

Introduction to source control with git

Sam Procter

Department of Computing and Information Sciences
Kansas State University

Tuesday, September 16, 2014

- 1 I'm not a git expert
 - But I use git *every* day at my job
- 2 You can learn how to use git on your own
 - I'll show you a basic introduction and give you an *understanding* of git
- 3 Follow along at:
<http://people.cis.ksu.edu/~samprocter/git-intro.pdf>

- 1 Source Control Management
 - A history of Source Control Tools
- 2 git
 - Git Concepts
 - Getting and Making Changes
 - Getting a Repository
 - Software Engineering with Github
- 3 Be Brave!
 - Learn by playing

How do you share projects now?

What happens if. . .

- You delete some code but realize later that you need it?
- You do some work on a lab machine, and then want to work on your pc at home?
- Your laptop dies?
- Two people change the same file?

Solution: Source Control!

A super-brief history of source control

Gen.	Networking	Operations	Concurrency	Examples
1	None	One file at a time	Locks	SCCS
2	Centralized	Multi-file	Merge before commit	CVS, SVN
3	Distributed	Changesets	Commit before merge	git, hg

Table: Source control through the years, adapted from [1]

- 1 SCCS: 1972, File locks, no sharing at all
- 2 CVS, SVN: 1986 (CVS), deltas, merging
- 3 git, Mercurial: 2005, "file system snapshots" distributed

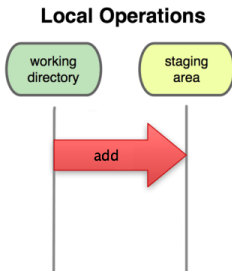
Where did git come from?

“Git began with a bit of creative destruction and fiery controversy”[2]

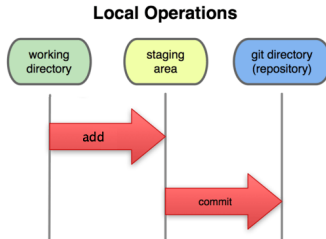


Git was created by Linus Torvalds (and other Linux developers) with aims of:

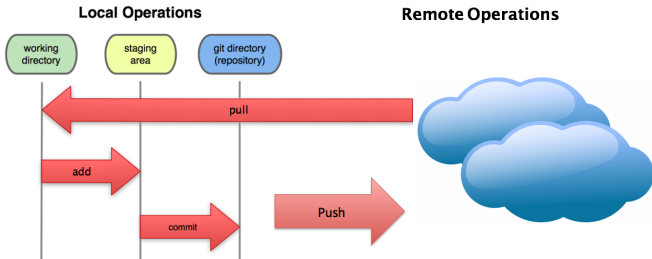
- Speed
- Simplicity
- Distributivity



- Working Directory: Your modified files
- Staging Area: Files to be shipped with the next commit
- Git Directory: The official record
- The cloud: github, cis.ksu.edu/~yourname, etc.



- Working Directory: Your modified files
- Staging Area: Files to be shipped with the next commit
- Git Directory: The official record
- The cloud: github, cis.ksu.edu/~yourname, etc.



- Working Directory: Your modified files
- Staging Area: Files to be shipped with the next commit
- Git Directory: The official record
- The cloud: github, cis.ksu.edu/~yourname, etc.

Sharing changes with git commit & push

Situation: You've created two files—a.txt, b.txt—and you want to share both of them.

Strategy: Use `git add` on a.txt and b.txt.

① `$ git add a.txt b.txt`

② `$ git commit -m 'Two new files!'`

③ `$ git push`

Situation: You've changed files, but they're already tracked by git.

Strategy: Use `git commit` with the `-a` flag to add everything automatically

- 1 `$ git commit -a -m 'Changed things'`
- 2 `$ git push`

Situation: You made changes at school, now you want to get those at home.

Strategy: Use `git pull` to get the latest version of your files

1 `$ git pull`

Situation: You've created some files, but never stored them in git.

Strategy: Use `git init` to create a repository, and `git push` to share it

1 `$ git init`

2 `$ git add .`

3 `$ git commit -m 'First commit'`

4 `$ git remote add origin <remote repo URL>`

5 `$ git push origin master`

(Adapted from [3])

Situation: Files you want are on github, and you've never downloaded them before.

Strategy: Use `git clone` to get the files for the first time

```
1 $ git clone <remote repo URL>
```



GitHub is a **free*** git host.

* Free means:

- Infinite (∞ !) publically-accessible repositories
- Five free private repositories for students

Using github

The screenshot shows a web browser displaying the GitHub repository page for 'sprocter/talks'. The browser's address bar shows the URL 'https://github.com/sprocter/talks'. The repository name 'sprocter / talks' is prominently displayed at the top, along with statistics: 1 Unwatch, 1 Star, and 0 Forks. Below this, the repository description reads 'Home to slides that accompany talks'. A summary bar indicates 5 commits, 1 branch, 0 releases, and 1 contributor. The current branch is 'master', and the file 'talks / +' is selected. A commit history table shows a recent commit by 'sprocter' 21 hours ago with the message 'Finished github section, tweaked things'. Below the commit history, the 'README.md' file is previewed, showing the title 'talks' and the same repository description. On the right side, there are navigation links for Code, Issues, Pull Requests, Wiki, Pulse, Graphs, and Settings. At the bottom right, there are options to clone the repository via SSH, HTTPS, or Subversion, and buttons for 'Clone in Desktop' and 'Download ZIP'.

sprocter / talks

Unwatch 1 Star 0 Fork 0

Home to slides that accompany talks — Edit

5 commits 1 branch 0 releases 1 contributor

branch: master talks / +

Finished github section, tweaked things

sprocter authored 21 hours ago latest commit 4b6ee2d7b6

scm-intro-git	Finished github section, tweaked things	21 hours ago
.gitignore	Initial commit	4 days ago
LICENSE	Initial commit	4 days ago
README.md	Initial commit	4 days ago

README.md

talks

Home to slides that accompany talks

Code

Issues 0

Pull Requests 0

Wiki

Pulse

Graphs

Settings

SSH clone URL

git@github.com:sprocter/talks

You can clone with HTTPS, SSH or Subversion

Clone in Desktop

Download ZIP

Viewing the list of commits

The screenshot shows a web browser displaying the GitHub repository page for 'sprocter/talks'. The browser's address bar shows the URL 'https://github.com/sprocter/talks/commits/master'. The repository name 'sprocter / talks' is visible at the top, along with 'Unwatch', 'Star', and 'Fork' buttons. The current branch is 'master'. The commit history is listed as follows:

- Commits on Sep 14, 2014**
 - Finished github section, tweaked things**
sprocter authored 21 hours ago
Commit hash: 48eae2d
- Commits on Sep 13, 2014**
 - Wrote more of the git how-to, began the github section**
sprocter authored 2 days ago
Commit hash: 89eb0e4
- Commits on Sep 11, 2014**
 - Worked on the slides some.**
sprocter authored 4 days ago
Commit hash: f55c35e
 - Initial commit**
sprocter authored 4 days ago
Commit hash: 4a37e50
 - Initial commit**
sprocter authored 4 days ago
Commit hash: 15abe60

Viewing the details of a commit

The screenshot shows a web browser displaying a GitHub commit page. The browser's address bar shows the URL: `https://github.com/sprocter/talks/commit/89eb0e4c03269be`. The repository name is `sprocter / talks`. The commit message is `Wrote more of the git how-to, began the github section`. The commit was authored 2 days ago and has 1 parent commit (`F55c35e`) and a commit hash of `89eb0e4c03269bebd8c5242dc0116842ee9739e7`. The page shows 10 changed files with 115 additions and 48 deletions. The selected file is `scm-intro-git/document.tex`. The diff shows changes to the `@@ -4,13 +4,19 @@` section, including the addition of a new theme (`whale`) and the removal of others (`warsaw`).

Wrote more of the git how-to, began the github section [Browse code](#)

master

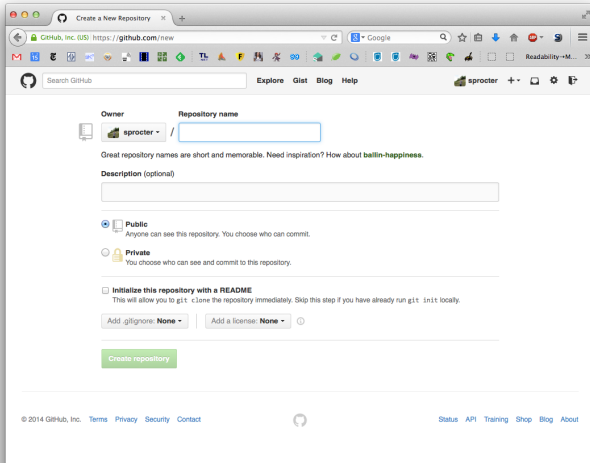
sprocter authored 2 days ago 1 parent F55c35e commit 89eb0e4c03269bebd8c5242dc0116842ee9739e7

Showing 10 changed files with 115 additions and 48 deletions. [Unified](#) [Split](#)

163 scm-intro-git/document.tex [View](#)

```
@@ -4,13 +4,19 @@
4 4   XX template based on a template by Till Tantau
5 5   XX this template is still evolving - it might differ in future releases!
6 6
7 7   -X \documentclass[handout]{beamer}
8 8   -\documentclass{beamer}
9 9   +\documentclass[handout]{beamer}
10 10  +\documentclass{beamer}
11 11
12 12  \modepresentation>
13 13  {
14 14  -\usetheme{warsaw}
15 15  -
16 16  +X \usetheme{Rochester}
17 17  +X \usecolortheme{seahorse}
18 18  +X \usetheme{Antibes}
19 19  +X \usecolortheme{dolphin}
20 20  +X \usetheme{Hannover}
21 21  +X \usecolortheme{whale}
```

Creating a new repository with github



The screenshot shows the GitHub 'Create a New Repository' page in a browser window. The browser's address bar shows 'https://github.com/new'. The page header includes a search bar, navigation links for 'Explore', 'Gist', 'Blog', and 'Help', and the user's profile 'sprocter'. The main form area is titled 'Create a New Repository' and contains the following elements:

- Owner:** A dropdown menu showing 'sprocter'.
- Repository name:** An empty text input field.
- Description (optional):** A text input field.
- Visibility:** Two radio button options: 'Public' (selected) and 'Private'. The 'Public' option is described as 'Anyone can see this repository. You choose who can commit.' The 'Private' option is described as 'You choose who can see and commit to this repository.'
- README:** A checkbox option 'Initialize this repository with a README'. Below it, a note states: 'This will allow you to `git clone` the repository immediately. Skip this step if you have already run `git init` locally.'
- Options:** Two dropdown menus: 'Add .gitignore: None' and 'Add a license: None'.
- Create repository:** A green button at the bottom of the form.

At the bottom of the page, there is a footer with copyright information '© 2014 GitHub, Inc.', links for 'Terms', 'Privacy', 'Security', and 'Contact', a GitHub logo, and links for 'Status', 'API', 'Training', 'Shop', 'Blog', and 'About'.



- git is *tremendously* googlable.
- Breaking things (especially after a commit / push) is very difficult
- Play with it!

No seriously, try it right now with either:

- <https://try.github.io>
- Your own github account



Eric Sink.

Version control by example.

Pyrenean Gold Press, 2011.



Scott Chacon.

Pro Git.

Apress, 2009.



Github, Inc.

<https://help.github.com>