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Computing tools
January 2024
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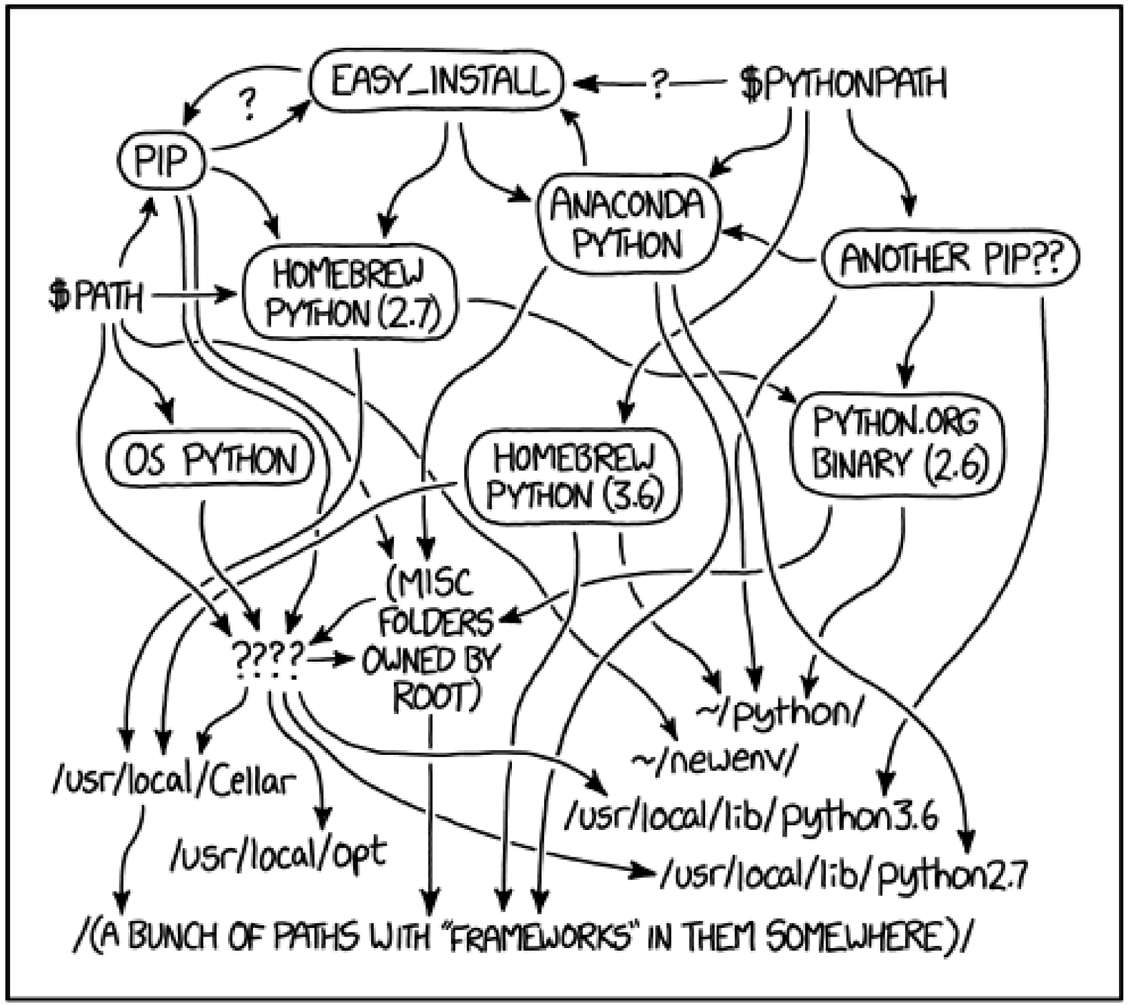


MY PYTHON ENVIRONMENT HAS BECOME SO DEGRADED
THAT MY LAPTOP HAS BEEN DECLARED A SUPERFUND SITE.

CONDA is a command line tool that allows for package and environment management.

PROS

Creating new environments for new projects allows for better versions and compatibility control.

It runs on non-Linux systems.

It makes it easy to clone environments.

Better at handling C/C++ libraries.

CONS

Not everything is Conda installable.

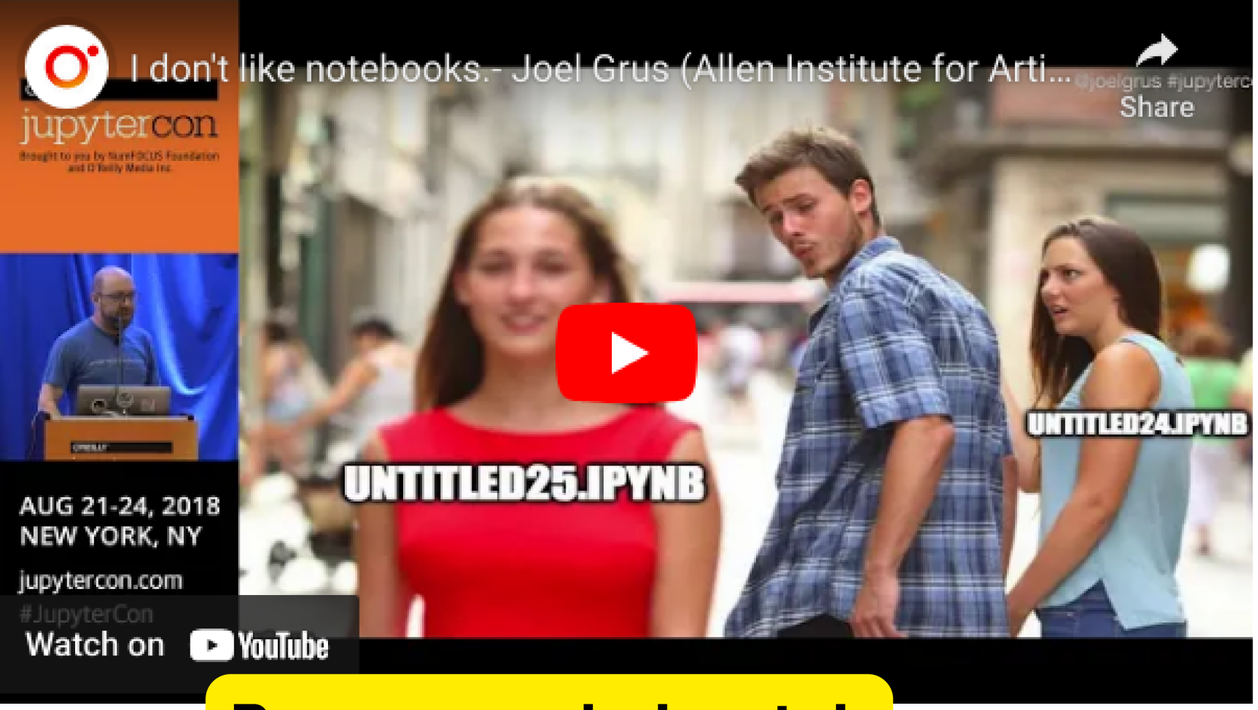
Less robust than pip*.

Full Anaconda can be unnecessarily heavy.

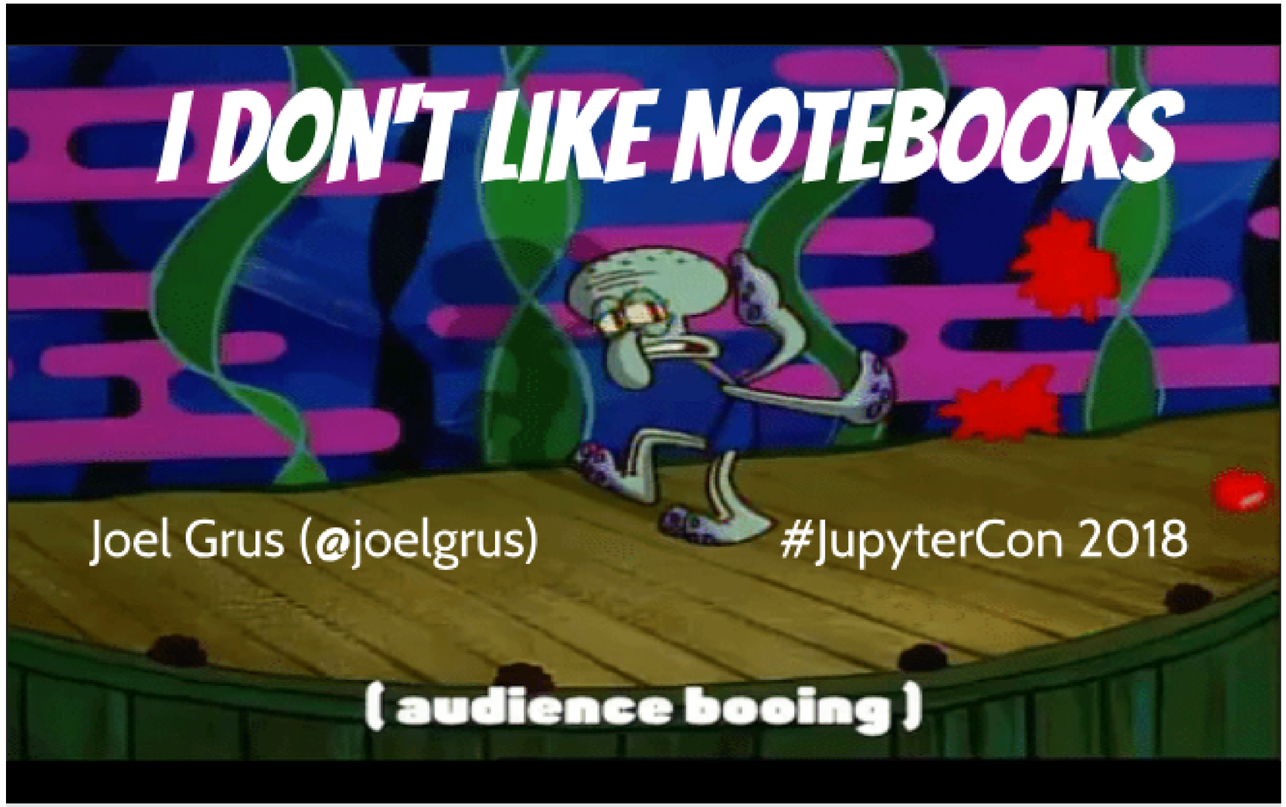
*pip stands for “Preferred Installer Program” or “ PIP Installs Packages”

cheatsheet

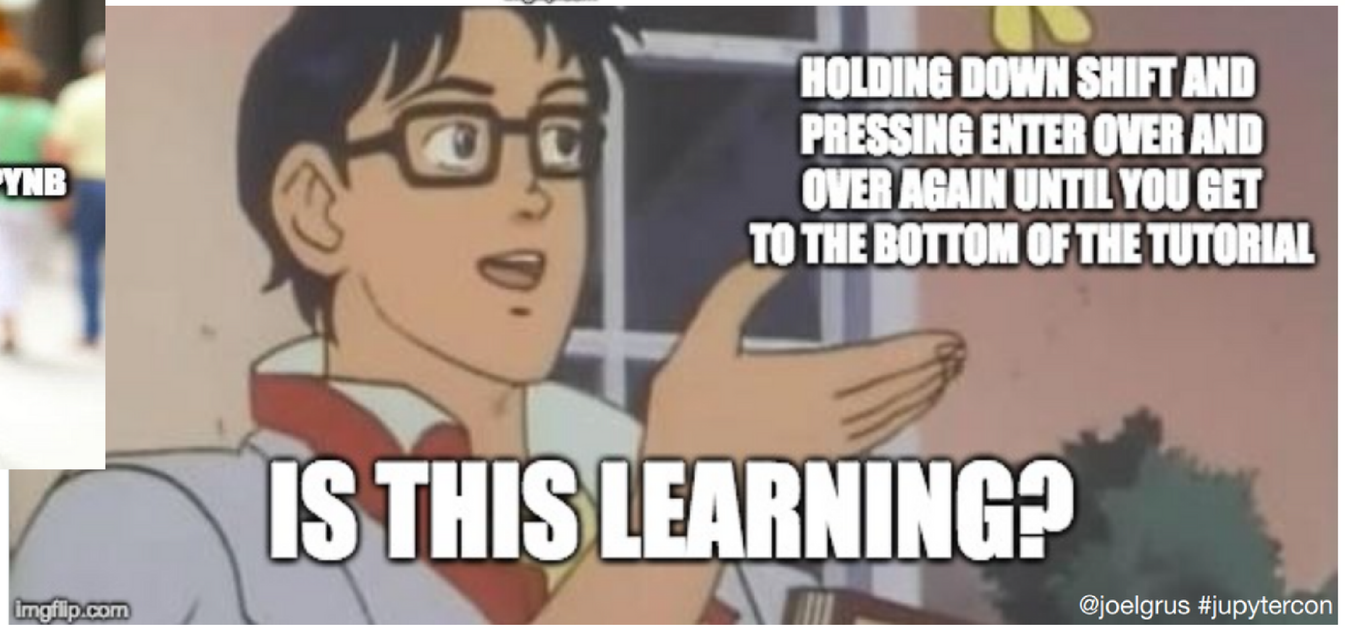
Jupyter Notebooks or Jupyter Lab are great but with great power comes great responsibility.



Recommended watch



Memes I stole from that talk in case you don't watch to watch all 56 minutes of it



Slides

Ideal workflow

Make a messy notebook.
Test things.
Clean up notebook.
Take advantage of markdown text and whatnot to make sure it’s well documented.
Turn it into a .py with a proper name and make into modules everything that can be turned into modules.

some systems have a private key for everything
while others have a public key for encryption
and a private key for decryption

public keys are a function of the private key
it is almost impossible to inverse that function

ssh generates a public key (id_rsa.pub) you can share with the remote server
and a private key (id_rsa) you keep in your computer

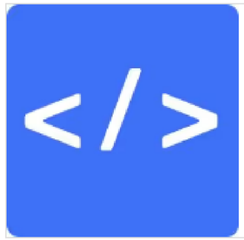
when you connect, public keys are exchanged between your computer and the server

usually we have one pair of keys per device

Git is a “version control system”

- make github account
- install git
- connect your local folder with your GitHub repository
- clone our repository

Git =! Github



Git Basics - Branching, Merging and pushing code to Github

Articles on Software Development, written by experienced Engineers from the perspective of...

Webtuu

GitHub

Fork a repository

A fork is a new repository that shares code and visibility settings with the original “upstream” repository.

GitHub Docs

commit
pull
push

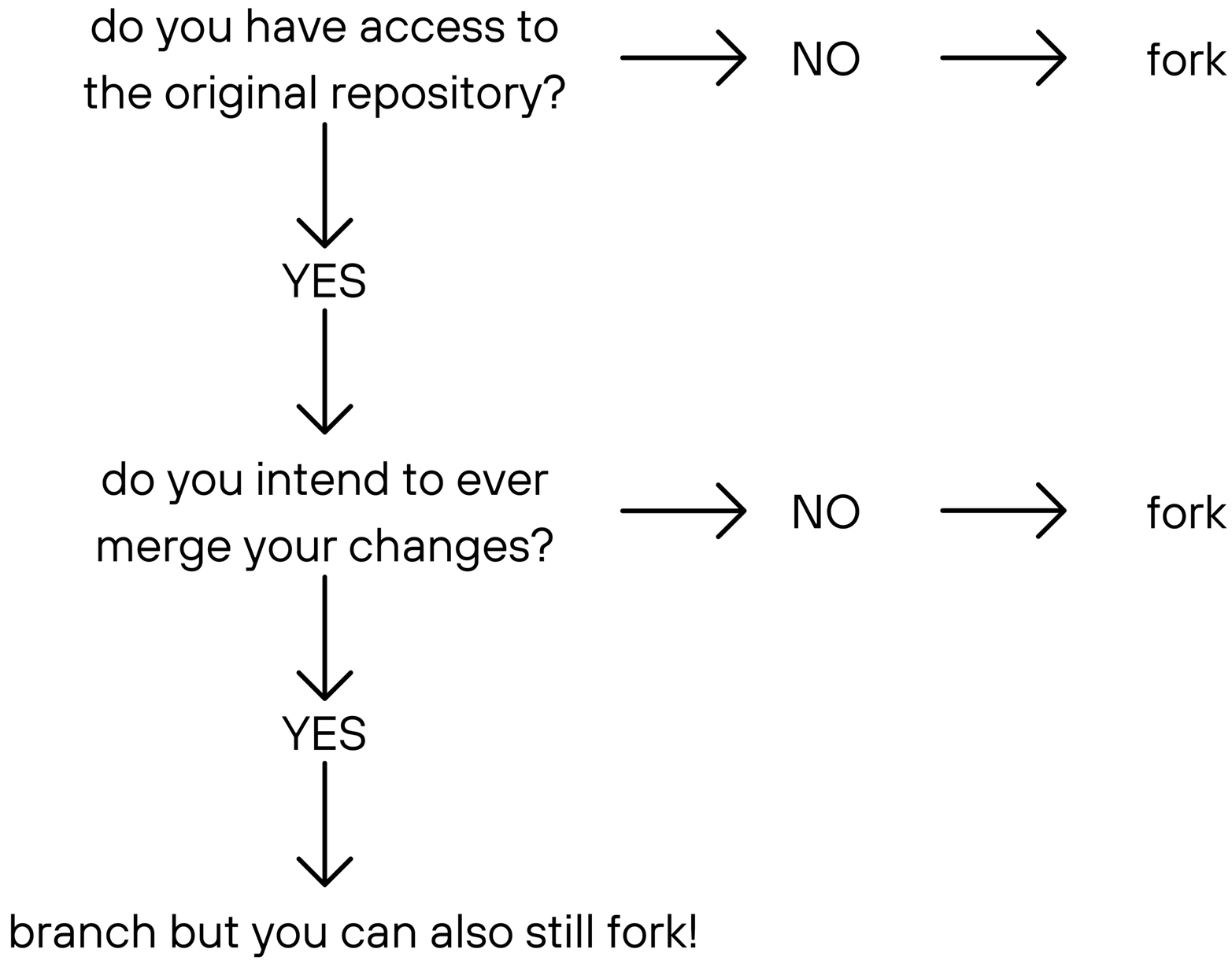
after saving files, you *commit* them, meaning you save changes as a version
you then *pull* to make sure you are up to date with the online version
finally you *push* your changes

THE GITHUB WORKFLOW

branches allow you to work on code in a self-contained environment, separate from whatever other collaborators might be doing, until you are ready to merge your changes.
forks are new repositories cloned which can also be eventually merged

you can create a .gitignore file that lists all the files you don't want to upload to github
this is useful if instead of being smart (adding files selectively) you are like me (use add --all and accidentally try to upload a 16GB data cube to github and break everything)

FORK OR BRANCH?



most reasonable workflow is

you create a repository on github
you create a folder for it on your laptop
git init creates a .git folder
git remote add origin URL connects your folder to your github repository
git pull origin master ensures you're synced
now you modify your files
then you *git add* your files
git commit -m 'updating this and this files'
git push

there will be fifteen thousand things that will go wrong the first few times but then you will get better and one day you will be able to fix your code when it breaks without crying

Git Cheat Sheet

GIT BASICS

`git init <directory>`	Create empty Git repo in specified directory. Run with no arguments to initialize the current directory as a git repository.
`git clone <repo>`	Clone repo located at `<repo>` onto local machine. Original repo can be located on the local filesystem or on a remote machine via HTTP or SSH.
`git config user.name <name>`	Define author name to be used for all commits in current repo. Devs commonly use `--global` flag to set config options for current user.
`git add <directory>`	Stage all changes in `<directory>` for the next commit. Replace `<directory>` with a `<file>` to change a specific file.
`git commit -m "<message>"`	Commit the staged snapshot, but instead of launching a text editor, use `<message>` as the commit message.
`git status`	List which files are staged, unstaged, and untracked.
`git log`	Display the entire commit history using the default format. For customization see additional options.
`git diff`	Show unstaged changes between your index and working directory.

UNDOING CHANGES

`git revert <commit>`	Create new commit that undoes all of the changes made in `<commit>`, then apply it to the current branch.
`git reset <file>`	Remove `<file>` from the staging area, but leave the working directory unchanged. This unstages a file without overwriting any changes.
`git clean -n`	Shows which files would be removed from working directory. Use the `-f` flag in place of the `-n` flag to execute the clean.

REWRITING GIT HISTORY

`git commit --amend`	Replace the last commit with the staged changes and last commit combined. Use with nothing staged to edit the last commit's message.
`git rebase <base>`	Rebase the current branch onto `<base>`. `<base>` can be a commit ID, branch name, a tag, or a relative reference to HEAD.
`git reflog`	Show a log of changes to the local repository's HEAD. Add `--relative-date` flag to show date info or `--all` to show all refs.

GIT BRANCHES

`git branch`	List all of the branches in your repo. Add a `<branch>` argument to create a new branch with the name `<branch>`.
`git checkout -b <branch>`	Create and check out a new branch named `<branch>`. Drop the `-b` flag to checkout an existing branch.
`git merge <branch>`	Merge `<branch>` into the current branch.

REMOTE REPOSITORIES

`git remote add <name> <url>`	Create a new connection to a remote repo. After adding a remote, you can use `<name>` as a shortcut for `<url>` in other commands.
`git fetch <remote> <branch>`	Fetches a specific `<branch>`, from the repo. Leave off `<branch>` to fetch all remote refs.
`git pull <remote>`	Fetch the specified remote's copy of current branch and immediately merge it into the local copy.
`git push <remote> <branch>`	Push the branch to `<remote>`, along with necessary commits and objects. Creates named branch in the remote repo if it doesn't exist.

ATLASSIAN

Visit atlassian.com/git for more information, training, and tutorials

Git cheat sheet | Atlassian Git Tutorial

Git cheat sheet that serves as a quick reference for basic Git commands to help you learn Git. Git...

Atlassian

Additional Options +

GIT CONFIG

`git config --global user.name <name>`	Define the author name to be used for all commits by the current user.
`git config --global user.email <email>`	Define the author email to be used for all commits by the current user.
`git config --global alias. <alias-name> <git-command>`	Create shortcut for a Git command. E.g. `alias.glog "log --graph --oneline"` will set `"git glog"` equivalent to `"git log --graph --oneline"`.
`git config --system core.editor <editor>`	Set text editor used by commands for all users on the machine. `<editor>` arg should be the command that launches the desired editor (e.g., vi).
`git config --global --edit`	Open the global configuration file in a text editor for manual editing.

GIT LOG

`git log -<limit>`	Limit number of commits by `<limit>`. E.g. `"git log -5"` will limit to 5 commits.
`git log --oneline`	Condense each commit to a single line.
`git log -p`	Display the full diff of each commit.
`git log --stat`	Include which files were altered and the relative number of lines that were added or deleted from each of them.
`git log --author="<pattern>"`	Search for commits by a particular author.
`git log --grep="<pattern>"`	Search for commits with a commit message that matches `<pattern>`.
`git log <since>..<until>`	Show commits that occur between `<since>` and `<until>`. Args can be a commit ID, branch name, HEAD, or any other kind of revision reference.
`git log -- <file>`	Only display commits that have the specified file.
`git log --graph --decorate`	`--graph` flag draws a text based graph of commits on left side of commit msgs. `--decorate` adds names of branches or tags of commits shown.

GIT DIFF

`git diff HEAD`	Show difference between working directory and last commit.
`git diff --cached`	Show difference between staged changes and last commit

GIT RESET

`git reset`	Reset staging area to match most recent commit, but leave the working directory unchanged.
`git reset --hard`	Reset staging area and working directory to match most recent commit and **overwrites all changes** in the working directory.
`git reset <commit>`	Move the current branch tip backward to `<commit>`, reset the staging area to match, but leave the working directory alone.
`git reset --hard <commit>`	Same as previous, but resets both the staging area & working directory to match. **Deletes** uncommitted changes, and **all commits after** `<commit>`.

GIT REBASE

`git rebase -i <base>`	Interactively rebase current branch onto `<base>`. Launches editor to enter commands for how each commit will be transferred to the new base.

GIT PULL

`git pull --rebase <remote>`	Fetch the remote's copy of current branch and rebases it into the local copy. Uses git rebase instead of merge to integrate the branches.

GIT PUSH

`git push <remote> --force`	Forces the `git push` even if it results in a non-fast-forward merge. Do not use the `--force` flag unless you're absolutely sure you know what you're doing.
`git push <remote> --all`	Push all of your local branches to the specified remote.
`git push <remote> --tags`	Tags aren't automatically pushed when you push a branch or use the `--all` flag. The `--tags` flag sends all of your local tags to the remote repo.

ATLASSIAN

Visit atlassian.com/git for more information, training, and tutorials

THIS WEEK'S ASSIGNMENT

- install conda (can be anaconda or miniconda)
- install jupyter notebooks
- install git
- make github account
- fork assignment repositories

Basic Python packages that you must have for this course

- Numpy
- Scipy
- Matplotlib
- emcee

Project specific

SED Fitting

- Prospector

< this project has a requirements.txt