Development with Git

“Digging in your eye-sockets with a fondue fork is strictly considered to be bad for your health, and seven out of nine optometrists are dead set against the practice.”

- Linus Torvalds, on Git mailing list


Censored!
Every time you don't use version control, Linus Torvalds get's a little angrier!

Outline

- Version control software
- Git for software development
- A few words on coding style and packaging in Python

Version control

To 0'th order

- Development history for your source code
- Collaboration with other developers
- Allows experimentation without breaking existing code
- Might take a little time to learn, but well worth it!

Version control

The generics

- Files and development history stored in repositories
- Check out files to a working directory
- Commit changes back to repository
- Update your working directory with commits from other developers
- Centralized vs. decentralized

Version control

Centralized

- Everyone commits to a server
- Does not encourage offline development
- Single point of failure
- 90's: CVS
- 00's: Subversion
- Now?

Version control

Decentralized

- Everyone has a copy
- Local commits
- Push to and pull from shared copy
- Encourages experimentation
- Many contenders
  - Mercurial
  - Bazaar
  - Git

http://git-scm.com

Git

Getting started

```
$ mkdir myawesomesoftware
$ cd myawesomesoftware
$ git init
Initialized empty Git repository in [path]
$ ls -a
. .. .git
$ echo "My awesome software" > README
$ git add README
$ git commit -m "Initial commit with README file."
[master (root-commit) 421659d] Bla bla
 1 files changed, 1 insertions(+), 0 deletions(-)
 create mode 100644 README

$ git help
```

Git

Under the hood

- Git keeps track of a database of commits.
- Every directory under version control has .git/
- A commit consists of [tree, author, timestamp, log message, parent commit(s)]
- Commits are named with hashes, eg. 0d30e664c0839392a0ec8c7c266e9e194b8bb7f6
- Formally a directed acyclic graph

Git

Local workflow

```
$ echo "Hope you like it" >> README
$ git status
[...]
modified:   README
[...]
$ git diff
[...]
 My awesome software
+Hope you like it
$ git commit -a -m "Added more info to the README."
$ git status
$ git log
```

Git

There and back again

- Checkout and revert
- If committed, you can (almost) never lose it!

Ammend an existing commit

```
$ git commit --amend
```

Discarding changes to files

```
$ get checkout -- <file>
```

Unstaging changes

```
$ git reset HEAD <file>
```

Create a new commit that removes some old commits

```
$ git revert
```

Rewinding commits. Only if they have not been pushed!

```
$ git reset --hard
```

Git

Branches

```
$ git branch -a
* master
$ git branch a_new_hope
$ git checkout a_new_hope
Switched to branch 'a_new_hope'
$ echo "CHANGES ARE COMING" >> README
$ git commit -a -m "Put changes warning in README"
$ git checkout master
$ git merge a_new_hope
Updating 16dbb3f..7351b65
Fast-forward
 README |    1 +
 1 files changed, 1 insertions(+), 0 deletions(-)
```

Git

Collaboration

```
$ git clone /path/on/shared/disk
$ git clone git://git-server.com/...
$ git clone user@host:path/to/repo
$ git clone http://host/repo.git

$ echo "My 5 cents" >> README
$ git diff
$ git commit -a -m "Changed README to include my 5 cents."
$ git pull
$ git push
```

Git

Setting up a shared repo

```
$ ssh myserver

$ cd /path/to/repos
$ mkdir myrepo.git
$ cd myrepo.git
$ git init --bare --shared
$ exit

$ cd /path/to/code
$ git remote add origin ssh://myserver/path/git/repos
$ git push -u origin master
```

Git

Resolving conflicts

```
$ git pull
CONFLICT (content): Merge conflict in file.txt
$ cat file.txt
<<<<<<< HEAD:file.txt
Hello world
=======
Goodbye
>>>>>>> 77976da35a11db4580b80ae27e8d65caf5208086:file.txt
$ vim file.txt
Hello world
Goodbye
$ git add file.txt
$ git commit -m "Merged conflicts in file.txt"
$ git push
```

Git

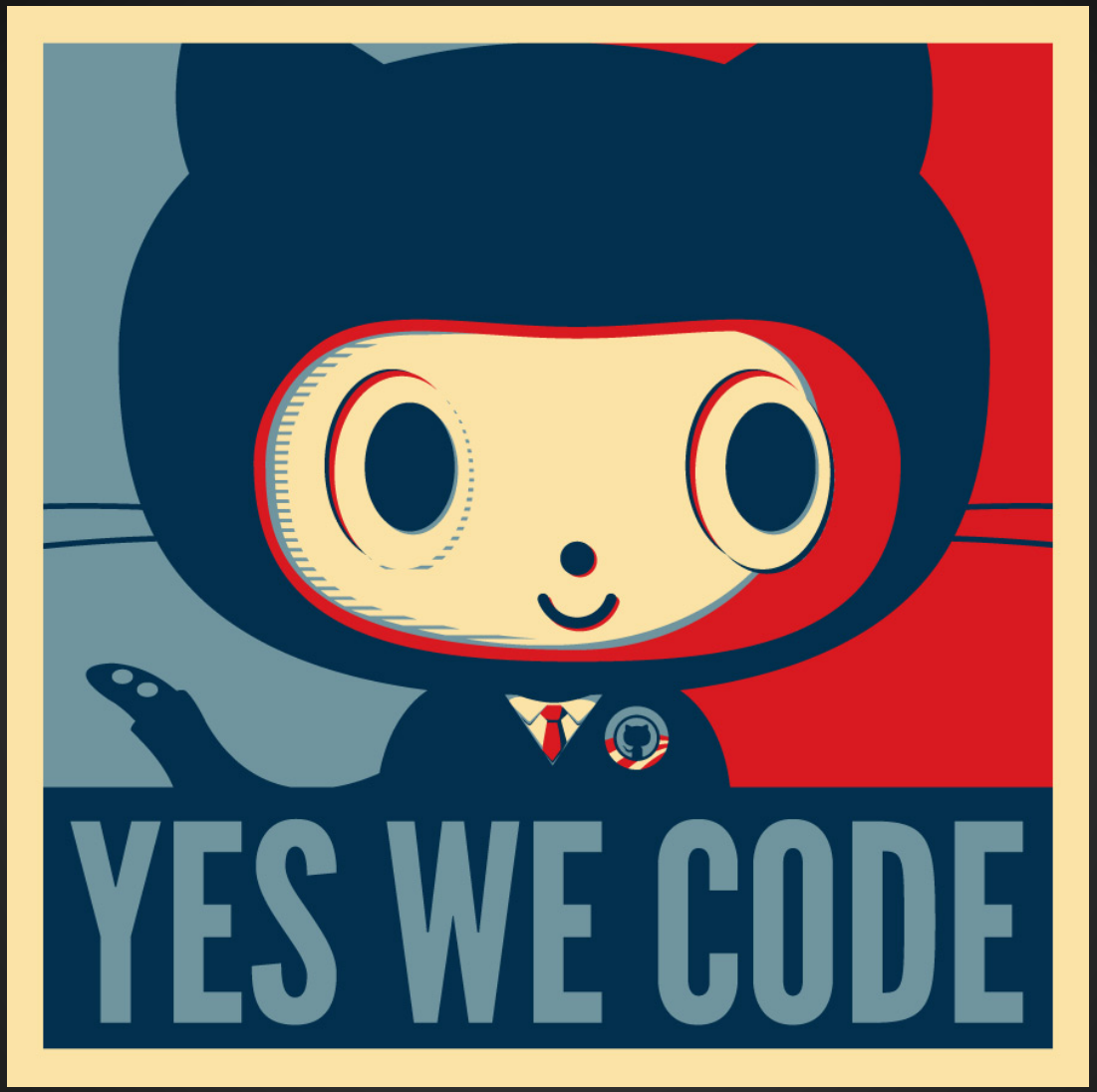
"Github" flow

```
$ git clone ...
$ git checkout -b my_new_feature
$ vim crazy_feature.py
$ [...]
$ git commit ...
$ git push -u origin my_new_feature
```

Tell someone about your new branch and get feedback!

```
$ git commit ...
$ git checkout master
$ git merge my_new_feature
$ git pull
$ git push
```

Anything in master is deployable.



http://github.com

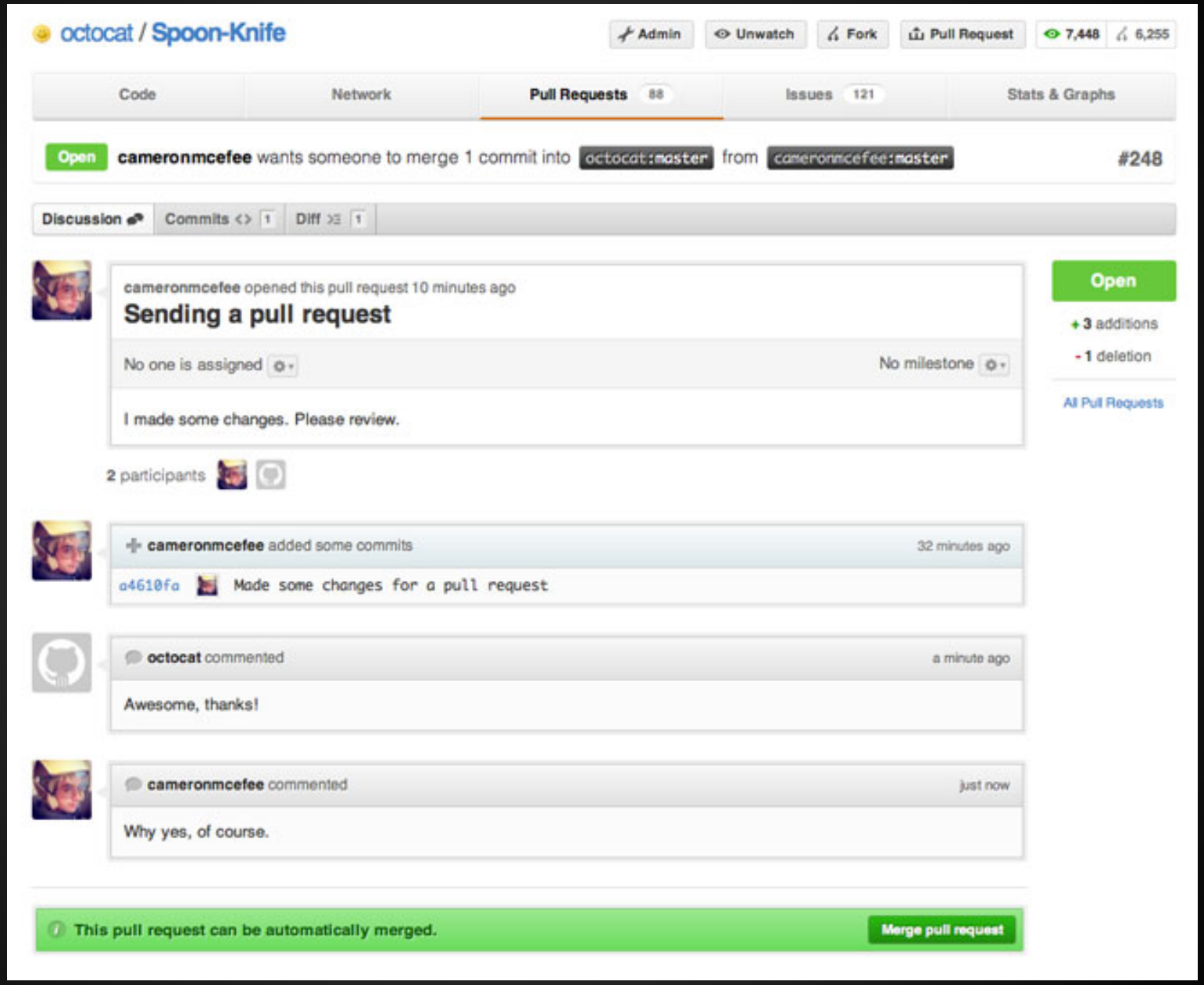
Git

Github?

- Your code in the cloud
- Handles all the plumbing of code collaboration
- Adds project management and social components
- Free for open source
- Revolutionizing software development!

Git

Github pull requests



Git

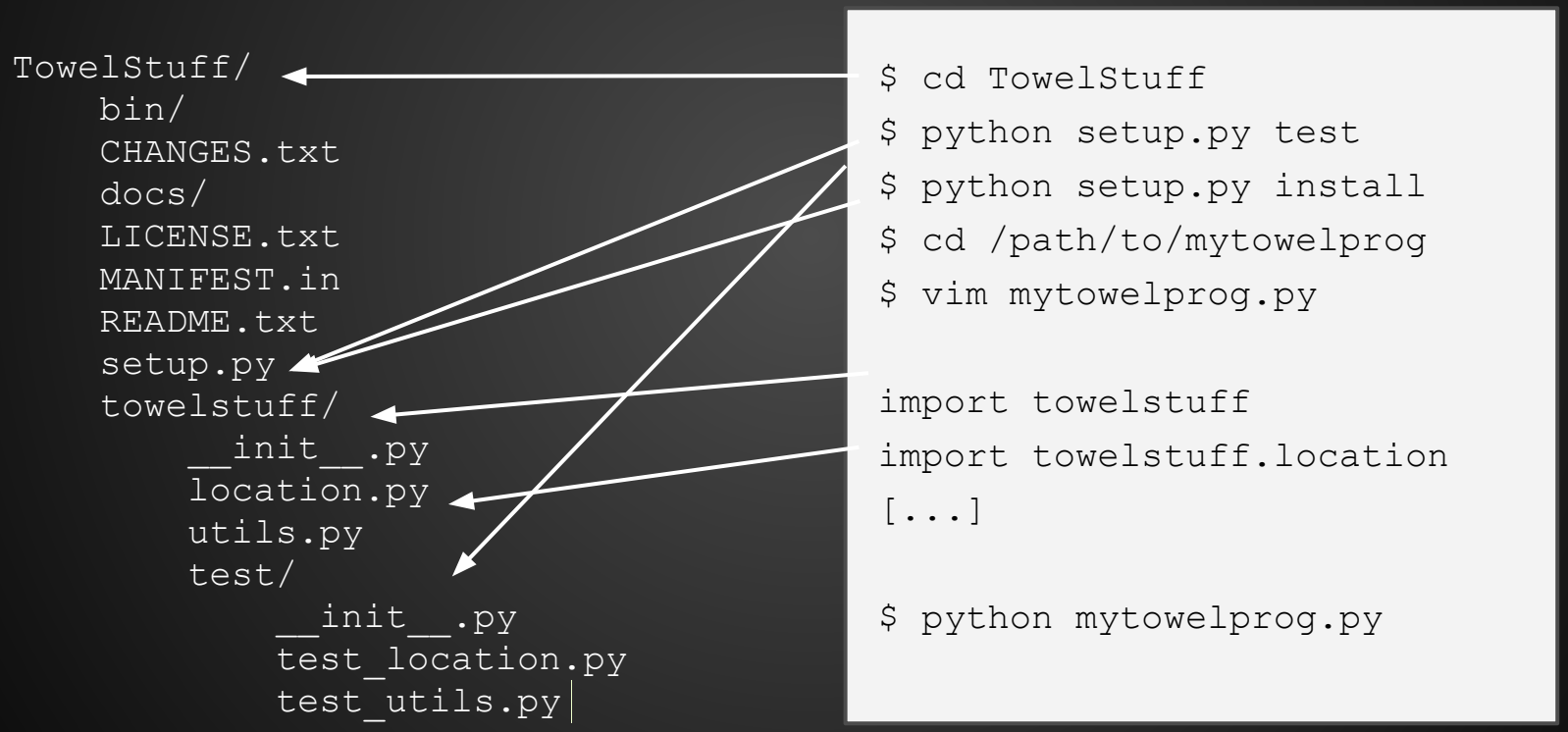
Github alternatives

- https://bitbucket.org/
  - Unlimited free private repos
  - A step behind Github
- http://gitlabhq.com/
  - Self-hosted Github-like
  - Only basics


The Hitchhiker's Guide to Packaging
http://guide.python-distribute.org

Python packaging

Directory structure



Python packaging

setup.py

```
from distutils.core import setup

setup(
    name='TowelStuff',
    version='0.1.0',
    author='J. Random Hacker',
    author_email='jrh@example.com',
    packages=['towelstuff', 'towelstuff.test'],
    scripts=['bin/stowe-towels.py','bin/wash-towels.py'],
    url='http://pypi.python.org/pypi/TowelStuff/',
    license='LICENSE.txt',
    description='Useful towel-related stuff.',
    long_description=open('README.txt').read(),
    install_requires=[
        "Django >= 1.1.1",
        "caldav == 0.1.4",
    ],
)
```

Python packaging

Publishing

- Create repository on Github (or other)
- Then it's just a matter of...

```
$ cd TowelStuff
$ git init
$ git add .  ## Bad practice!
$ git commit -m "Imported TowelStuff package into Git."
$ git remote add origin https://github.com/<username>/TowelStuff.git
$ git push -u origin master
```

Breakout session

```
$ git clone git://github.com/brinkar/bloomdemo.git
$ cd bloomdemo
$ less INSTRUCTIONS
```