Open Source Software

Development with GitHub

Open Source Software Development with GitHub

Outline

- Open source software and Github

- User Testimonials

- How to – user interface (Kristin)

- How to – commandline (Reed)

Open Source Software

Source code: the technical blueprint that tells the computer program how to function.

Open Source Software

Open Source: source code that is accessible to inspect, modify, copy and use.
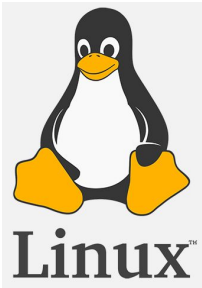
Closed Source: proprietary source code that can not be accessed or change by the public.

Open Source Software
Its a Philosophy!
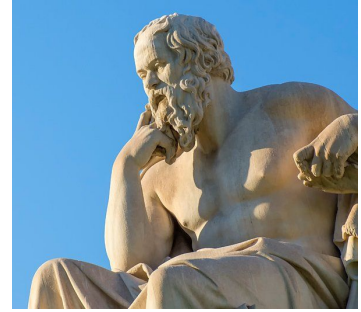
- Proponents believe people should have the right to use their software in whatever way they see fit without licensing restrictions.

- Allows software to evolve through open contributions from many users.

- Critics worry if open source leads to difficulty in managing programs and wonder if software can be reliably developed without profit intensive.

Open Source Software
FOR YOU!

- Transparency & reproducibility in data analysis

- Collaborative development of and easy access to community tools

- Coding Portfolio
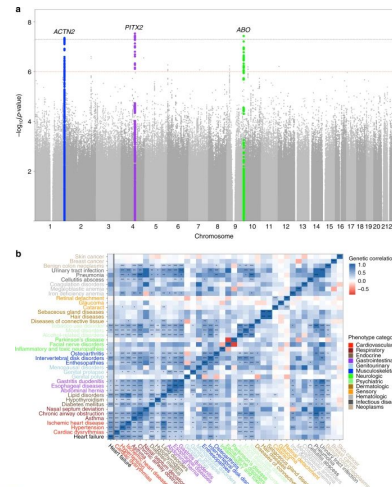
How do you develop open source software?

1) Write some code

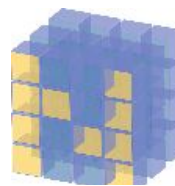2) Publish on Internet

Developing Open Source Software with GitHub

Developing Open Source Software with GitHub

Resources:

- GitHub's User manual
- Community support
- YouTube
- Google!

Version Control

Version control is a system that records changes to a file or set of files over time so that you can recall specific versions later.

Version Control

MSys Technologies
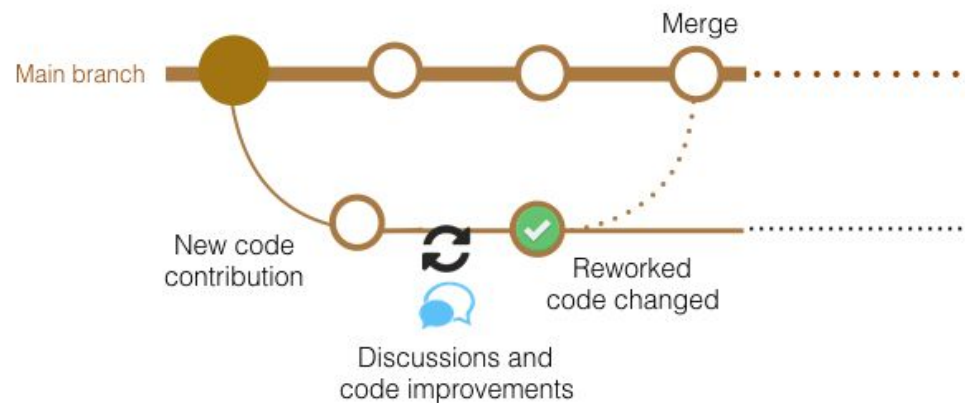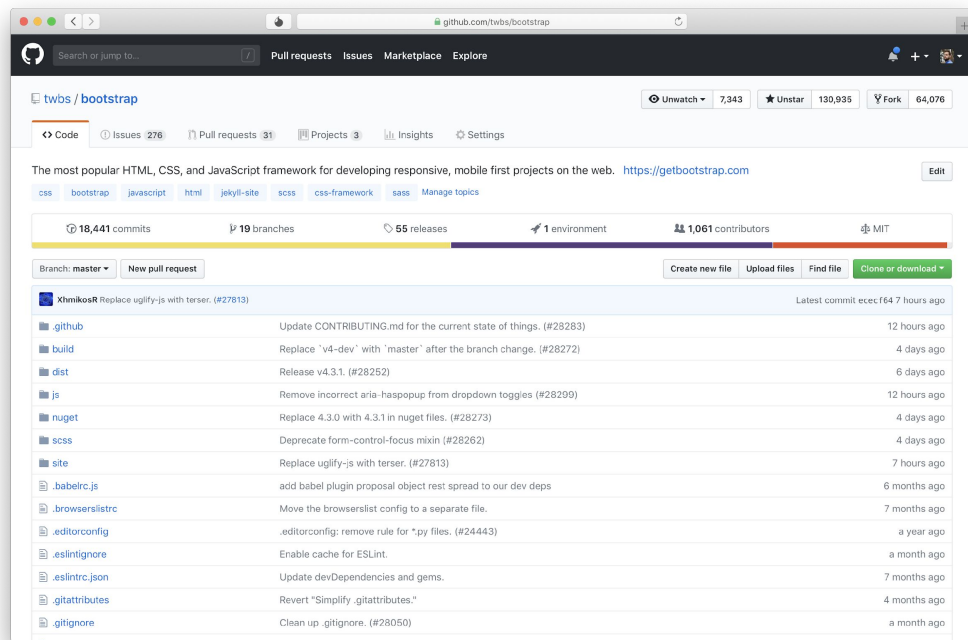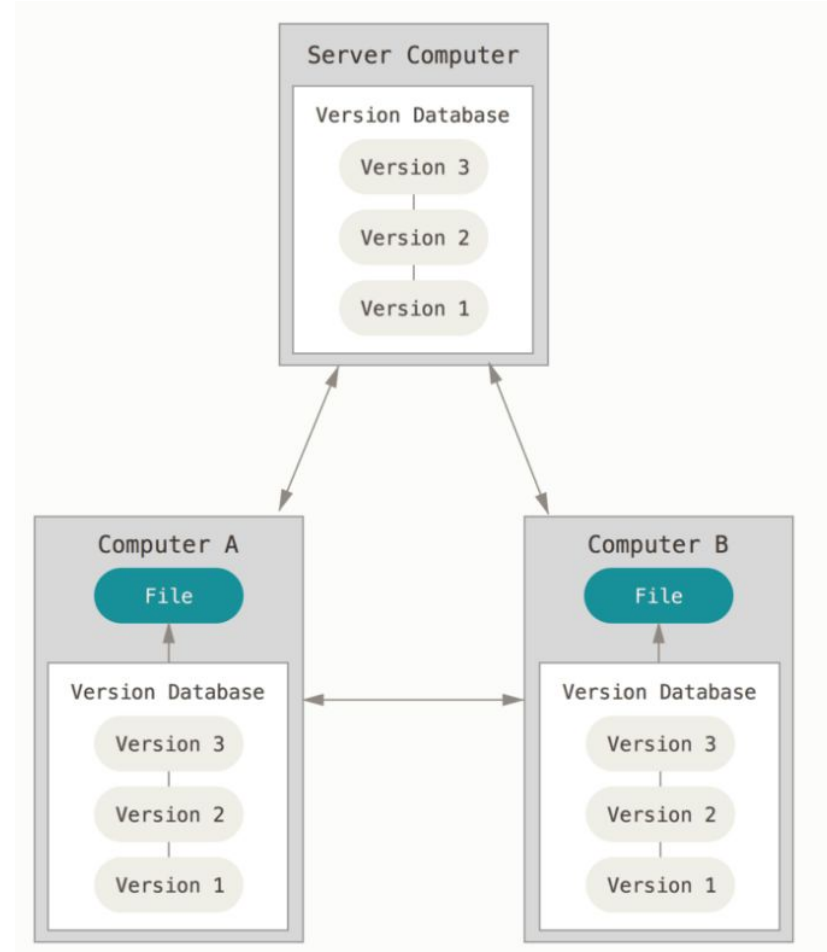Expanding Horizons

20 BEST VERSION CONTROL SYSTEMS OF 2020 - 1/2

01 AWS CodeCommit
It is a fully-managed source control service that empowers your team to collaborate on code.
It offers a secure storage solution for your binary files, documents, and source code in the cloud.

02 Team Foundation Server
It is an integrated server suite to share code, track and monitor workflows, and ship software
Its version control solution offers unlimited private repositories for storage and collaboration on the code

03 GitHub
It is a software development platform built explicitly for developers.
It empowers you to manage projects, build software, and host and review code

04 JEDI VCS
It is an open-source VCS platform.
It offers features such as project and line history, time tracker, project-based rights management, an integrated ToDo Manager, and customizable DiffTool

Protecting Your Open Source Projects

choosealicense.com

Protecting Your Open Source Projects

choosealicense.com

{ What if none of these work for me? }

My project isn't software.

There are licenses for that.

I want more choices.

More licenses are available.

I don't want to choose a license.

Here's what happens if you don't.

The content of this site is licensed under the Creative Commons Attribution 3.0 Unported License.

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Curated with ❤ by GitHub, Inc. and You!

Protecting Your Open Source Projects

~~Why would anyone want to use my code?!~~
How does my open source code help me?

TRACE GENOMICS

Bioinformatics Engineer

APPLY FOR THIS JOB

REMOTE / COMPUTATIONAL SCIENCE / FULL-TIME

Qualifications
- MS or PhD in Bioinformatics, Biology or Computer Science, or a related field
- Minimum 2 years experience in building and maintaining production scale bioinformatics pipelines
- Fluency with Python
- Experience with AWS
- Experience with metagenomics
- Proven record of bioinformatics expertise, vis a vis publications, publicly-available computational tools packages, or github repos that show thoughtful genomics analysis

Job posting from Trace Genomics on 11/30/2020

~~Why would anyone want to use my code?!~~
How does my open source code help me?

Cincinnati Children's

BIOINFORMATICS ANALYST

- **Documentation and Reproducibility:** Writes and maintain tools/scripts with documentation, concept of singularity, version control and reproducibility. Familiarity with GitHub is preferred. Maintain transparent open access documentation of project goals, analytical approaches and milestones for each project.

**Job posting from
Cincinnati Children's
Hospital on 11/30/2020**

Who else uses GitHub?

Who else uses GitHub?

How else can I utilize GitHub?

How else can I utilize GitHub?

Lucia (Lucy) Williams   Research   Teaching   Outreach   CV

Lucia Williams

Computer science graduate
student studying algorithms,
both theory and application.

📍 Bozeman, Montana

✉ Email

○ Github

I am a third-year PhD student in computer science at Montana State University in Bozeman, Montana. My advisor is Brendan Mumey. I am interested in the design and analysis of algorithms and data structures for problems in computational biology. I have worked on flow network based methods for RNA sequencing and on methods for finding conserved genomic regions in the presence of missing data or without a single reference genome. I have also worked with the Computational Topology and Geometry group at MSU to develop the theory behind a new method for comparing shapes without manual landmarking. See my research page for more detail on my research pursuits.

Before starting my PhD, I worked as a data scientist at an online advertising company in Seattle, after earning undergraduate degrees in applied math and urban planning. Outside of work, my main hobby is playing and coaching Ultimate Frisbee. I also enjoy human-powered outdoor adventures.

https://lgw2.github.io/

Recap so far

- Open Source Software

  - Allows software to evolve through open contributions from many users

- Version Control

  - a system that records changes to a file or set of files over time

- Protecting your work with licences

- Ability to centralize and showcase your work and collaborative projects

How is GitHub used in the biological sciences?

Examples from CMB Faculty

Erin Osborne Nishimura
Department of Biochemistry and Molecular Biology

Interacting with GitHub via the command line

2. Push up commits from work computer

GitHub

5. Push up new commit to GitHub

3. Pull down commits to home computer

new commit

1. Make two commits on work computer

4. Add another commit on home computer
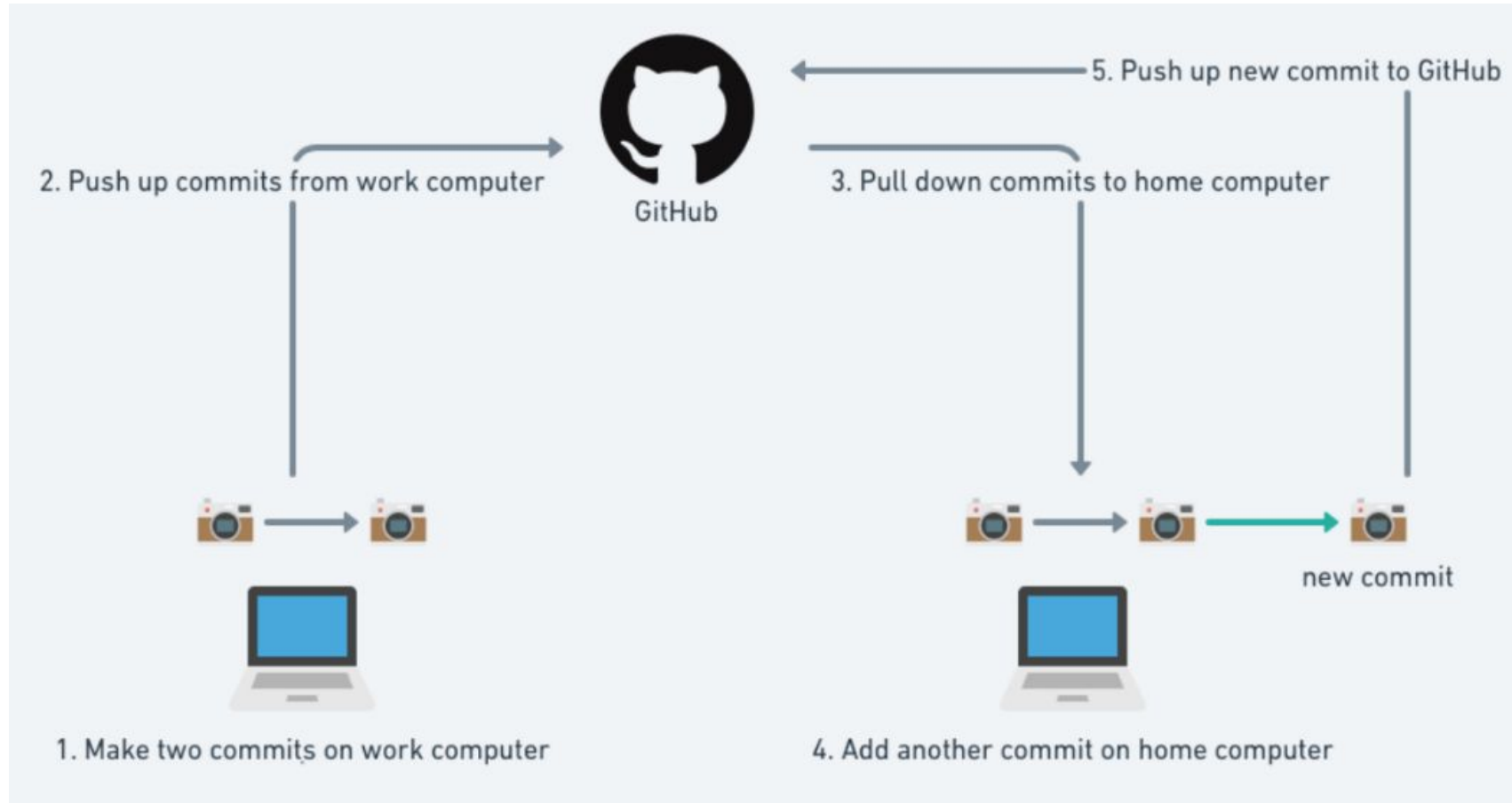
Interacting with GitHub via the command line

What is Git?

- Git is the command line version control system (VCS) software which works on your local computer.

- Git was created by Linus Torvalds in 2005 for development of Linux

- You need Git to use GitHub. You can use Git locally without GitHub.
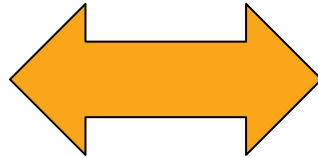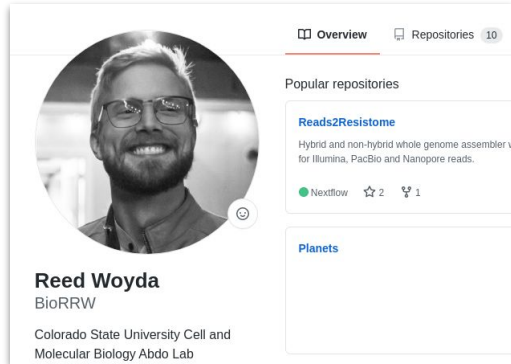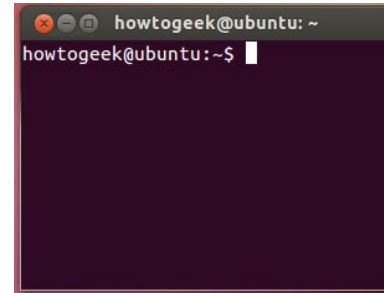
Interacting with GitHub via the command line

Brief introduction on git command line usage:

- **Cloning** existing repositories

- **Editing** code from repositories

- **Commit** modified code to existing repositories

Interacting with GitHub via the command line
How to obtain Open Source code from GitHub

1. Open terminal on local computer

2. Navigate to directory of your choosing

3. git clone https://github.com/kscott94/test_repository.git
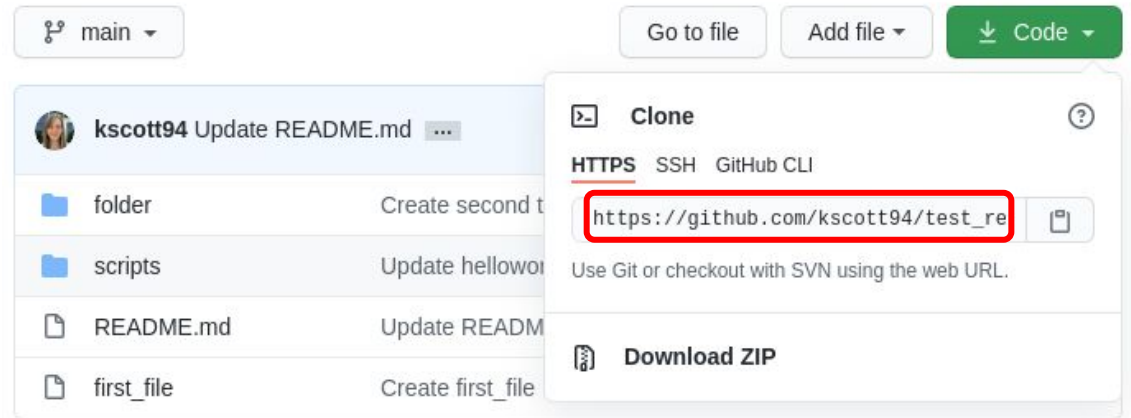
Interacting with GitHub via the command line Collaboration

List of command I used to edit a script from a collaborators GitHub repository:

1. In desired directory, tell Git who we are:
   a. git config --global user.name "BioRRW"
   b. git config --global user.email reedwoyda@gmail.com
2. Initialize current directory as a Git repository:
   a. git init
3. Connect to the desired repository:
   a. git remote add qcmb_github https://github.com/kscott94/test_repository
4. Make edits to file of choice (here I edited the helloworld.py script)
5. Prepare the edited file for upload to GitHub:
   a. git add helloworld.py
6. Lastly, **commit** the edited file for final upload to the repository:
   a. git commit helloworld.py -m "Updated helloworld.py script"

Recap: How to use GitHub/Git

- How to create a GitHub repository
  - Add content
  - Add collaborators

- How to download a repository from GitHub (command-line)

- How to 'connect' to an existing repository for collaboration (command-line)

  - Make edits

  - Commit those edits to the GitHub repository

- See edits reflected in GitHub repository

Open Discussion/Questions
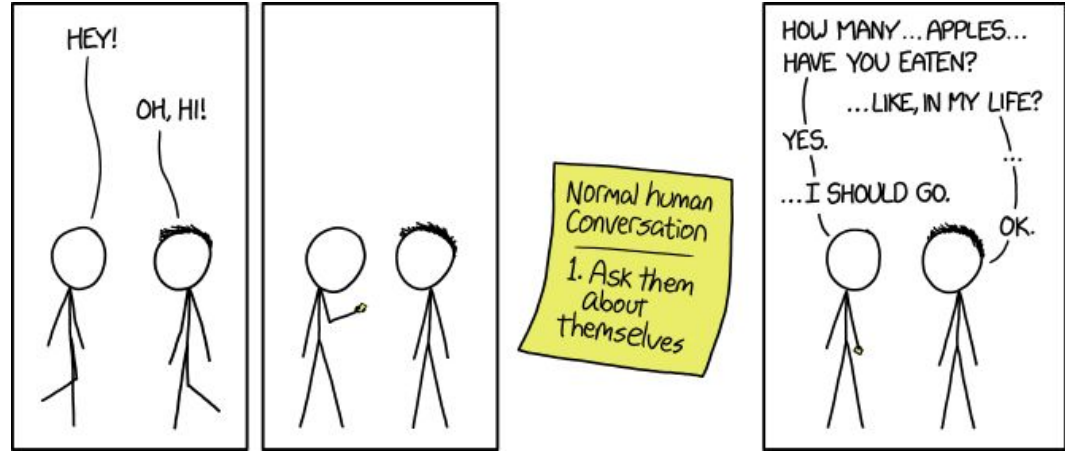
Resources

- Basic Git usage
  - https://git-scm.com/docs/gittutorial

- Basic GitHub Guide
  - https://guides.github.com/activities/hello-world/
  - https://pages.github.com/

- GitHub documentation
  - https://docs.github.com/en

- Git/GitHub usage (Youtube)
  - https://www.youtube.com/watch?v=SWYqp7iY_Tc&ab_channel=TraversyMedia
- This slide show
  - https://github.com/BioRRW/qCMB_OpenSource_Webinar