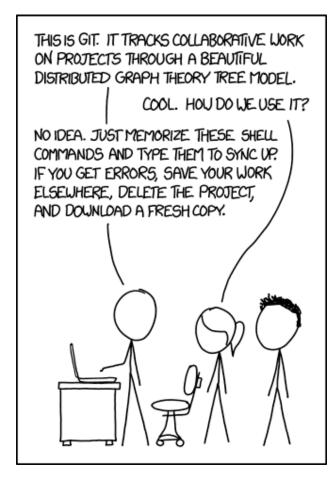
5 Git and GitHub



https://xkcd.com/1597/

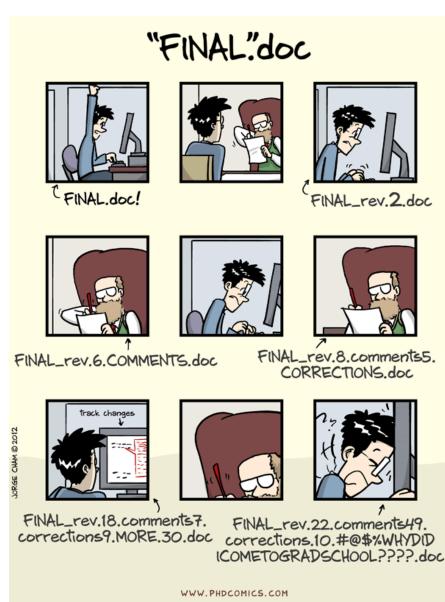
Note: Thanks to <u>http://happygitwithr.com</u> for inspiration and material.

5.1 Definition/background

Git is a version control system that was created to help developers manage collaborative software projects. Git tracks the evolution of a set of files, called a **repository** or **repo**.

This helps us

- *merge* conflicts that arrise from collaboration
- *rollback* to previous versions of files as necessary
- store master versions of files, no more paper_final_final_I_really_mean_it.docx



(http://phdcomics.com/comics/archive.php?comicid=1531)

5.2 Terminology

- **Repository:** The most basic element of git, imagine as a project's folder. A repository contains all of the project files, and stores each file's revision history. Can be either public or private.
- **Clone:** A copy of a repository that lives on your computer instead of on a website's server somewhere, or the act of making that copy.
- **Pull:** When you are fetching in changes and merging them.
- **Commit:** An individual change to a file (or set of files). Every time you save it creates a unique ID that allows you to keep record of what changes were made when and by who.
- Push: Sending your committed changes to a remote repository such as GitHub.com.
- **Fork:** A fork is a personal copy of another user's repository that lives on your account. Forks allow you to freely make changes to a project without affecting the original.
- **Pull Request:** Proposed changes to a repository submitted by a user and accepted or rejected by a repository's collaborators.
- **Issue:** Issues are suggested improvements, tasks or questions related to the repository.
- **Remote:** This is the version of something that is hosted on a server, most likely GitHub.com. It can be connected to local clones so that changes can be synced.

From <u>https://help.github.com/articles/github-glossary/</u>.

5.3 GitHub

There are many hosting services for remote repositories (<u>GitHub</u>, <u>Bitbucket</u>, <u>GitLab</u>, etc.). We will use GitHub in this class, but the ideas carry over to the other services.

By default, all materials on GitHub are **public**. This is *good* because you are getting your work out there and contributing to the open source community!

If you need **private** repos, checkout <u>GitHub for Education (https://education.github.com/)</u> - free private repos for students/postdocs/professors.

5.4 Creating Repos

andeek -	New repository ((*)) GitHu Import repository New organization New organization
r jennybc starred time	elyportfolio/gitgraphr 3 hours ago
Create a n	ew repository
	tains all the files for your project, including the revision history.
Owner	Repository name
💓 andeek 🗸	
4202	
· ·	
Great repository	names are short and memorable. Need inspiration? How about animated-octo-er
Great repository Description (opt	·
	·
	·
Description (opt	ional)
Description (opt Descr	·
Description (opt Descr	ional)
Description (opt Descr	n see this repository. You choose who can commit.
Description (opt Description (opt Description (opt Description (opt Public Anyone ca Private You choos Initialize this	ional) n see this repository. You choose who can commit. e who can see and commit to this repository. repository with a README
Description (opt Description (opt Description (opt Description (opt Public Anyone ca Private You choos Initialize this	ional) n see this repository. You choose who can commit. e who can see and commit to this repository.
Description (opt Description (opt Description (opt Public Anyone ca Private You choos Initialize this This will let you	ional) In see this repository. You choose who can commit. In who can see and commit to this repository. In repository with a README Immediately clone the repository to your computer. Skip this step if you're importing an existing

Initialize readme (yes), .gitignore (R usually), license (e.g. GPL 3)

Your Turn

1. Create a hello-world repo

Cloning a repo -

Search or jump to	/ Pi	l requests issues Marketplace Explore	+ + [™]
	stat400-csu / note		r Star 0 ÿFork 0
	Class notes for STAT40 Manage topics	0@CSU ⊮1 branch © 0 releases ಟ1 contributor	Edit
	Branch: master - New	Create new file Upload files Find file	le Clone or download -
	🖹 andeek Merge branch	Use SSH	
	00_admin	add notes from thursday Use Git or checkout with SV	
	0_tools	your turn https://github.com/sta	at400-csu/notes. 😭
	2_probability	restructure and midterm facts Open in Desktop	Download ZIP
	3 simulating	add notes from today	20 0073 000

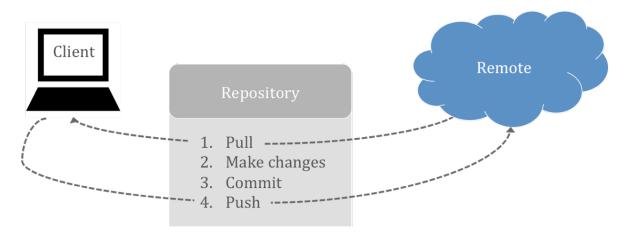
From scratch:

- 1. Create the repo on the GitHub website
- 2. Clone the repo
- 3. Start working
- 4. Add files, commit, push, etc.

From existing folder:

- 1. Create the repo on the GitHub website
- 2. Clone the repo
- 3. Copy existing work into local folder
- 4. Add files, commit, push, etc.





Important: remember to pull before you start working to get the most up to date changes from your collaborators (or your past self) before making local changes!

5.6 When should I commit?

Think of commits as a checkpoint in a video game. This is a point in time when you want to save your status so that you can come back to it later if need be.

Commits are like voting. I like to do it early and often.

- Me, right now

5.7 Blow it up

Sometimes your local repo gets borked. That's OK. There are ways that we can work really hard and fix them, but sometimes you just want to stash your files somewhere and re-clone from your centralized repository.

5.8 Git with RStudio

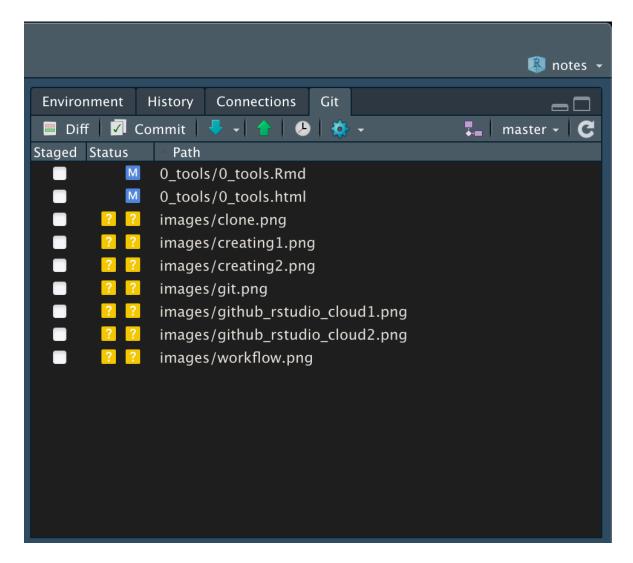
Rstudio (and our class RStudio server) allows you to make projects based on GitHub repos.

The life car have may have been have many from may 0 • 00 grade [] [] [] a contraction [] [] • Anno • means and [] [] • Contraction [] [] • Anno • restorn 4.2.1 (2022-06-23) "Funny-Looking Kid" right (C) 2022 The R Foundation for Statistical Computing	Conference History C	
тение им. им	a 🔐 🔂 💷 Import Dataset	Connections Tutorial
rsion 4.2.1 (2022-06-23) "Funny-Looking Kid"	a 🔐 🔂 💷 Import Dataset	
	R - Clobal Environmen	
form: x86_64-pc-linux-gnu (64-bit)	Đ	nvironment is empty
free software and comes with ABSOLUTELY NO W Greate Project		
are welcome to redistribute it under certain		
'license()' or 'licence()' for distribution R New Directory Start a project in a brand new working directory >	Films Piets Packages Garder O Blank File - Manne	Help Viewer
tural language support but running in an Engl Estating Directory Account a project with a contrag working directory.	A Name Image: Strength Strengt Strengt Strength Strength Strength Strength Strength Stre	Size Modified 0.8 Aug 23, 2022, 3:27 PM
a collaborative project with many contributo 'contributorsO' for more information and otion()' on how to cite R or R packages in pu ^{Control} Control and Contr	STATEGO	1.2 K8 Aug 19, 2022, 4:14 PM 765 8 Aug 21, 2022, 7:59 PM 85 8 Aug 21, 2022, 7:59 PM
Carol		
'demo()' for some demos, 'help()' for on-lin,,		

••• •• •• ••	â liberator stat colostate edu	6		≙ + 9
File Edit Code View Plots Session Build Debug Profile Tools Help			kap	lan 😤 🕞 Sessions (1) - 🕗
• • • • • • • • • • • • • • • • • • •				(B Project (None) = R.4.2.
Consule Terminal × jobs × (@ 8.42.1 + -/ **		8	Environment History Connections Tutoria	
QF #421/~			🔐 🚽 🖙 Import Dataset + 🔅 92 Milli + 🦸 R + 🍈 Clobal Environment +	E Line + (
R version 4.2.1 (2022-06-23) "Funny-Looking Kid Copyright (C) 2022 The R Foundation for Statistica Platform: x86_64-pc-linux-gnu (64-bit)			Environment is	empty
R is free software and comes with ABSOLUTELY NO W You are welcome to redistribute it under certain	Back Create Project from Version Control			
Type 'license()' or 'licence()' for distribution	Clone a project from a Git repository		Tiles Pints Packages Help Viewer O Folder O Blank File + O Upload O De Altone	iete 🗟 Rename 🌒 +
Natural language support but running in an Engl	SVN Subversion Checkout a project from a Subversion repository		Alistery 01	
R is a collaborative project with many contributo			C = x	
Type 'contributors()' for more information and			0 D temp 11	KB Aug 19, 2022, 4:14 PM
'citation()' on how to cite R or R packages in pu			0 D temp2 76	5 8 Aug 21, 2022, 7:59 PM
contention of the second secon			C 1 temp3 85	8 Aug 29, 2022, 8:21 Ab
Type 'demo()' for some demos, 'help()' for on-lin 'help.start()' for on HTML browser interface to he Type 'q()' to quit R.				

••• •• • •				
file Edit Code View Plots Session Build Debug Profile Tools Help 0 + 0				
Consule Terminal - jobs - (@ 8.42.3 - +/ -0		8	Environment History Connections Turnial	= Lon • 100
R version 4.2.1 (2022-06-23) "Funny-Looking Kid Copyright (C) 2022 The R Foundation for Statistica Platform: x86_64-pc-linux-gnu (64-bit) R is free software and comes with ABSOLUTELY NO W	l Computing		Environment is em	
You are welcome to redistribute it under certain	Back Clone Git Repository			
Type 'license()' or 'licence()' for distribution	Repetercy (R):		Files Picts Packages Help Viewer Q Folder O Blank File + Q Upload O Delete -	Rename Q + C
Natural language support but running in an Engl	Create project as subdirectory of:		A Name Sce	Modified Aug 23, 2022, 3:27 PM
R is a collaborative project with many contributo Type 'contributors()' for more information and 'citation()' on how to cite R or R packages in pu	- Brass.			Aug 19, 2022, 4:14 PM Aug 21, 2022, 7:59 PM Aug 29, 2022, 8:21 AM
Type 'demoQ' for some demos, 'help()' for on-lin 'help.start()' for an HTML browser interface to he Type 'q()' to quit R.	termentif 🔮 Countrigen Count Ip:			

Local RStudio works much the same way, with the ability to push/pull from a local project to a GitHub repo.



By letting us

- 1. Select files to commit.
- 2. Commit
- 3. Push/Pull

5.9 Collaboration

In this class, we will have a collaborative project. It will be hosted on GitHub and part of your grade will be how well you collaborate through the use of GitHub. For this, we will need to have project repos that everyone can push to!

Your collaborators will have a lot of power in your repo, so choose wisely! They can change anything in the repo and add their own files. They can also delete your files! The only thing they can't do is delete the repo, add collaborators, or change other settings for the repo.

5.10 Installation help

We are not covering installation on your personal computers for this class. If you would like to work through it on your own, here is an *excellent* guide: <u>http://happygitwithr.com</u>/installation-pain.html

Feel free to come to office hours or setup individual time with us if you need help.

Your Turn

- 1. Edit the README file in your hello-world repo
- 2. Commit and push changes
- 3. Check out your commit history!