Introduction to Git & GitHub

February 2018

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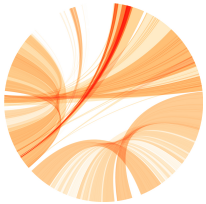


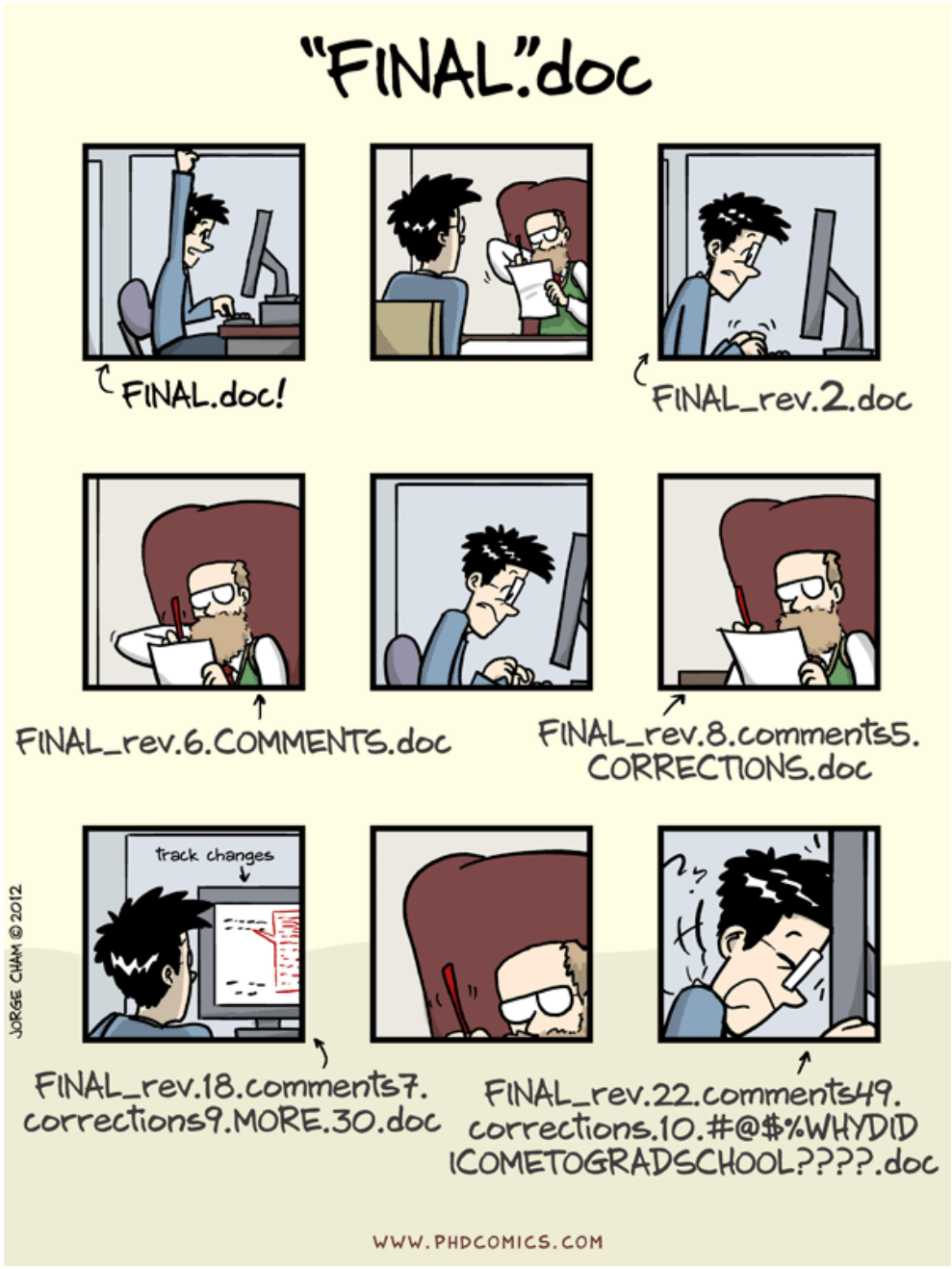
URPP Evolution in Action

Git is hard to learn (and teach)

- Git was not build for our exact usage (supports many workflows)
- Git commands are sometimes not intuitive
- The advantages are long-term
- Learning/using Git is sometimes frustrating

> "Git has a real knack for making me feel stupid!"
> Torsten Seemann

The problem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Problem cont.

- You want to improve a script that works. After 2 hours of rewriting the new script still doesn't work. Unfortunately you overwrote the original version that worked and can't go back.

- You biked into the office only to realize that the USB key with last night's work is still on the kitchen table.

- Which version of the script/data did I use 3 years ago when I did the analysis?

You use Git to take snapshots of all the files in a folder (including subfolders).

This folder is called a repository or repo.

When you want to take a snapshot of a project (1 file or many files), you create a commit

Boxplot.R

Boxplot-2.R

Boxplot-Elena-feedback.R

Boxplot-Final.R

Boxplot-Final2.R

By saving copies

`Boxplot.R`

By making commits

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When you commit a file or files,

some information is along with the changes to the file

1. Who
2. When
3. commit message

You can add more information about the changes you've made in a commit message

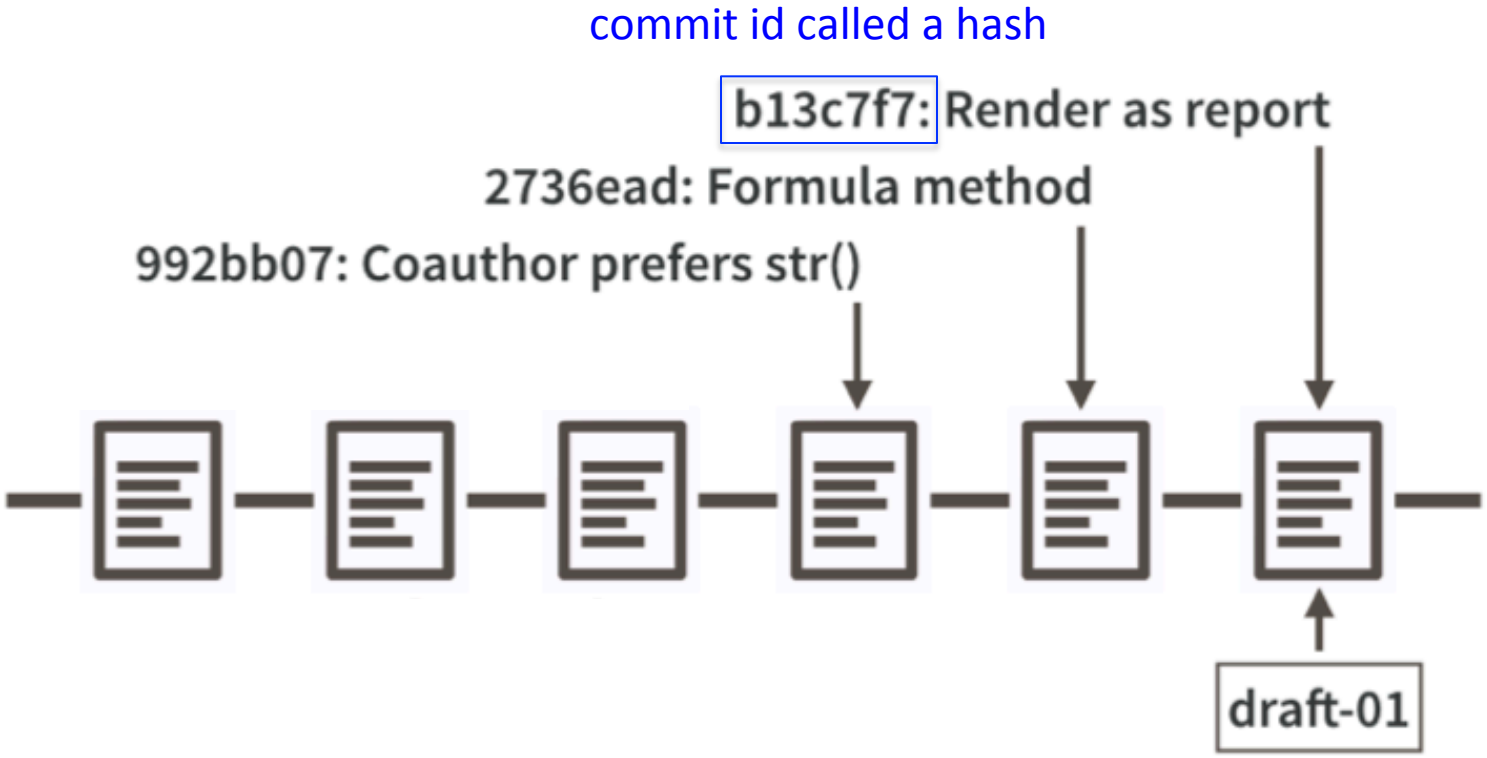
Stefan Wyder
2:25pm January 30th 2018

New colorblind-safe colors

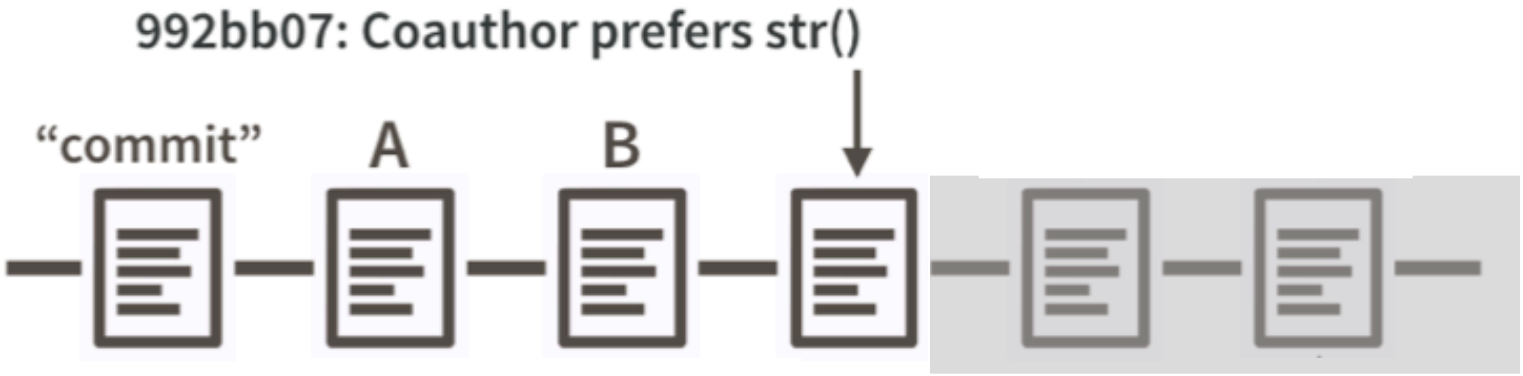
More detailed explanatory text, if necessary. Explain the problem that this commit is solving

explains what and why ~~how~~ (the diff explains)

Git stores the whole history of your project



I can tell Git what commit I want to check out using the commit hash



My other commits still exist, but when I look in my repo, it's as they never happened

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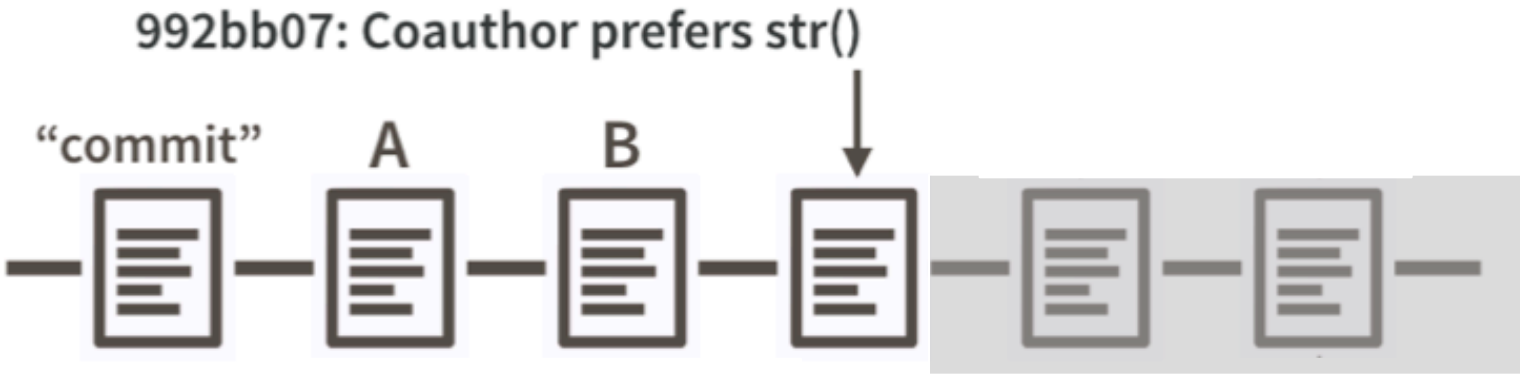
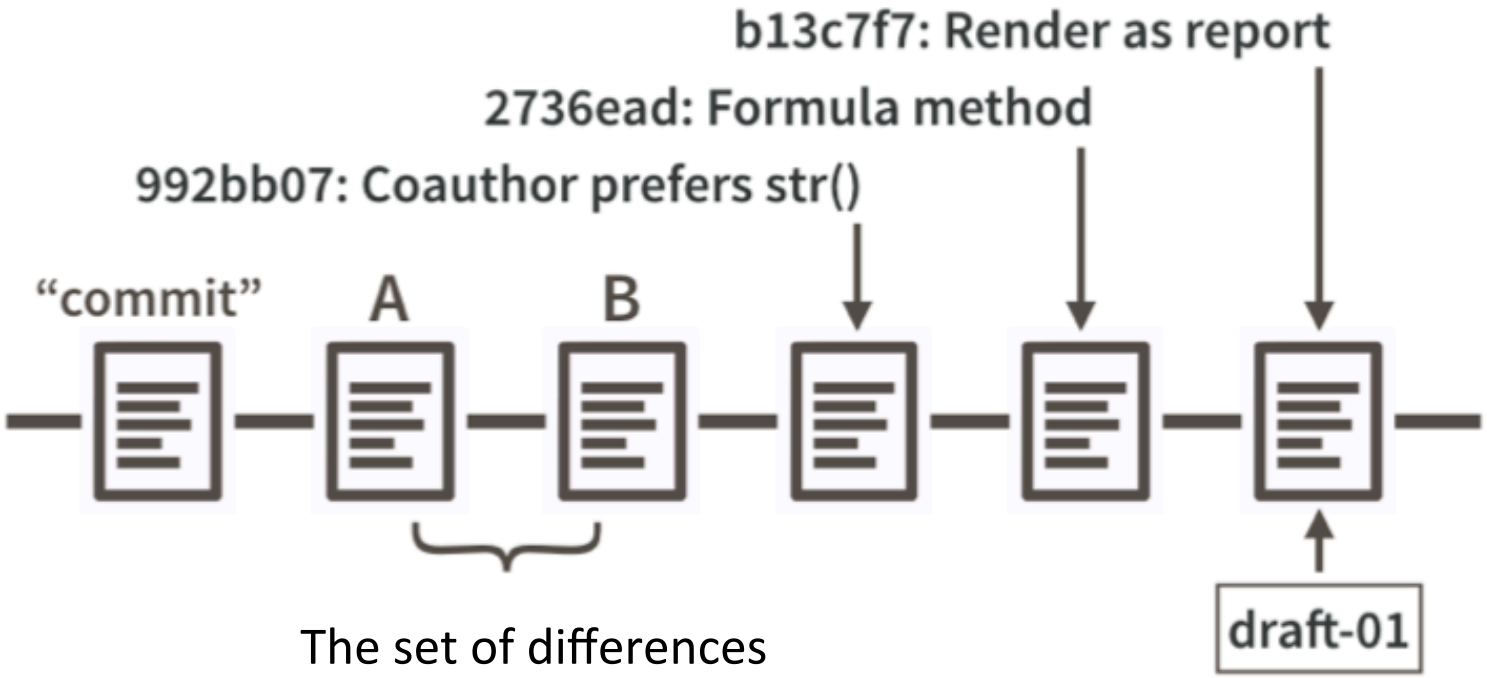


My other commits still exist, but when I look in my repo, it's as they never happened

The power of Git comes from the diff



The set of differences between A and B is called a "diff"

The diff

Showing 1 changed file with 7 additions and 7 deletions.

Unified | Split

14 Day2/3_1-functions-and-modules.ipynb — View

```
@@ -115,19 +115,19 @@
```

```
    "cell_type": "markdown",
    "metadata": {},
    "source": [
-    "### Using Modules\n",
+    "### Libraries and Modules\n",
     "\n",
-    "One of the great things about Python is the free availability of a _huge_ number of modules that can be imported into your code and used. Modules are developed with the aim of solving some particular problem or providing particular, often domain-specific, capabilities.\n",
+    "One of the great things about Python is the free availability of a _huge_ number of libraries (also called package) that can be imported into your code and (re)used. \n",
     "\n",
-    "Like functions, which are usable parts of a program, packages (also known as libraries) are reusable programs with several modules.\n",
+    "Modules contain functions for use by other programs and are developed with the aim of solving some particular problem or providing particular, often domain-specific, capabilities. A library is a collection of modules, but the terms are often used interchangeably, especially since many libraries only consist of a single module (so don't worry if you mix them). \n",
     "\n",
-    "In order to import a module, it must first be installed and available on your system. We will cover this briefly later in the course.  \n",
+    "In order to import a library, it must available on your system or should be installed.  \n",
```

Version control works for any file format (code, pdfs, docs, xls, jpg, etc.)

... but works best for plain text-based files (txt, Markdown, Python, R, Matlab, any other code)

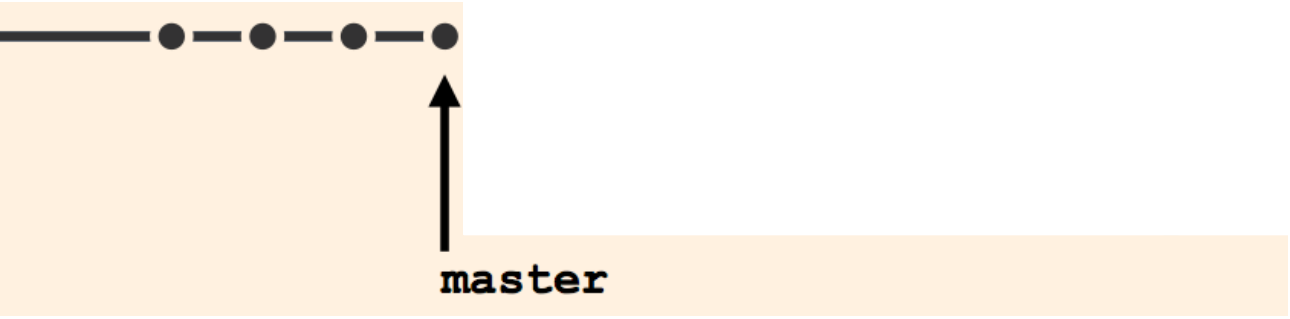
Git helps you experiment

So far, everything has been very linear and ordered.

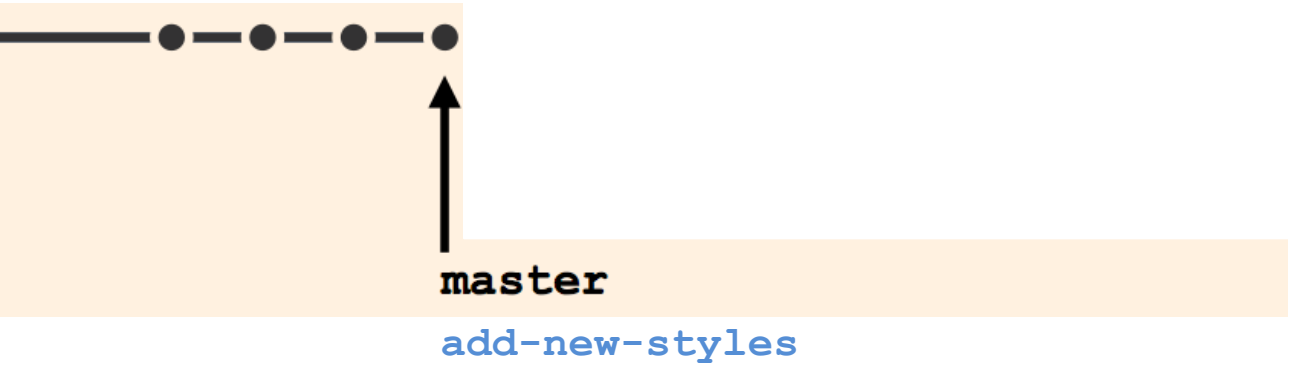
But sometimes you want to make easily discardable experiments

The way you do this in Git is with branches

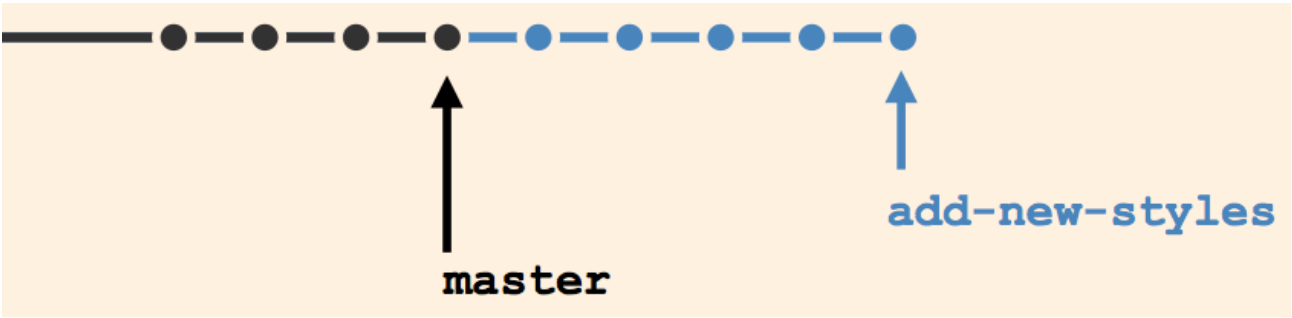
The default branch name in Git is master



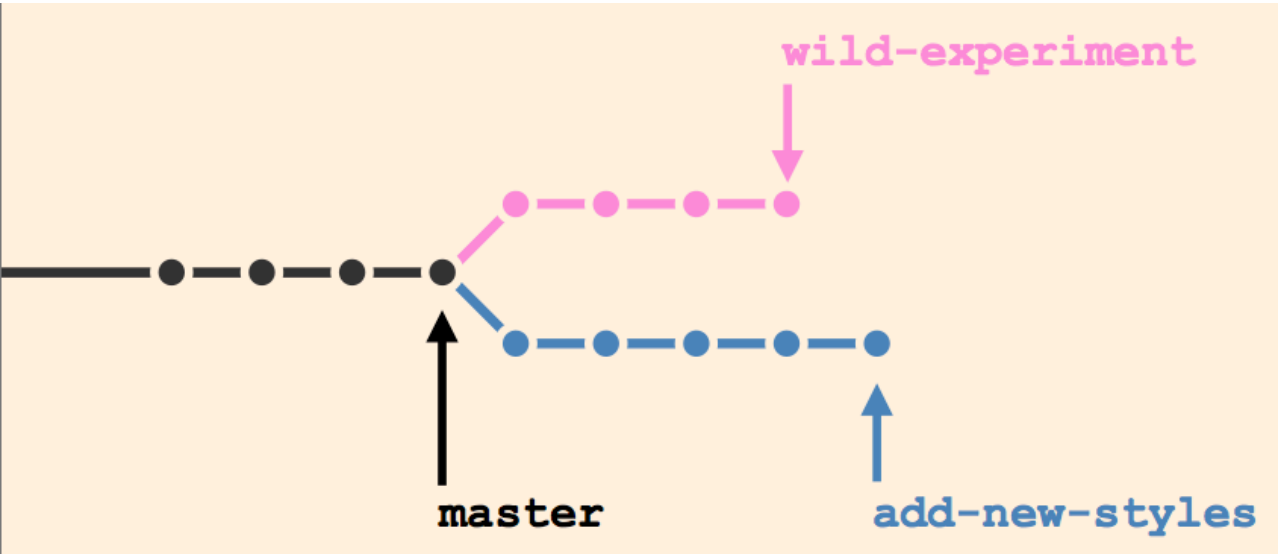
You can add your own branches too



and do lots of work on them

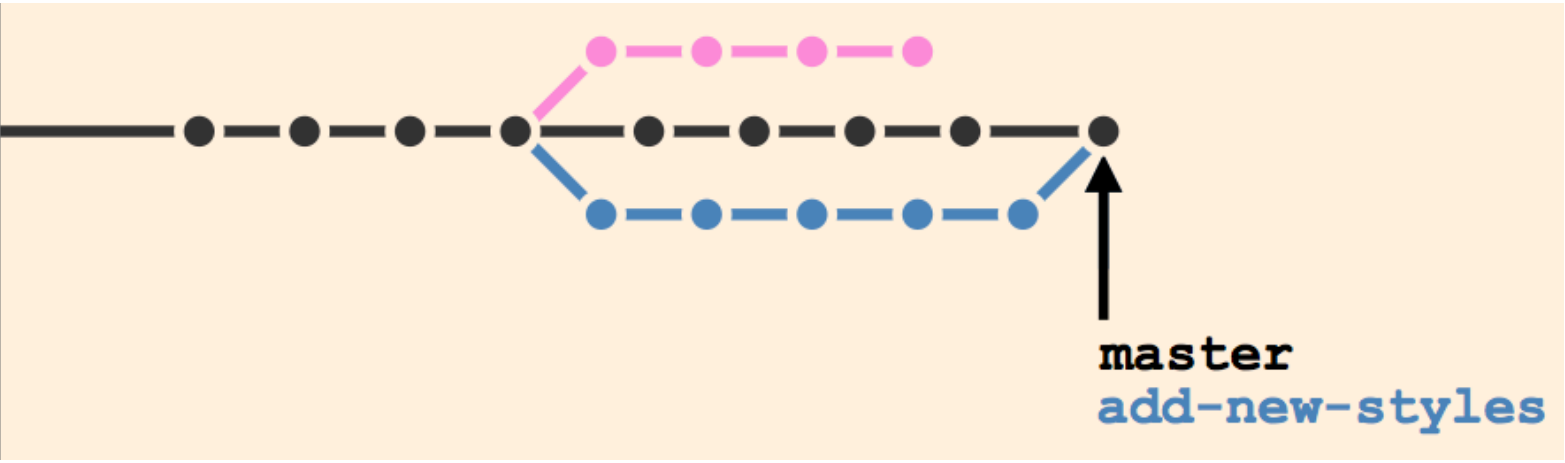


Branches are useful for trying out stuff



The master branch is often considered special (latest stable version) and other branches contain work in progress

Once you're happy with some work, you need a way to get it back to master



To get changes from one branch into another, you merge them

1. Git lets you tell the story of your project (commit: take snapshots of files)

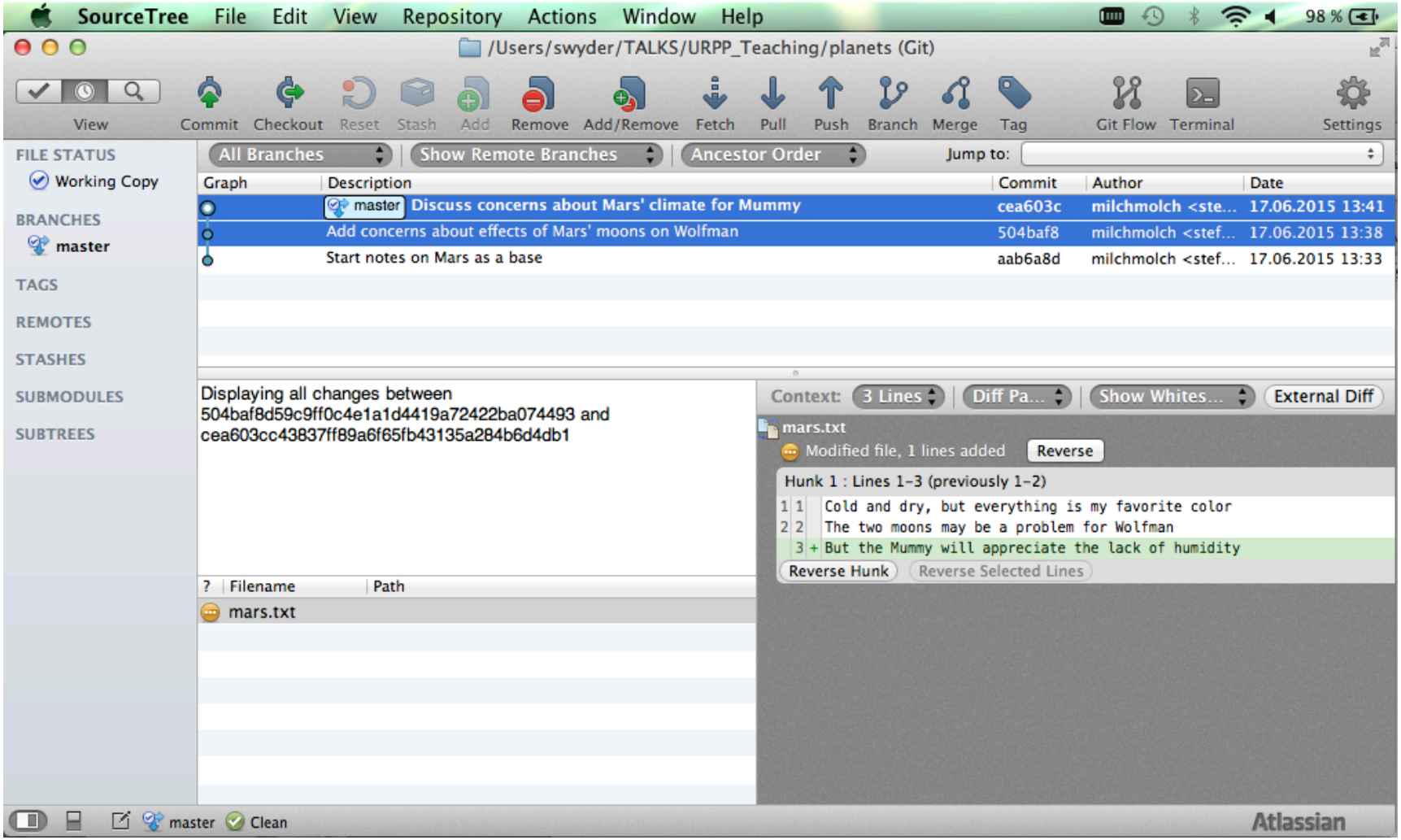
2. Git lets you time travel (check out)

3. Git helps you experiment (branch)

4. Git helps you backup your project

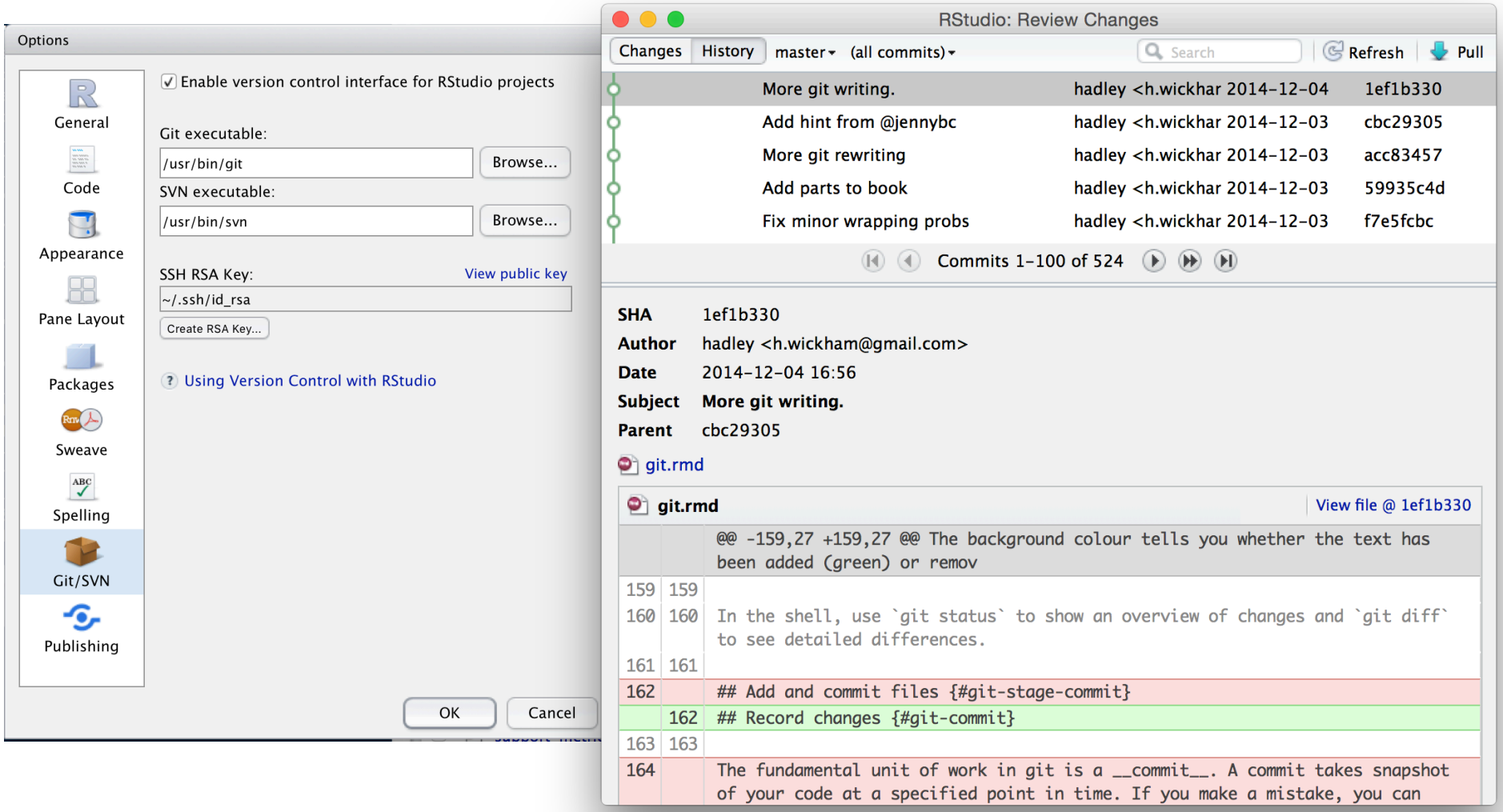
5. Git helps you collaborate across multiple computers/people (clone push pull merge)

Try out graphical front-end



e.g. SourceTree or GitKraken

Basic git commands in Rstudio



https://support.rstudio.com/hc/en-us/articles/200532077-Version-Control-with-Git-and-SVN
http://r-pkgs.had.co.nz/git.html

Git terms

repository	your project folder
commit	a snapshot of your repo
hash	an id for a commit
checkout	time travel to a specific commit
branch	a movable label that points to a commit
merge	combining two branches
remote	a computer with the repository on it
clone	get the repository from the remote for the first time
push	send commits to a remote
pull	get commits from a remote

Sources

- http://cdn.rawgit.com/luispedro/talk-git-intro/master/slides.html
- https://speakerdeck.com/alicebartlett/git-for-humans
- https://doi.org/10.7287/peerj.preprints.3159v2

Advantages of Git/GitHub vs Google docs