard-query, github-query-wARNING, github-js

The following graph shows the number of common exceptions in GitHub’s Haystack. You’re looking to make sure there hasn’t been a major, sustained spike in any of these exception types since you deployed.

GitHub.com common exception metric rates

The following graph shows Github’s performance rates on Github. You’re looking to make sure there hasn’t been a major, sustained spike in performance since you deployed (indicating a major performance regression).

Browser response time percentiles

The following graph shows API error codes. You’re looking to make sure there hasn’t been a major, sustained spike in any particular error code since you deployed.
the best way to build and ship software

Deployed migration-sign-off-requests
by rocio an hour ago

Elastomer::Client::ServerError
an hour ago — SearchPhaseExecutionException [Failed to execute phase [query], all shards failed; shardFailures [XIC...

Git::Ref::ComparisonMismatch
an hour ago — refs/pull/43/merge is at ae5add0dc5a3e36f0349e3aad17007f505c93a3 but expected 384991120758697777f6...

Erno::ETIMEDOUT
an hour ago — Connection timed out - orca_connect_recv

Elastomer::Client::ServerError
an hour ago — SearchPhaseExecutionException [Failed to execute phase [query], all shards failed; shardFailures [XICb92yDR...

Elastomer::Client::ServerError
an hour ago — SearchPhaseExecutionException [Failed to execute phase [query], all shards failed; shardFailures [tEcT5SNTS...
the best way to build and ship software

Hubot has your back

hubot BOT 16:24

[nagios sev1 issue] github/haystack-slow-queries-per-minute is WARNING
Defined in config/haystack/alerts.yml

hubot BOT 16:27

[nagios sev1 issue#47533] github/haystack-slow-queries-per-minute is OK after 3 minutes
Hubot has your back

Nagios (3023645) - github/haystack-slow-queries-per-minute - 2016-06-01 07:24:39 -0700 #47533

hubot opened this issue 18 hours ago · 5 comments

hubot commented 18 hours ago

**github/haystack-slow-queries-per-minute is WARNING**

This is an early warning intended to give you time to fix it ahead of it going CRITICAL. Please prioritise work on this issue before it goes CRITICAL. If this has fired too soon or too late, please update the alert WARNING threshold appropriately.

**Output**

```
WARNING Haystack exceptions per minute: 286.80

Nagios check created by github/nagios
```

**Notes**

You're not receiving notifications from this thread.
Wrap it up

hubot  BOT  16:08

tarebyte merged github/github#56028: Add audit log events for IntegrationInstallation create and destroy

[github:master]: tarebyte pushed 1 commit
06bc4b5: Merge pull request #56028 from github/tarebyte/integrations-2/audit-for-integration-installations - tarebyte

Hubot  BOT  16:08

Build #3343285 (06bc4b5) of enterprise/master was skipped: #3342961 was successful and has the same git tree

hubot  BOT  16:08

tarebyte deleted github/tarebyte/integrations-2/audit-for-integration-installations

@tarebyte: it looks like you merged the "tarebyte/integrations-2/audit-for-integration-installations" branch into master, so I've unlocked github in production.

@jnnunemaker: You're up to deploy github/interactions!
The (very shortened) recipe

- COMMON PHILOSOPHY
- ASYNCHRONOUS COMMUNICATION
- CHATOPS
- CONTINUOUS DELIVERY
Isn’t that still too risky???
Feature Toggles

Feature flipping is the act of enabling or disabling features or parts of your application, ideally without re-deploying or changing anything in your code base.

The goal of this gem is to make turning features on or off so easy that everyone does it. Whatever your data store, throughput, or experience, feature flipping should be easy and have minimal impact on your application.
Feature Toggles

Toggle Features

- deployments_next_reponav
  Adds a repository navigation item for the Deployments dashboard at e.g.
  `forks_survey`
  #55238
- live_updates
  Enables live updates (aka long polling) for github.com. Live updates ...
- log_accessibility
  Reports accessibility issues to the github-accessibility bucket.
- pr_survey
  Shows a segment of users a survey about Pull Requests
github/workflow...
- request_tracing
  Traces AS::Notifications events during a request and draws a timeline...
- same_site_cookies
  Enables setting both strict and lax SameSite cookies for user sessions.
- semantic_diff
  Let's people view semantic diffs. jcc @github/semantic-diff
  on bugs. #...
Feature Toggles
**Scientist!**

A Ruby library for carefully refactoring critical paths.

**How do I science?**

Let’s pretend you’re changing the way you handle permissions in a large web app. Tests can help guide your refactoring, but you really want to compare the current and refactored behaviors under load.

```ruby
require "scientist"

class MyWidget
  def allows?(user)
    experiment = Scientist::Default.new "widget-permissions"
    experiment.use { model.check_user?(user).valid? } # old way
    experiment.try { user.can?(:read, model) } # new way
    experiment.run
  end
end
```
Make Pulse aware of spam #45325

skalinik commented on Aug 31, 2015

Fixes #20985

Initial to do items stolen from @erebor's comment

To do

- Update `fetch_issues_and_pull_requests`
- Maybe make `fetch_issues_and_pull_requests` a SQL query instead of rejecting on `is_pamy`?
- Update `issue_comment_counts`
- Update `merge_commit_counts`
- Move all parts of the tests into the `spamminess_enabled` check block
- Probably add some more to do list items
- Write a to do list
- Add more Science
- Fix science test failures

cc/ @github/pulse (9 people) Now featuring @skalinik @github/spam
The `inject` could instead be replaced by `Hash[select_rows...]`. I'm not sure if that's better/faster/clearer, but just noticed it.
### Developer tools / Code experiments

#### Active code experiments

These experiments are running now. Don’t forget that experiments can hurt site performance!

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Rate/min @ %, % wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>api-user-repos.cached-ids</td>
<td>0/100, 0%</td>
</tr>
<tr>
<td>contrib-calendar.days-with-today</td>
<td>924/100, 0%</td>
</tr>
<tr>
<td>cpone_gpgverify</td>
<td>0/100, 0%</td>
</tr>
<tr>
<td>goomba-markdown-pipeline</td>
<td>3,597/25, 0%</td>
</tr>
<tr>
<td>goomba-short_repo_description</td>
<td>5,291/50, 0%</td>
</tr>
<tr>
<td>sciencetown</td>
<td>0/100, 0%</td>
</tr>
<tr>
<td>suggestions_without_spam</td>
<td>0/10, 0%</td>
</tr>
</tbody>
</table>

#### Inactive code experiments
GitHub Vision
Pair programming with a robot

```ruby
app/models/directory.rb

@@ -66,6 +66,12 @@ def preferred_license

66 66
@license_blob = preferred_file(:license)
67 67
end
68 68

69 + # The preferred ISSUE_TEMPLATE in a tree (see #preferred_file for more info)
70 + def preferred_issue_template
71 +   return @issue_template_blob if defined?(@issue_template_blob)
72 +   @issue_template_blob = tree_entries.detect { |e| e[:name] =~ /^issue_template/ }

sentinel
/^ looks like a regular expression which uses anchors that match beginning/end of line. This could lead to the bypass of the intended input validation. If you intended to match the beginning/end of string please use \A\z instead.
```
Dependency Graphs

Dependency graph

These dependencies have been defined in linguist's manifest files, such as `github-linguist.gemspec` and `package.json`

- **Dependencies defined in package.json**: atom / season
  - ~5.4

- **Dependencies defined in github-linguist.gemspec**: brianmario / charlock_holmes
  - ~> 0.7.5

Dependents:

How repositories that contain relate to other repositories on GitHub

Ruby and JavaScript
Python coming soon
# Data-driven Security

Detect public security vulnerabilities in your dependencies

Security alerts

Auto PR to fix issue

<table>
<thead>
<tr>
<th>Dependencies defined in Gemfile</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>▼ sprockets / sprockets</td>
<td>➔ 1.0</td>
</tr>
<tr>
<td>▢ jine / rouge</td>
<td>➔ 1.0</td>
</tr>
<tr>
<td>▼ amazon / aws-s3</td>
<td>1.0.5f1bf84</td>
</tr>
<tr>
<td>▼ rails / spring</td>
<td>➔ 1.0</td>
</tr>
<tr>
<td>▢ rails / webpacker</td>
<td>➔ 1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dependencies defined in package.json</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>▼ primercss / primer-core</td>
<td>➔ 0.1</td>
</tr>
<tr>
<td>▢ pmarscell / electryll</td>
<td>➔ 0.2</td>
</tr>
<tr>
<td>▼ defunkt / facebox</td>
<td>➔ 1.0</td>
</tr>
</tbody>
</table>

Note: Only users with admin access to this repository can see this message.

⚠️ Suggested unsafe dependency updates

More than one of the dependencies that you’re using are vulnerable to issues that can pose significant risk to the developers and users of this repository. To help mitigate potential exploitation, we can automatically create Pull Requests to upgrade these dependencies to the next safe versions you review.

Update all unsafe dependency versions
Method and function summary

Summary list of methods and functions changed within a file

Supports Go, JavaScript, TypeScript, Python & Ruby
### Topics

- **Subject-based connections between repositories**
- **Explore and discover related repositories**
- **Suggestions and connections based on machine learning and natural language processing**
GitHub Pages: Communicate & visualize results

Results are out / Die finalen Ergebnisse sind da

This year, the German Association for Computer Science is hosting InformatiCup - a computer science competition for students - the twelfth time.

This year’s InformatiCup challenge is dedicated to the new possibilities that arise based on the application of artificial intelligence and repository mining - based on the social coding platform GitHub.

Die Gesellschaft für Informatik richtet in diesem Jahr zum zwölften Mal den InformatiCup - einen Informatikwettbewerb für Studierende - aus.

Den neuen Möglichkeiten der Anwendung künstlicher Intelligenz und automatischer Empfehlungsdienste im Bereich der Softwareentwicklung widmet sich der InformatiCup 2017 mit der Aufgabe der automatischen Klassifizierung von Repositories auf der kolaborativen Entwicklungsplattform GitHub.
HPI Impressed at GitHub ML Challenge
Markdown: Document setup and research questions
Use of Jupyter notebooks to document experiments
Discover from your Dashboard

Based on repositories you've starred

**github/VisualStudio**
GitHub Extension for Visual Studio

- visual-studio
- c-sharp
- git

- C#  ★  917  3 issues need help  Updated 5 minutes ago

Based on repositories you've starred

**jenkinsci/github-plugin**
Jenkins GitHub plugin

- github
- jenkins-plugin

Discover repositories

Recommendations are based on your stars and people you follow. You can always go to Explore to see more.

Got it
“Pair programming with Hubot”
DevOps Definition

DevOps: A **culture** where people and robots, regardless of title or background, work together to imagine, develop, deploy and operate a system.
Questions?
Thank You!
References used within the presentation

- https://github.com/blog/2093-how-the-services-team-uses-github
- https://github.com/blog/1124-how-we-use-pull-requests-to-build-github
- https://github.com/blog/1939-how-github-uses-github-to-document-github
- https://www.youtube.com/watch?v=YIpNpptGX6Q
- https://guides.github.com/introduction/flow/
- http://githubengineering.com/deploying-branches-to-github-com/
- https://www.youtube.com/watch?v=NST3u-GjjFw
- http://githubengineering.com/scientist/
- http://johnnunemaker.com/flipper/
- https://enterprise.github.com
- https://paypal.github.io/InnerSourceCommons/
- https://github.com/blog/2079-managing-large-files-with-git-lfs
Bonus
the best way to build and ship software

http://www.oreilly.com/programming/free/
Hubot deployed on Heroku