



# Online “Remote” Repositories

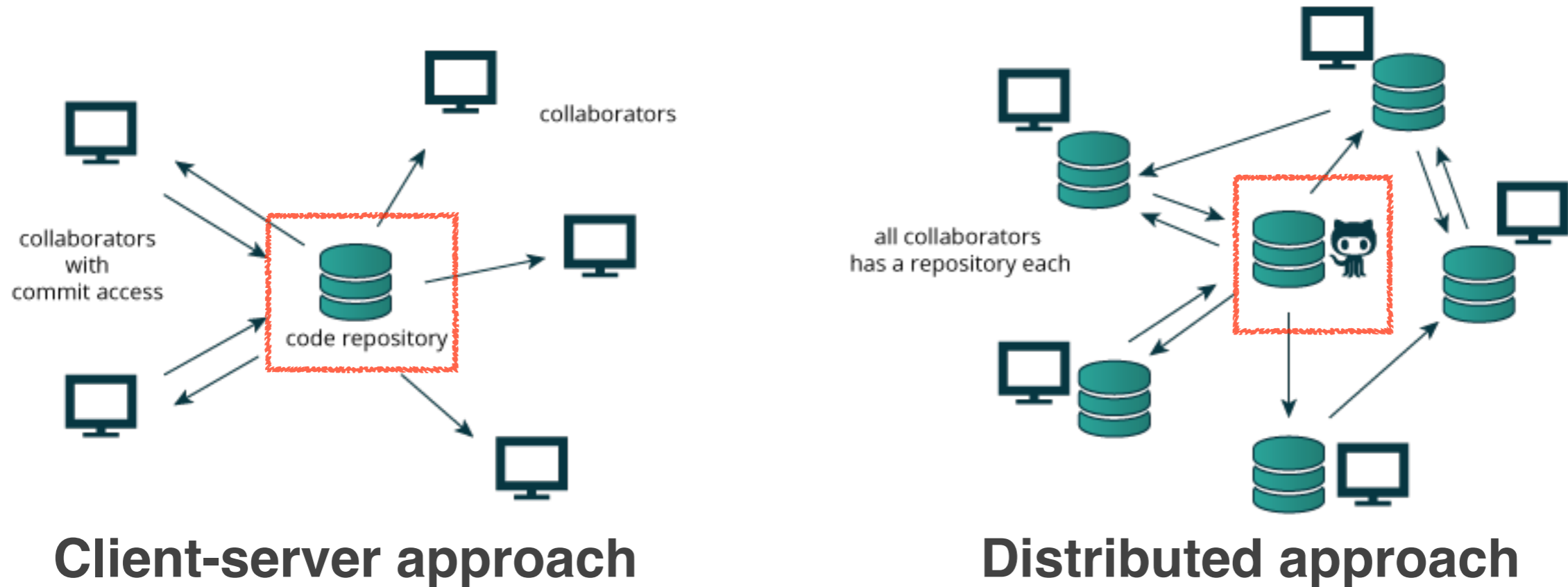
**GitHub** and **Bitbucket** centralized Git repositories for dissemination and collaboration

**Barry Grant**

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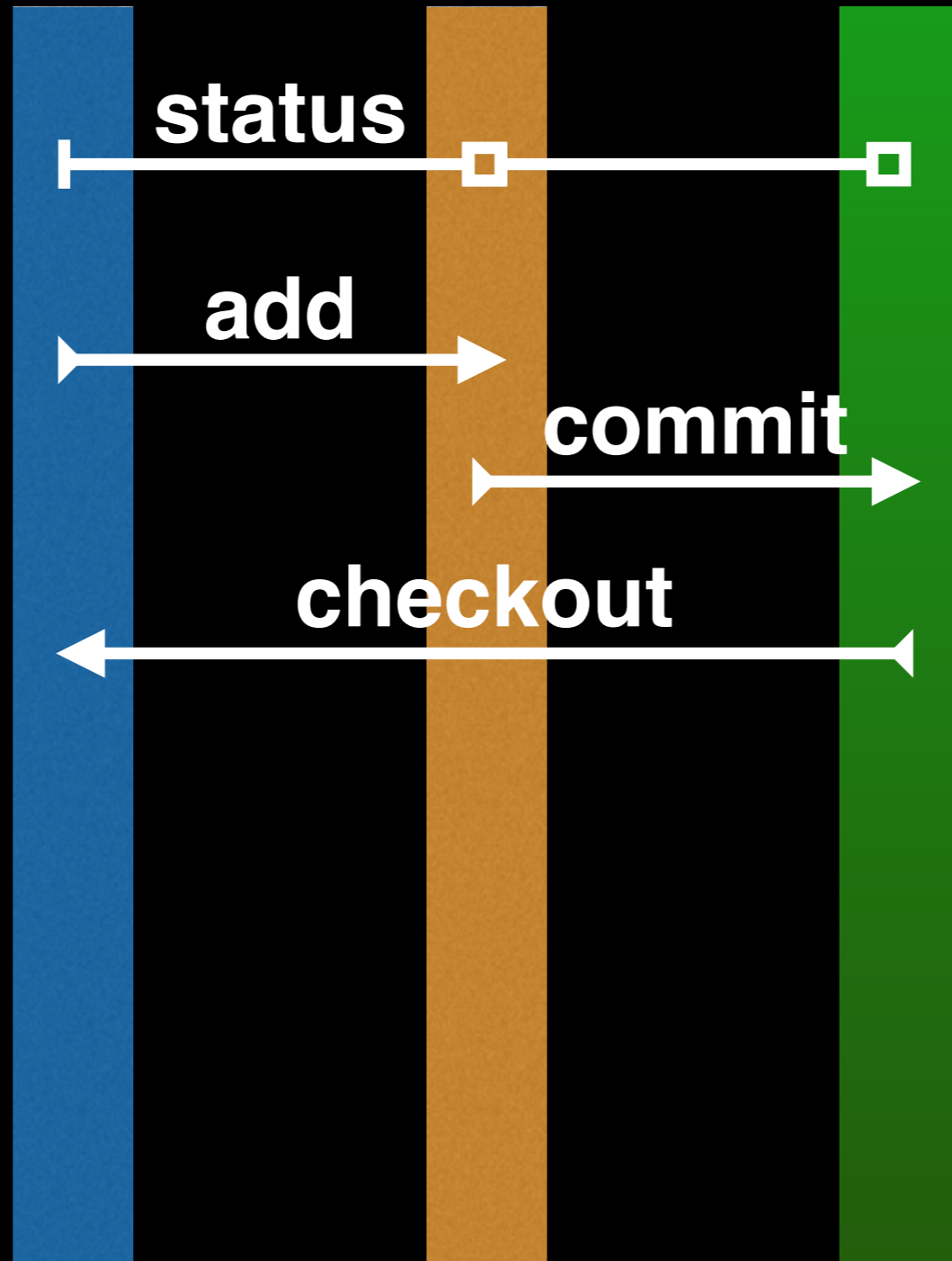
<http://thegrantlab.org>

# Recap: Client-Server vs Distributed VCS



For distributed version control systems like Git a “remote repository” (e.g. an online Git repo at GitHub or Bitbucket) promotes further dissemination and collaboration.

Your Directory      'Staging Area'      Local Repository

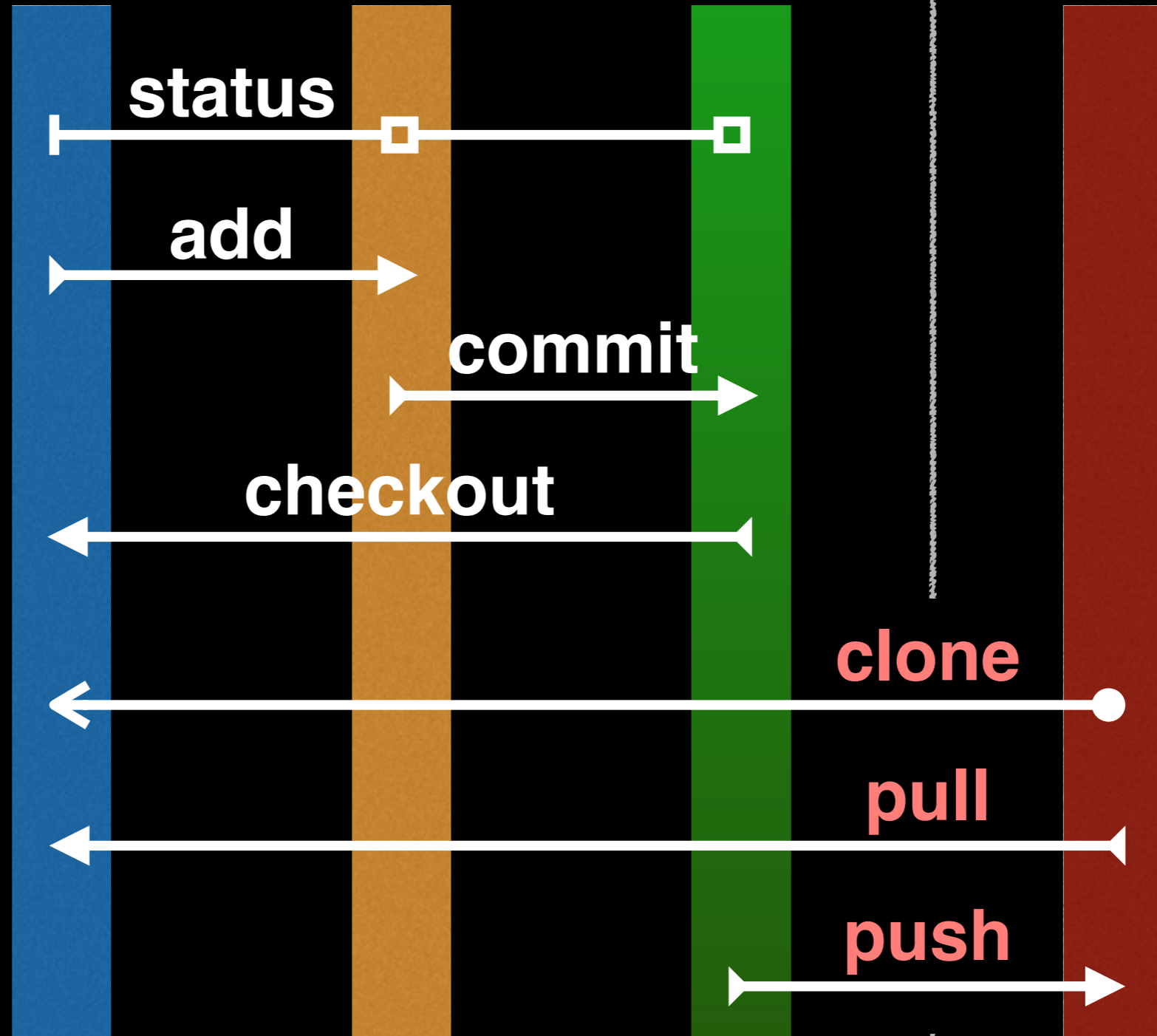


Your  
Directory

'Staging  
Area'

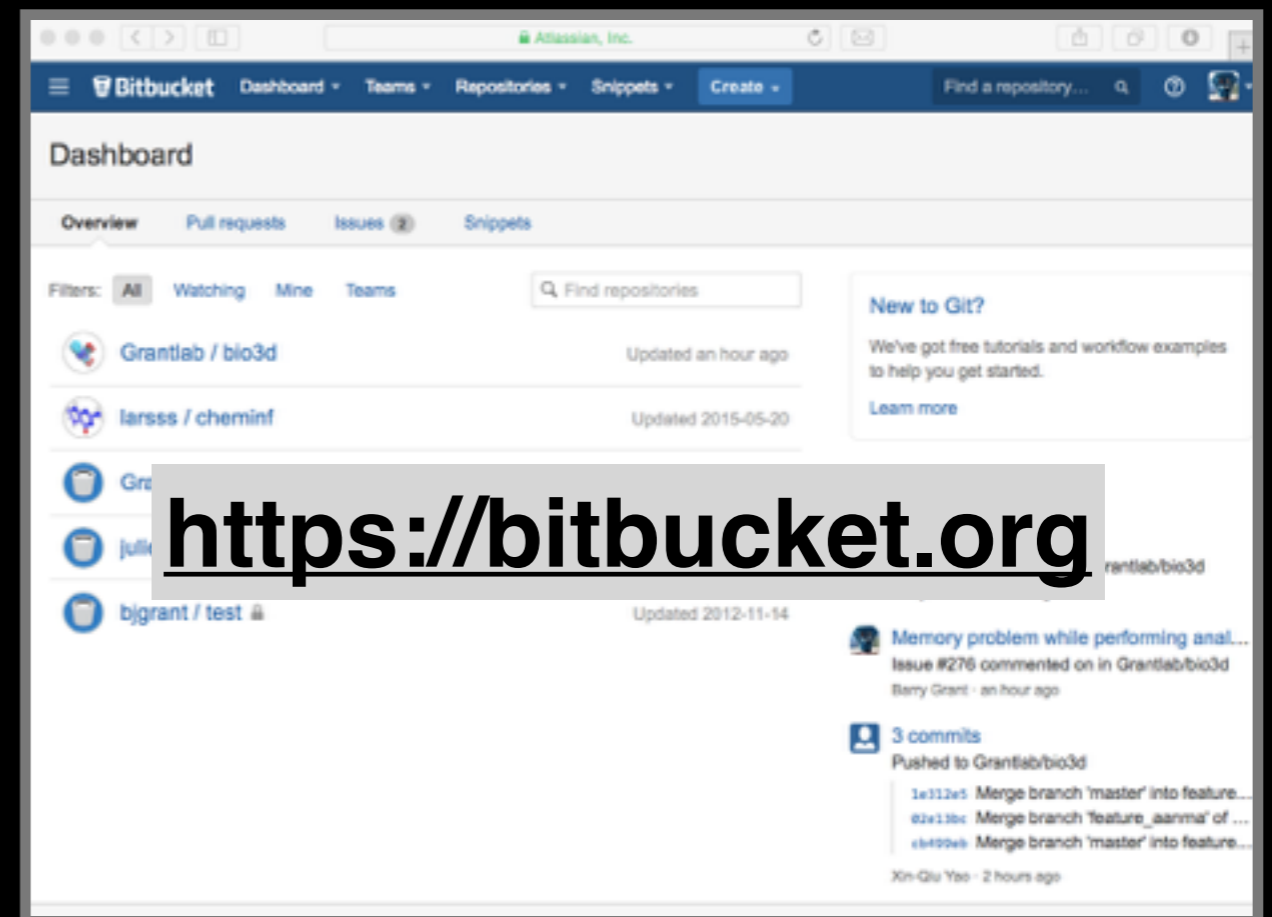
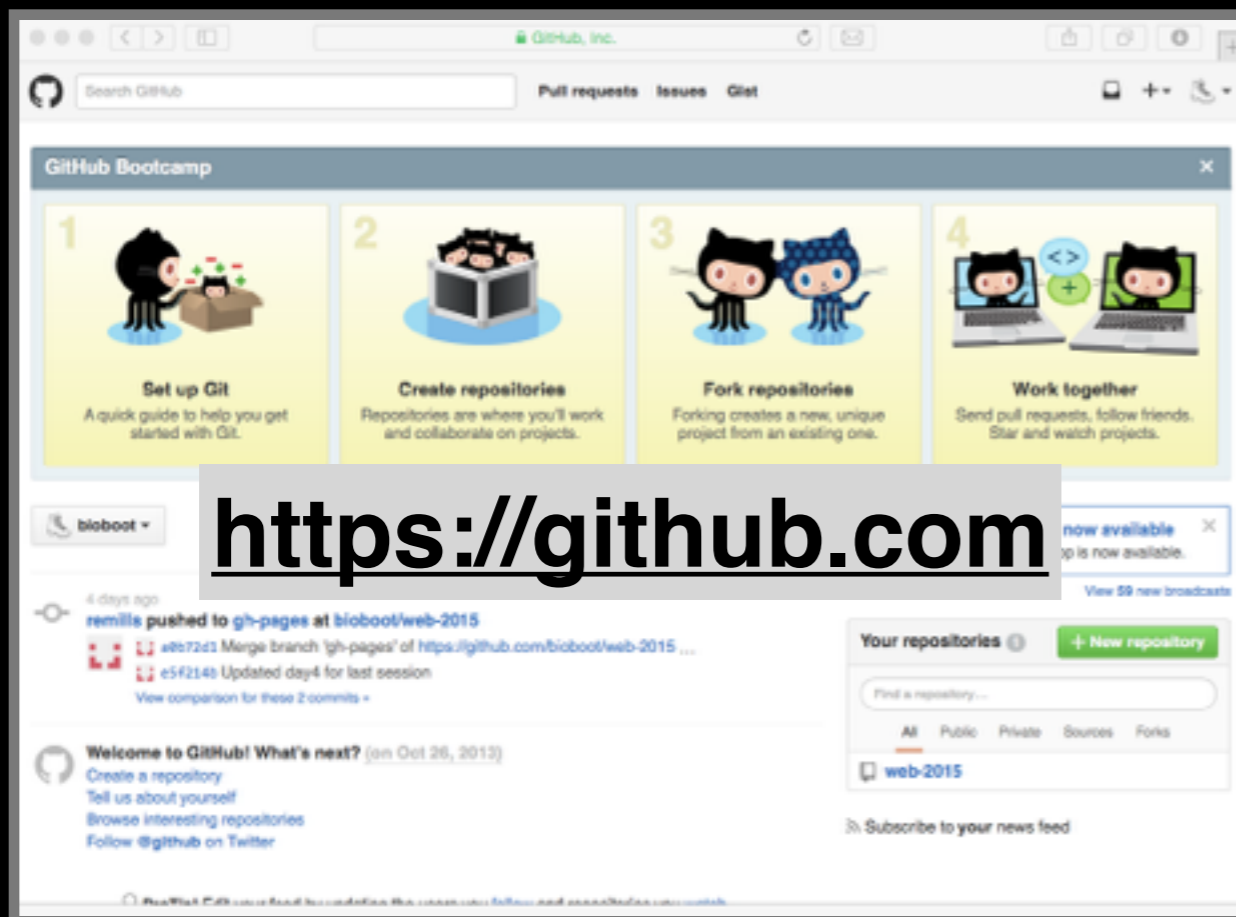
Local  
Repository

Remote  
Repository



# GitHub & Bitbucket

**GitHub** and **Bitbucket** are two popular hosting services for Git repositories. These services allow you to share your projects and collaborate with others using both **'public'** and **'private'** repositories\*.



Nikkei 17893.73 0.49% Hang Seng 21404.96 0.72% U.S. 10 Yr -0/32 Yield 2.074% Crude Oil 39.17 -0.36% Yen 119.16 0.26% EXPAND

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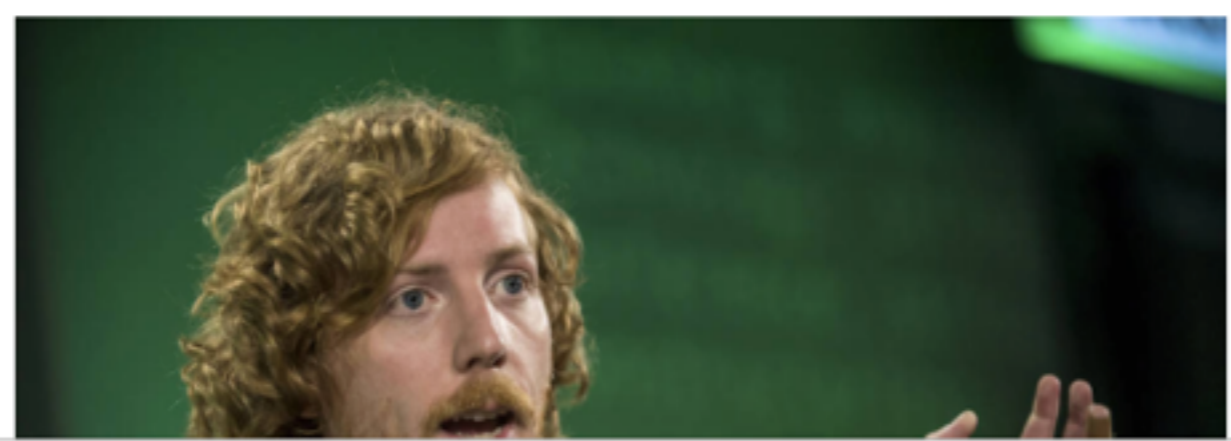
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TECH

## GitHub Raises \$250 Million at \$2 Billion Valuation

Capital raise puts company's total funding at \$350 million



### Analytics

How does your organization's talent measure up to its technology?

[Read the MIT Sloan report](#)

# What is the big deal?

- At the simplest level GitHub and Bitbucket offer **backup** of your projects history and a centralized mechanism for **sharing** with others by putting **your Git repo online**.
  - GitHub in particular is often referred to as the “nerds FaceBook and LinkedIn combined”.
- At their core both services **offer a new paradigm for open collaborative project development**, particularly for software.
  - In essence they allow anybody to contribute to any public project and get acknowledgment.  
[We will demo this later!]

# Public contributing by **'fork & pull'**

For any public project on GitHub or BitBucket you can make any change you like - that is **you don't first need permissions to contribute** your improvements/bug-fixes/ideas *etc.*

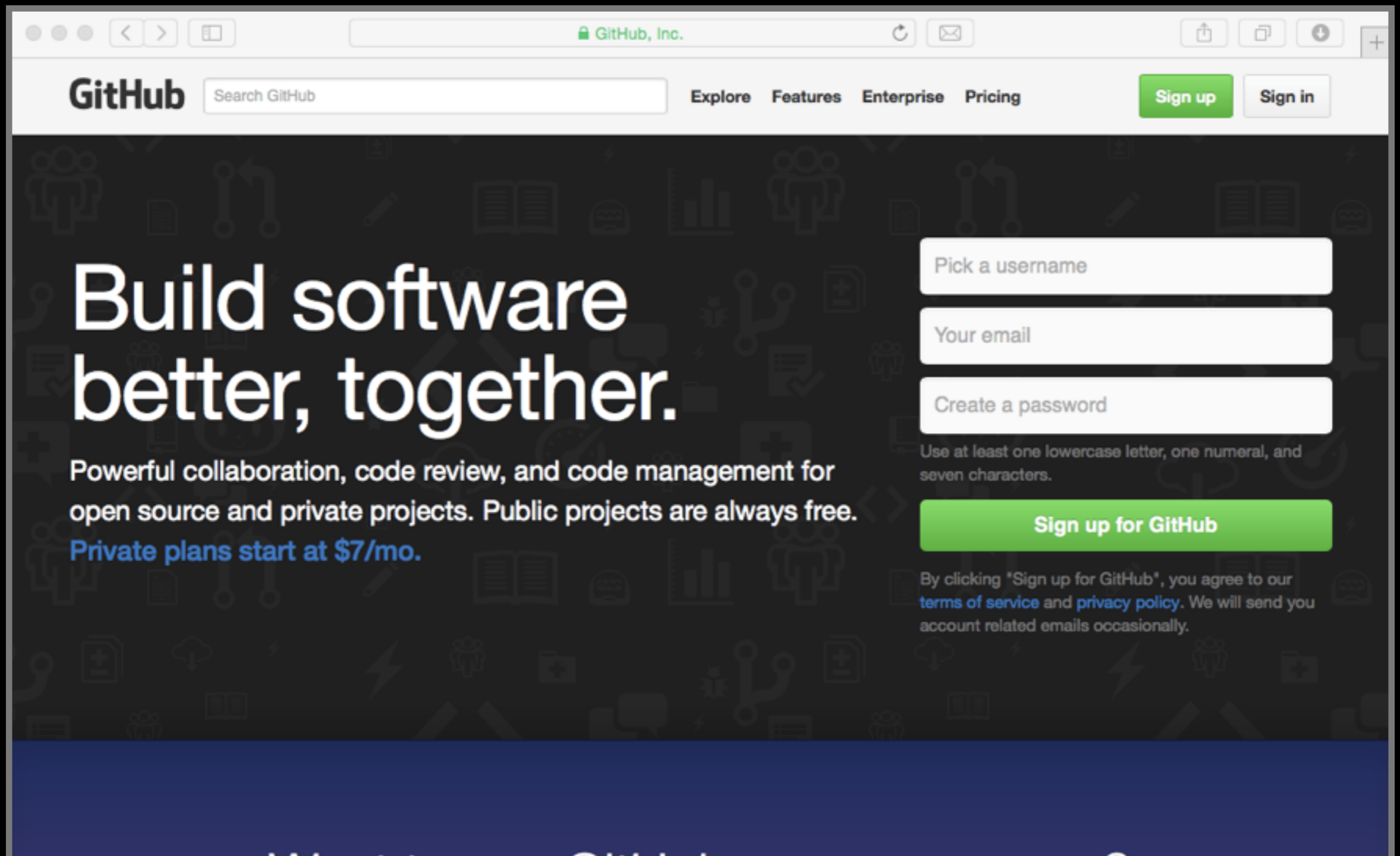
- There are two mechanisms for doing this:
  1. For trusted "collaborators" (via a **shared repository** and regular **commit & push** steps)
  2. Joe public (via a different **'fork & pull request'** approach)

You don't have to beg for permission (just submit a **pull request**) on GitHub or BitBucket and your changes with attribution will be in the project and its history once approved!



# First sign up for a GitHub account

<https://github.com>

A screenshot of the GitHub website's sign-up page. The browser's address bar shows "GitHub, Inc." and the URL "https://github.com". The page features a dark background with a pattern of small icons. On the left, the text "Build software better, together." is prominently displayed. Below it, a paragraph describes GitHub as a platform for collaboration, code review, and code management, noting that public projects are free and private plans start at \$7/month. On the right side, there is a sign-up form with three input fields: "Pick a username", "Your email", and "Create a password". Below the password field, there is a note about password requirements: "Use at least one lowercase letter, one numeral, and seven characters." A green "Sign up for GitHub" button is positioned below the form. At the bottom of the form, there is a disclaimer: "By clicking 'Sign up for GitHub', you agree to our terms of service and privacy policy. We will send you account related emails occasionally." The top navigation bar includes the GitHub logo, a search bar, and links for "Explore", "Features", "Enterprise", and "Pricing". "Sign up" and "Sign in" buttons are also present in the top right corner.

# Pick the **FREE** plan!

Search GitHub Pull requests Issues Gist

## Welcome to GitHub

You've taken your first step into a larger world, @biobootStudent.

Completed Set up a personal account Step 2: Choose your plan Step 3: Go to your dashboard

### Choose your personal plan

Plan	Cost	Private repositories	
Large	\$50/month	50	Choose
Medium	\$22/month	20	Choose
Small	\$12/month	10	Choose
Micro	\$7/month	5	Choose
Free	\$0/month	0	Chosen

Each plan includes:

- Unlimited collaborators
- Unlimited public repositories
- Free setup
- HTTPS Protection
- Email support
- Wikis, Issues, Pages, & more

Charges to your account will be made in **US Dollars**. Converted prices are provided as a convenience and are only an estimate based on current exchange rates. Local prices will change as the exchange rate fluctuates.  
Don't worry, you can cancel or upgrade at any time.

# Your GitHub homepage

Check your email for verification request

The screenshot shows a web browser window displaying the GitHub homepage for a user named 'biobootStudent'. The browser's address bar shows 'GitHub, Inc.'. The page header includes a search bar, navigation links for 'Pull requests', 'Issues', and 'Gist', and a user menu. The main content area features a profile card on the left with a placeholder profile picture, the username 'biobootStudent', and statistics for 'Followers', 'Starred', and 'Following', all showing zero. To the right of the profile card is a 'Pro tip' banner and a navigation bar with tabs for 'Contributions', 'Repositories', and 'Public activity'. The 'Contributions' section displays a grid for the months of September through August, with a legend indicating the number of contributions per day. Below the grid is a text box explaining the contribution graph and a button to 'Read the Hello World guide'.

GitHub, Inc.

Search GitHub

Pull requests Issues Gist

Pro tip: updating your profile with your name, location, and a profile picture helps other GitHub users get to know you. [Edit profile](#)

+ Contributions Repositories Public activity

Contributions

Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug

M

W

F

Summary of pull requests, issues opened, and commits. [Learn how we count contributions.](#) Less      More

This is your **contribution graph**. When you make a commit to a repository, you'll get a  for that day. Make more contributions and you'll get a darker green square. Over time, your chart might start looking [something like this](#).

We have a quick guide that will show you how to create your first repository. You'll also make a commit and **earn your first green square!**

[Read the Hello World guide](#)

# Skip the hello-world tutorial

<https://guides.github.com/activities/hello-world/>

The screenshot shows the GitHub homepage for a user named 'biobootStudent'. At the top, there is a navigation bar with the GitHub logo, a search bar, and links for 'Pull requests', 'Issues', and 'Gist'. A red circle highlights the '+ New repository' button in the top right corner. Below the navigation bar, a blue notification box states 'Your email was verified.' with a close button. A large dashed box contains a promotional message: 'Learn Git and GitHub without any code!' followed by 'Using the Hello World guide, you'll create a repository, start a branch, write comments, and open a pull request.' and a green 'Let's get started!' button. Below this, the user's profile 'biobootStudent' is shown with a dropdown arrow. A 'Welcome to GitHub! What's next?' section (3 hours ago) lists links for 'Create a repository', 'Tell us about yourself', 'Browse interesting repositories', and 'Follow @github on Twitter'. A 'ProTip!' section suggests updating followed users and watched repositories. On the right, a 'Your repositories' section shows '0' repositories and a '+ New repository' button, with a message: 'You don't have any repositories yet! Create your first repository or learn more about Git and GitHub.' Below that, another 'ProTip!' section mentions 'Feline cephalopod adhesives' for decorating devices. At the bottom right, there is a 'Subscribe to your news feed' link.

# Name your repo

## demo1\_github

GitHub, Inc.

Home Gmail GCal WolverineAccess 2delicious 2CiteULike 2Papers UMProxy + v Gscholar > Plex It! ToRead SCALI Bioinf525\_Video Bio3D PCA App Index of /

Search GitHub Pull requests Issues Gist

Owner: **bloobootStudent** / **demo1\_github** ✓

Great repository names are short and memorable. Need inspiration? How about **cuddly-octo-broccoli**.

Description (optional): My first github repo

**Public**  
Anyone can see this repository. You choose who can commit.

**Private**  
You choose who can see and commit to this repository.

**Initialize this repository with a README**  
This will let you immediately clone the repository to your computer. Skip this step if you're importing an existing repository.

Add .gitignore: **None** | Add a license: **None** ⓘ

**Create repository**

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# Lets push an existing repository

Change back in your **Terminal/MobilXterm** App

- > `cd ~/Desktop/git_class` *# Your local repo*
- > **git remote** add origin `https://github.com/YourGitHubUserName/demo1_github.git`
- > **git push** -u origin master

(Tip: you can get the long URL in step2 here from your GitHub page)

# Lets push an existing repository

Change back in your **Terminal/MobilXterm** App

- > `cd ~/Desktop/git_class` *# Your local repo*
- > **git remote** add origin `https://github.com/YourGitHubUserName/demo1_github.git`
- > **git push** -u origin master

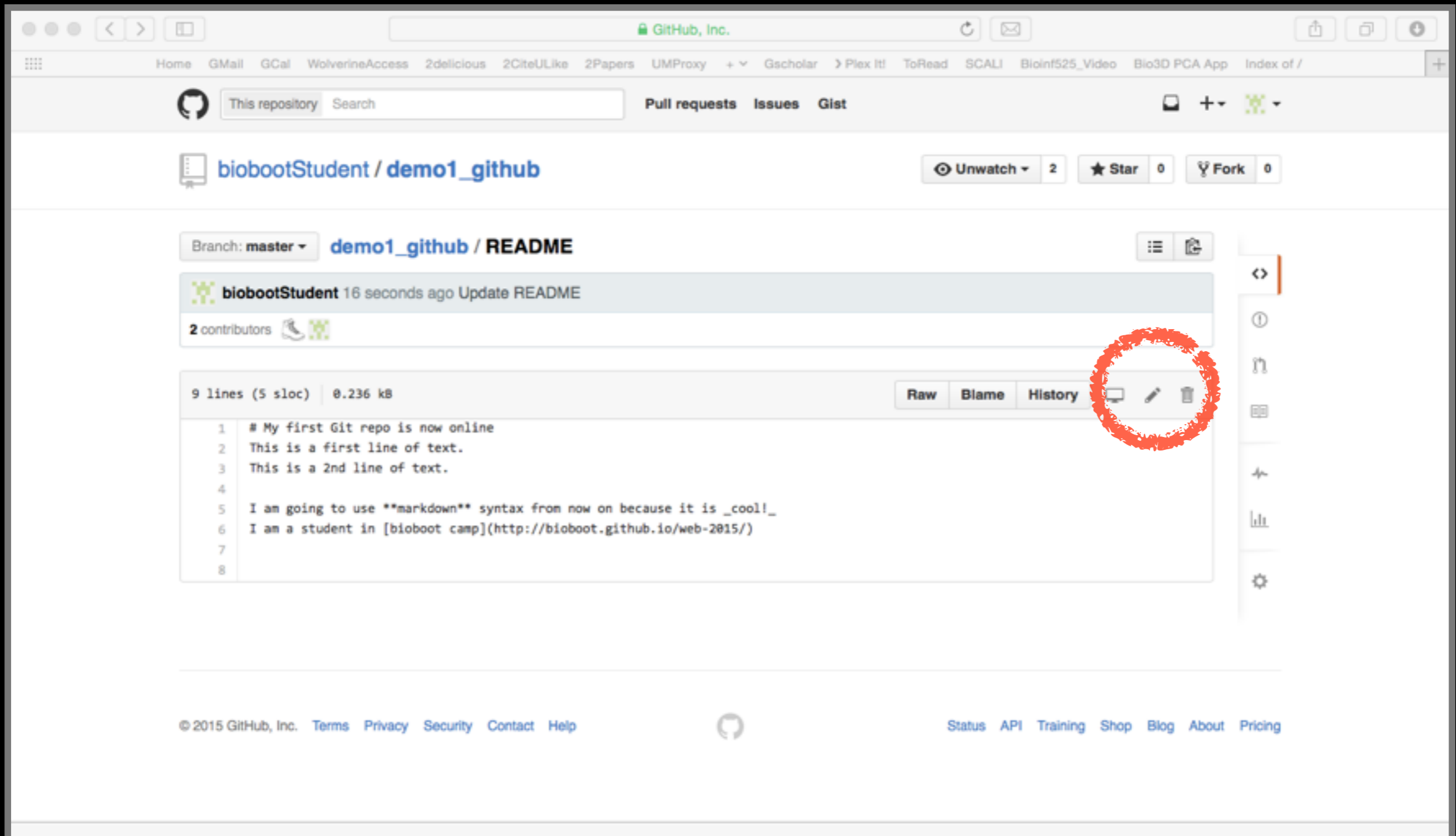
**Congratulations!**

You just pushed your local repo to GitHub!!

Check it out in your web browser...

# Lets edit README online

Specifically lets add some Markdown content



The screenshot shows a web browser window displaying a GitHub repository page for 'biobootStudent / demo1\_github'. The repository is on the 'master' branch, and the current file being viewed is 'README'. A recent commit by 'biobootStudent' is shown, indicating an update to the README file. The README content is displayed in a code editor, showing 9 lines of text. A red circle highlights the 'Edit' button (pencil icon) in the top right corner of the code editor area, indicating the next step in the process.

Branch: master demo1\_github / README

biobootStudent 16 seconds ago Update README

2 contributors

9 lines (5 sloc) 0.236 kB

Raw Blame History

```
1 # My first Git repo is now online
2 This is a first line of text.
3 This is a 2nd line of text.
4
5 I am going to use markdown syntax from now on because it is cool!
6 I am a student in [bioboot camp](http://bioboot.github.io/web-2015/)
7
8
```

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# Lets also edit locally...

And rename README to README.md

- > mv README README.md *# Move to Markdown*
- > git **status**
- > git **add** README.md README
- > git **push** -u origin master

*# What happened and why?*

# We need to **pull** changes first!

- > git **pull** origin master *# Sync from GitHub*
- > git **status** *# What does the msg mean?*
- > git **push** -u origin master *# Sync to GitHub*

# Success!

Lets look at how GitHub presents your commit history

The screenshot shows a GitHub repository page for 'biobootStudent / demo1\_github'. The repository has 7 commits, 1 branch, 0 releases, and 1 contributor. The '7 commits' link is circled in red. The repository is on the 'master' branch. The commit history shows two commits: 'Update README.md' by biobootStudent a minute ago (latest commit b9ffed426a) and 'Add ToDo and finished README' an hour ago. The README file is visible, containing the text: 'My first Git repo is now online', 'This is a first line of text. This is a 2nd line of text.', 'I am going to use markdown syntax from now on because it is cool!', and 'I am a student in bioboot camp lucky me ;-)'.

biobootStudent / demo1\_github

Unwatch 2 Star 0 Fork 0

My first github repo — Edit

7 commits 1 branch 0 releases 1 contributor

Branch: master demo1\_github / +

Update README.md

biobootStudent authored a minute ago latest commit b9ffed426a

File	Commit Message	Time
README.md	Update README.md	a minute ago
ToDo	Add ToDo and finished README	an hour ago

README.md

## My first Git repo is now online

This is a first line of text. This is a 2nd line of text.

I am going to use markdown syntax from now on because it is cool!

I am a student in bioboot camp lucky me ;-)

Code

Issues 0

Pull requests 0

Wiki

Pulse

Graphs

Settings

HTTPS clone URL

https://github.com/1

You can clone with HTTPS, SSH, or Subversion.

Clone in Desktop

Download ZIP

Do it Yourself!

# Demo 2

<https://github.com/bioboot/demo2-github>

# Summary: Forking, Pull requests & code review

- Using these three steps you can contribute any public project even though you don't have write access.
- You first “**fork**” the repo you are interested in. This creates a completely separate copy of the repo by cloning it and adding a copy to **YOUR** GitHub (or Bitbucket) account.
- You then make your changes (in your forked repo) and submit a **pull request** back to the original repo.
- These undergo **code review** and, if approved, subsequent merging into the original repo.

## Side-Note: **Keeping your fork up to date**

- When the central repository is updated with someone else's code (after your fork was created), these new commits do not magically appear on your fork.
- You will need to add a link to the original **upstream** central repository to be able to pull changes.

```
> git remote add upstream https://github.com/  
bioboot/demo2-github.git  
> git remote -v  
> git pull upstream master
```

*# Can you now **push** to 'upstream'?*

# Optional: Further self exploration of BitBucket/GitHub/Git features

- **Issues** are integrated into repos and enable bug tracking, feature requests, to-do items, questions etc. on a per project basis. E.G.  
<https://bitbucket.org/Grantlab/bio3d/issues>
- **Websites** and Wikis. For example I have course websites hosted on GitHub and authored collaboratively via git. See:  
<https://github.com/bioboot/web-2015>  
<http://w16.bioinfquiz.org>
- Some **git commands** to play with:

```
> git show  
> man git-blame
```

```
> git log --stat  
> git log --graph --oneline
```

# Side-Note: Identifying how to **contribute** to an open source project

- Oftentimes open source projects place a **CONTRIBUTING.md** file in the root directory.
- It explains how a potential contributor should format code and submit patches etc. Here is a fine [example](#) from the [ggplot2](#) R package.
- From a maintainer's point of view, the document succinctly communicates how best to collaborate.
- And for a contributor, one quick check of this file verifies their submission follows the maintainer's guidelines.



# Summary

- Git is a popular ‘distributed’ version control system that is lightweight and free
- GitHub and BitBucket are popular hosting services for git repositories that have changed the way people contribute to open source projects
- Introduced basic git and GitHub usage and encouraged you to adopt these ‘best practices’ for your future projects.

# Learning Resources

- **Set up Git**. If you will be using Git mostly or entirely via **GitHub**, look at these how-tos.  
< <https://help.github.com/categories/bootcamp/> >
- **Getting Git Right**. Excellent **Bitbucket** git tutorials  
< <https://www.atlassian.com/git/> >
- **Pro Git**. A complete, book-length guide and reference to Git, by Scott Chacon and Ben Straub.  
< <http://git-scm.com/book/en/v2> >
- **StackOverflow**. Excellent programming and developer Q&A.  
< <http://stackoverflow.com/questions/tagged/git> >

# Learning git can be painful!

However in practice it is not nearly as crazy-making as the alternatives:

- Documents as email attachments
- Hair-raising ZIP archives containing file salad
- Am I working with the most recent data?
- Archaeological “digs” on old email threads and uncertainty about how/if certain changes have been made or issues solved

Finally Please remember that **GitHub**  
and **BitBucket** are **PUBLIC** and that  
you should cultivate your professional  
and scholarly profile with intention!

# Side-Note: Changing your default git text editor

- You can configure the default text editor that will be used when Git needs you to type in a message.
  - > `git config --global core.editor nano`
- If not configured, Git uses your system's default editor, which is generally Vim.