

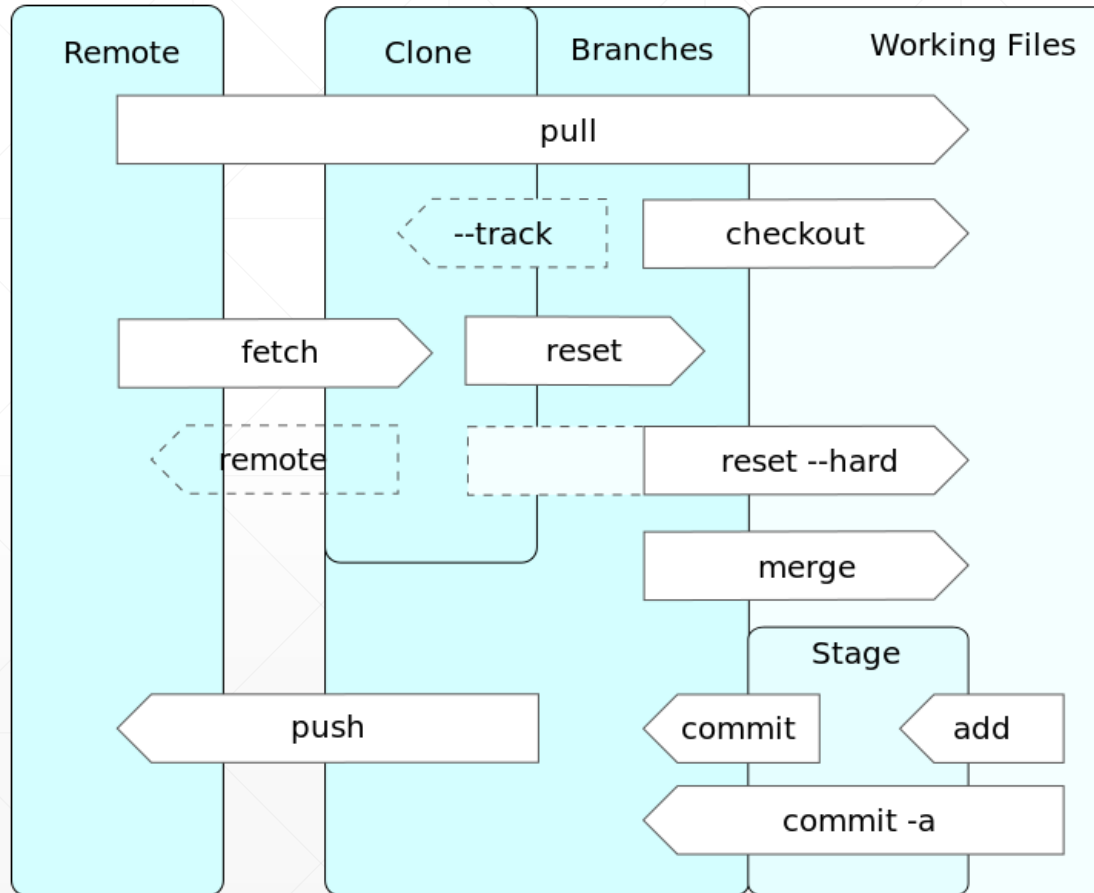
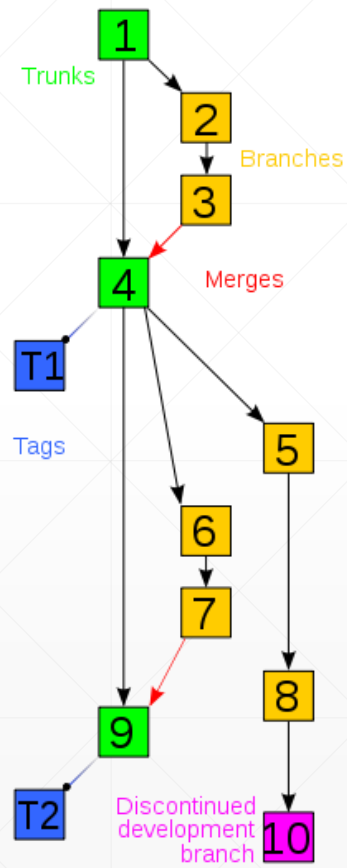
Git and GitHub

Dr. Qiusheng Wu

<http://wetlands.io>

What is Git?

- Git is a distributed version control system (VCS)



Install Git

➤ Download Git from <https://git-scm.com/>



About

The advantages of Git compared to other source control systems.



Documentation

Command reference pages, Pro Git book content, videos and other material.



Downloads

GUI clients and binary releases for all major platforms.



Community

Get involved! Bug reporting, mailing list, chat, development and more.



Pro Git by Scott Chacon and Ben Straub is available to [read online for free](#). Dead tree versions are available on [Amazon.com](#).



Windows GUIs



Tarballs



Mac Build



Source Code

Companies & Projects Using Git

Google

facebook

Microsoft

twitter

Linked in

NETFLIX



PostgreSQL



android



RAILS



Qt



GNOME



eclipse



KDE



Xfce

What is GitHub?

➤ GitHub is a web-based Git repository hosting service.

- GitHub: <https://github.com/>
- GitHub Desktop: <https://desktop.github.com/>

Simple collaboration from your desktop

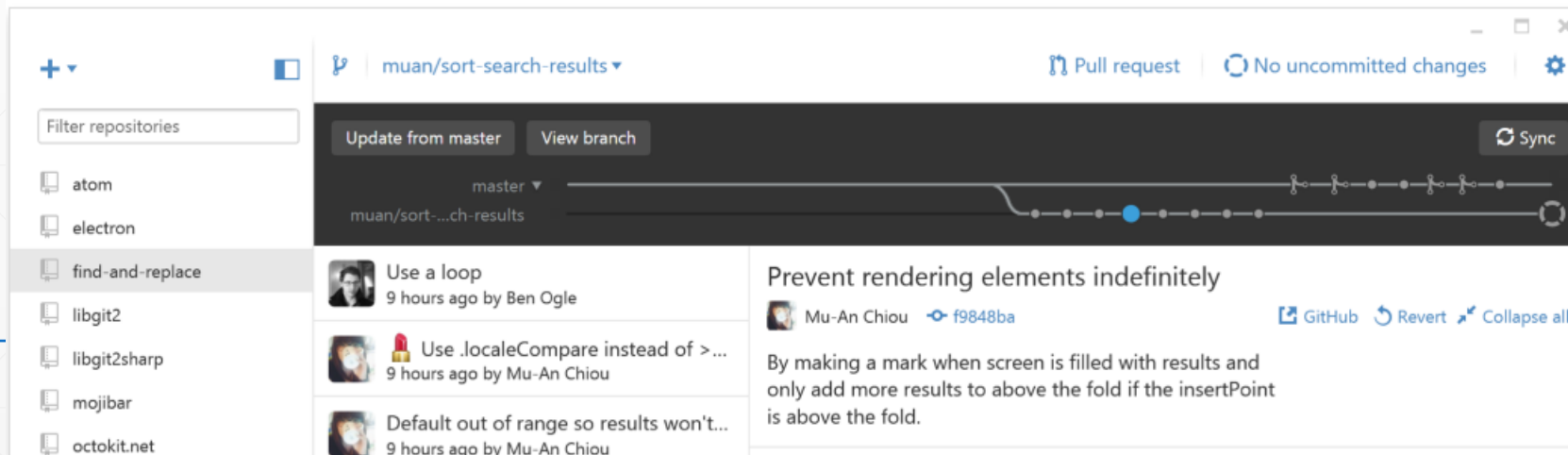
GitHub Desktop is a seamless way to contribute to projects on GitHub and GitHub Enterprise.

Available for Mac and [Windows](#)

Download GitHub Desktop

Windows 7 or later

By clicking the Download button you agree to the End-User License Agreement





Sign up a GitHub account


➤ <https://github.com/join>

Join GitHub

The best way to design, build, and ship software.

**Step 1:**
Set up a personal account

**Step 2:**
Choose your plan

**Step 3:**
Tailor your experience

Create your personal account

Username

This will be your username — you can enter your organization's username next.

Email Address

You will occasionally receive account related emails. We promise not to share your email with anyone.

Password

Use at least one lowercase letter, one numeral, and seven characters.

By clicking on "Create an account" below, you are agreeing to the [Terms of Service](#) and the [Privacy Policy](#).

Create an account

You'll love GitHub

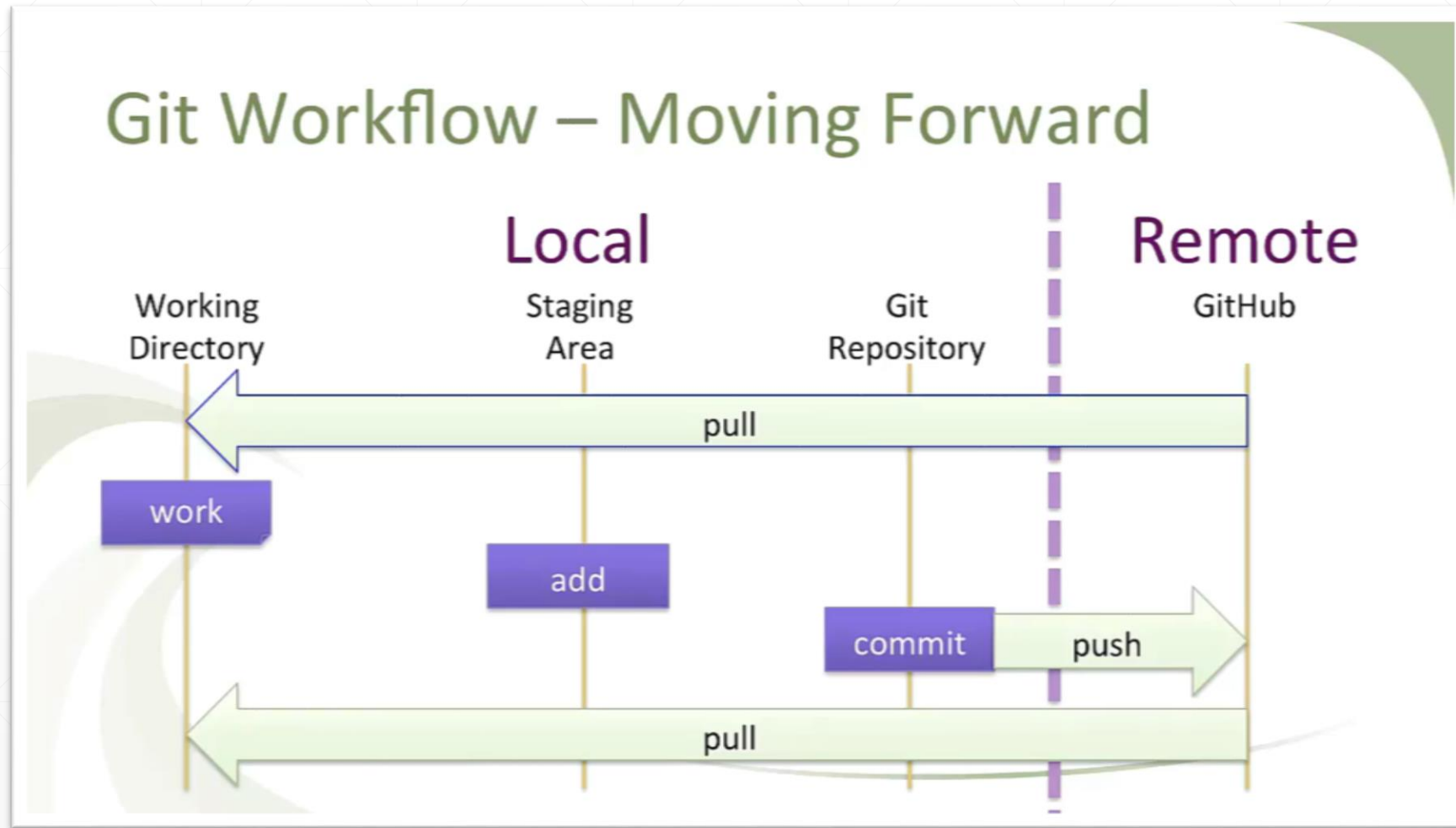
Unlimited collaborators
Unlimited public repositories

- ✓ Great communication
- ✓ Frictionless development
- ✓ Open source community

Key Git concepts

- Repository contains files, history, config managed by Git
 - Three States of Git
 - Working directory
 - Staging area – pre-commit holding area
 - Commit – Git Repository (history)
 - Remote repository (GitHub)
 - Master branch
-

Git Workflow



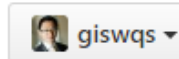
Create a new repository

➤ <https://github.com/new>

Create a new repository

A repository contains all the files for your project, including the revision history.

Owner



Repository name



Great repository names are short and memorable. Need inspiration? How about **reimagined-robot**.

Description (optional)

This is a testing 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

Clone a repository

- Clone a repo from GitHub to your local computer

The screenshot shows the GitHub interface for a repository named 'testing' by user 'giswqs'. At the top, it displays '1 commit', '1 branch', '0 releases', and '1 contributor'. Below this, there are buttons for 'Branch: master', 'New pull request', 'Create new file', 'Upload files', 'Find file', and a green 'Clone or download' button. The 'Clone or download' dropdown menu is open, showing the 'Clone with HTTPS' option selected. The URL 'https://github.com/giswqs/testing.git' is displayed in a red-bordered box with a copy icon to its right. Other options in the dropdown include 'Use SSH', 'Open in Desktop', and 'Download ZIP'. The repository content shows a file named 'README.md' with the text 'testing' and 'This is a testing repo'.

1 commit 1 branch 0 releases 1 contributor

Branch: master New pull request Create new file Upload files Find file Clone or download

giswqs Initial commit

README.md Initial commit

Clone with HTTPS Use SSH

Use Git or checkout with SVN using the web URL.

`https://github.com/giswqs/testing.git`

Open in Desktop Download ZIP

README.md

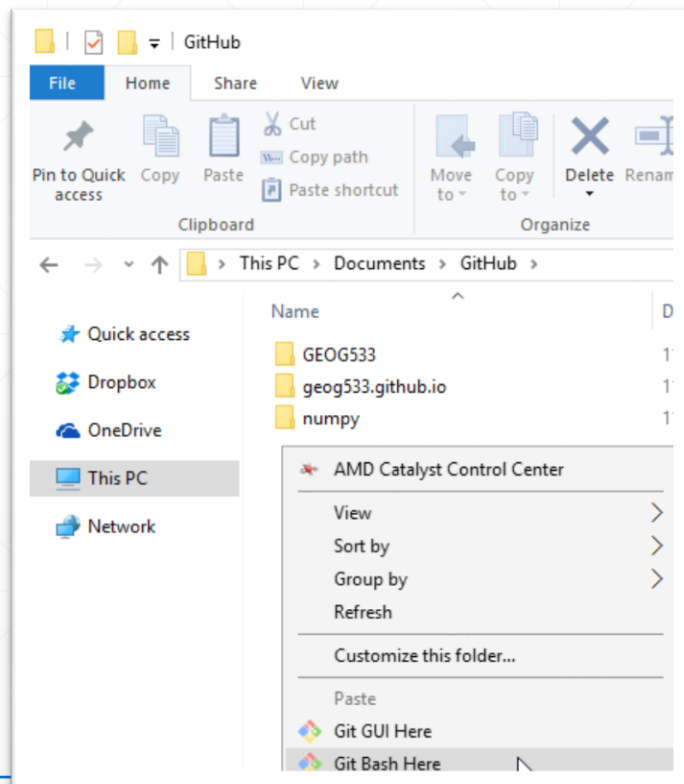
testing

This is a testing repo

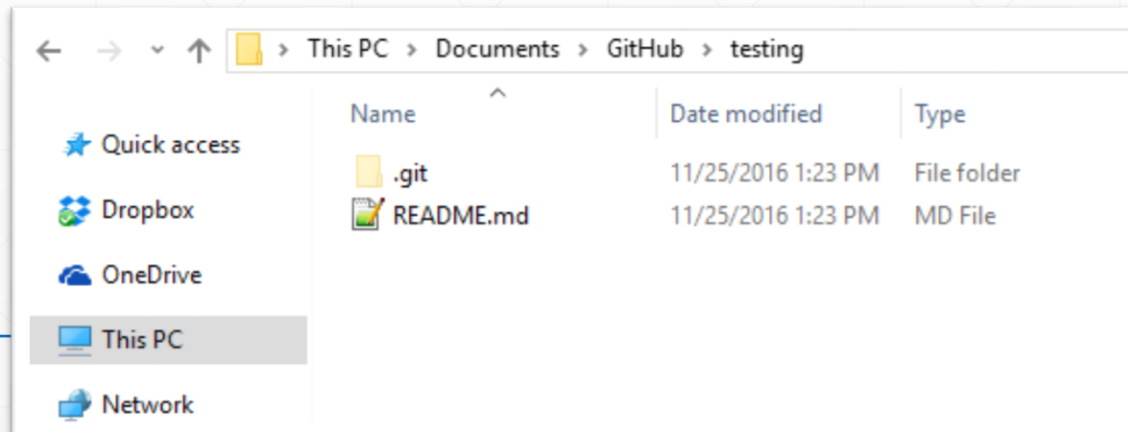
Clone a repository

➤ Steps

- Open **Git Bash**
- Enter command: ***git clone https://github.com/giswqs/testing.git***

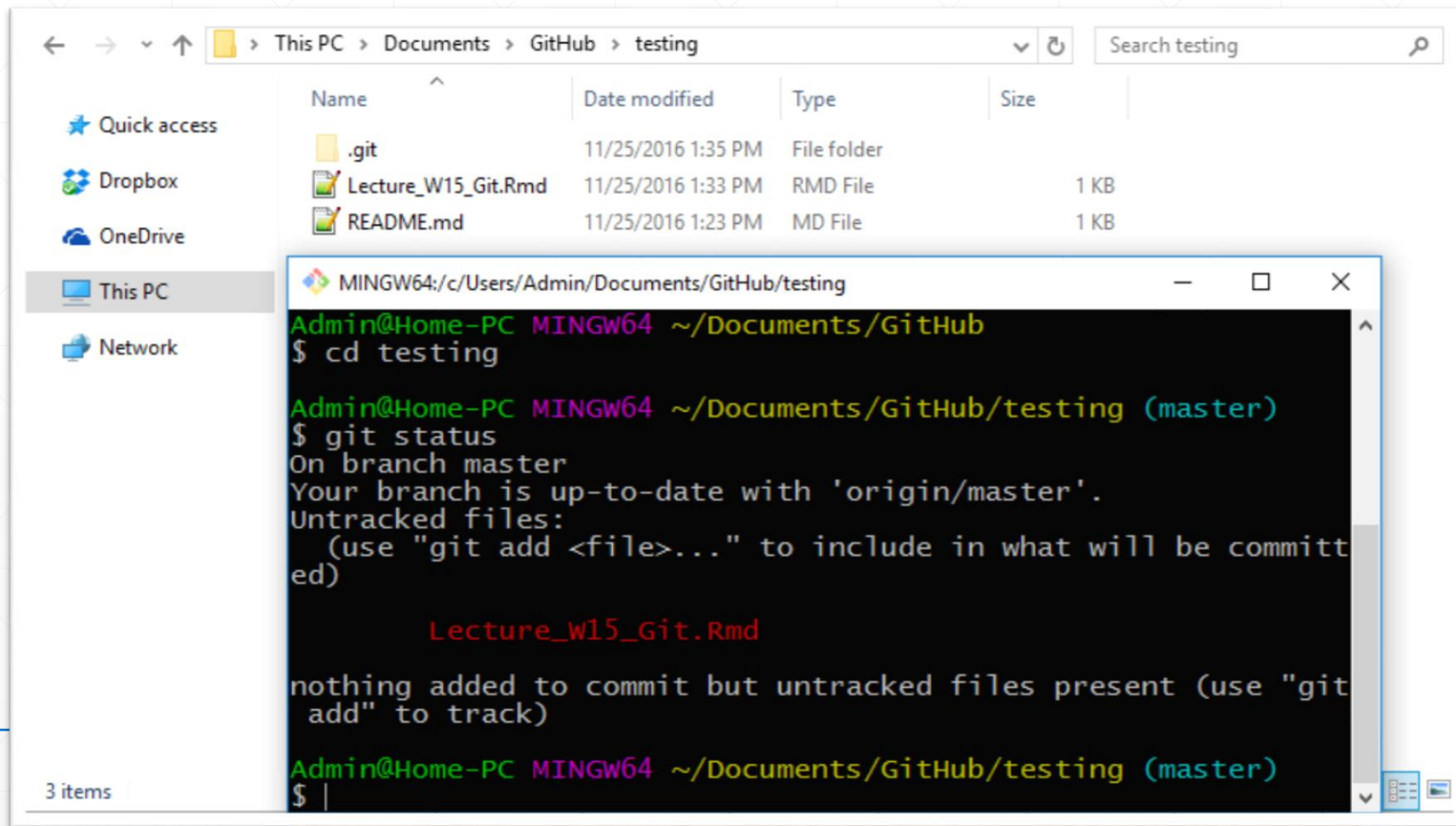


```
MINGW64/c/Users/Admin/Documents/GitHub
Admin@Home-PC MINGW64 ~/Documents/GitHub
$ git clone https://github.com/giswqs/testing.git
Cloning into 'testing'...
remote: Counting objects: 3, done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
Admin@Home-PC MINGW64 ~/Documents/GitHub
$
```



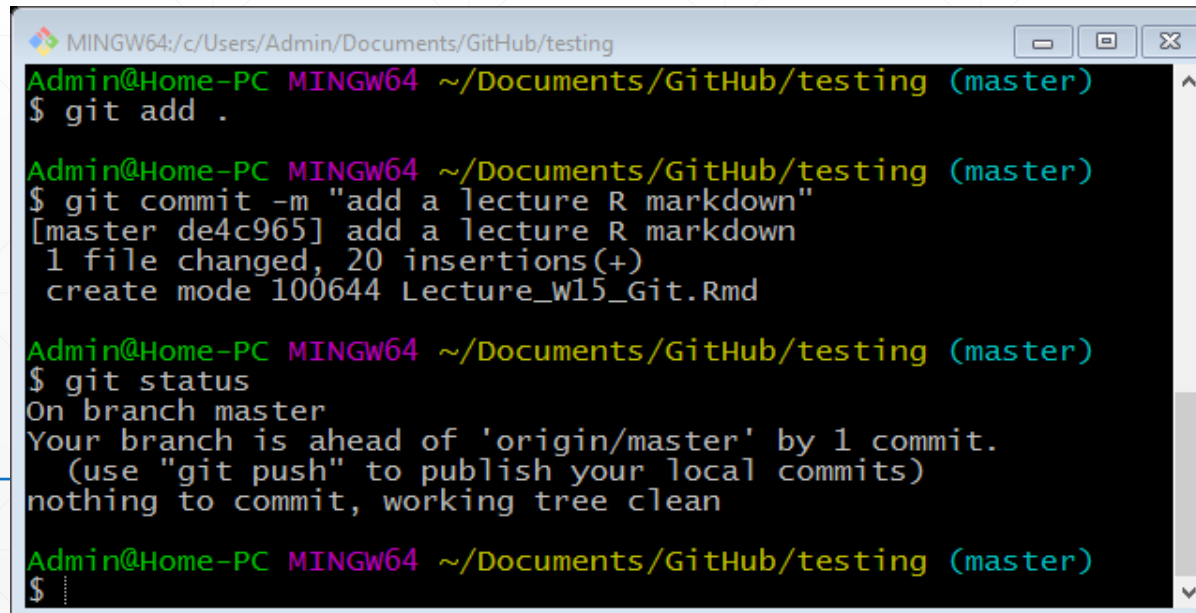
Add files to local repo

- Add any files to the local repo folder (e.g., *Lecture_W15_Git.Rmd*)
- Use command ***git status*** to check changes



Commit the changes

- Add files to Git staging area
 - ***git add .*** or ***git add "[filename]"***
- Commit the staged content as a new commit snapshot
 - ***git commit -m "[descriptive message]"***
- Check status
 - ***git status***

A screenshot of a Windows terminal window with a black background and green text. The window title is 'MINGW64:/c/Users/Admin/Documents/GitHub/testing'. The terminal shows a sequence of Git commands and their outputs. The first command is 'git add .' followed by a prompt. The second command is 'git commit -m "add a lecture R markdown"', which outputs the commit hash '[master de4c965]', the message 'add a lecture R markdown', and file statistics: '1 file changed, 20 insertions(+)' and 'create mode 100644 Lecture_w15_Git.Rmd'. The third command is 'git status', which outputs 'On branch master', 'Your branch is ahead of 'origin/master' by 1 commit.', '(use "git push" to publish your local commits)', and 'nothing to commit, working tree clean'. The prompt '\$' is visible at the bottom.

```
MINGW64:/c/Users/Admin/Documents/GitHub/testing
Admin@Home-PC MINGW64 ~/Documents/GitHub/testing (master)
$ git add .

Admin@Home-PC MINGW64 ~/Documents/GitHub/testing (master)
$ git commit -m "add a lecture R markdown"
[master de4c965] add a lecture R markdown
1 file changed, 20 insertions(+)
create mode 100644 Lecture_w15_Git.Rmd

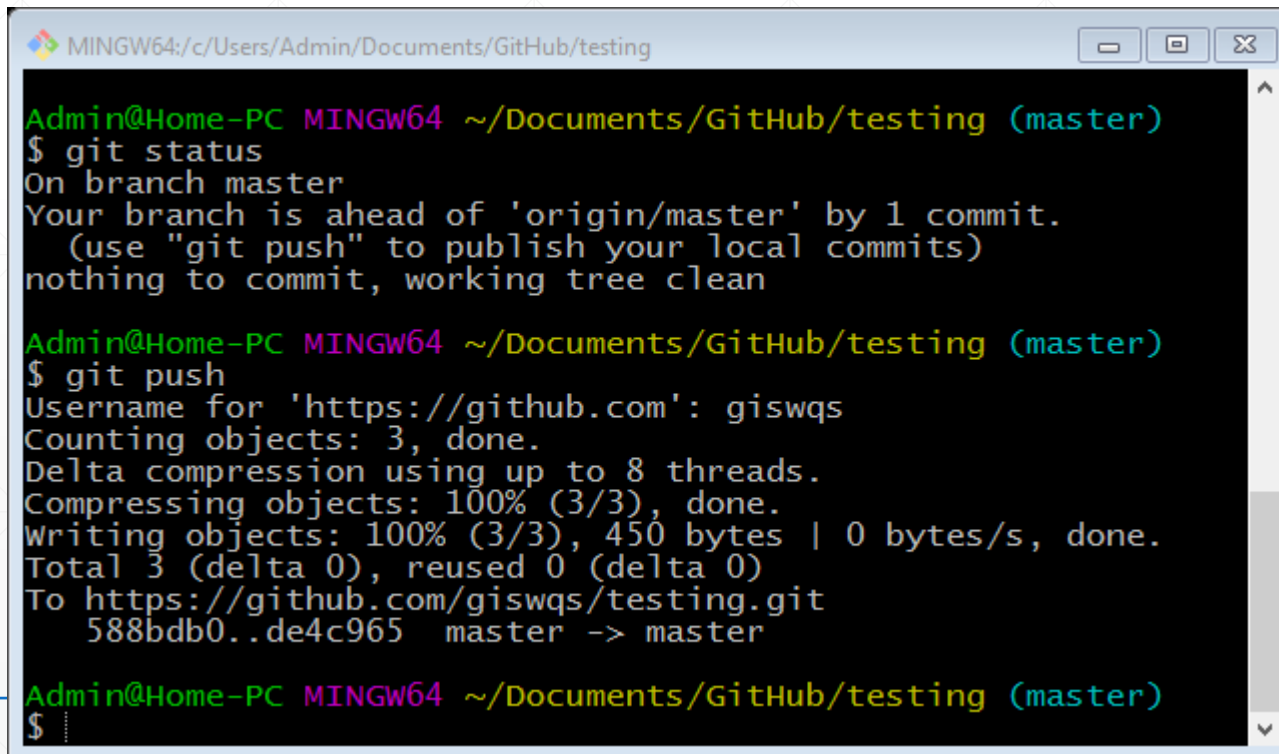
Admin@Home-PC MINGW64 ~/Documents/GitHub/testing (master)
$ git status
On branch master
Your branch is ahead of 'origin/master' by 1 commit.
(use "git push" to publish your local commits)
nothing to commit, working tree clean

Admin@Home-PC MINGW64 ~/Documents/GitHub/testing (master)
$
```

Push changes to GitHub

➤ Push changes to GitHub

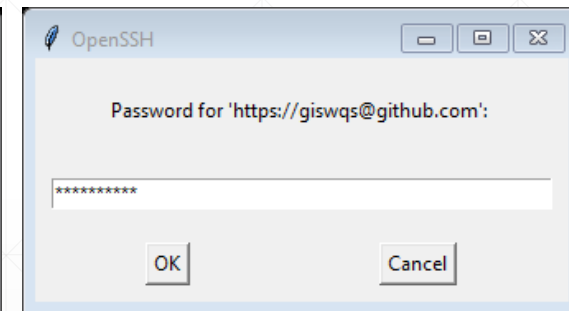
- ***git push***
- Optional: ***git config credential.helper store*** (no need to enter GitHub username and password every time)



```
Admin@Home-PC MINGW64 ~/Documents/GitHub/testing (master)
$ git status
On branch master
Your branch is ahead of 'origin/master' by 1 commit.
  (use "git push" to publish your local commits)
nothing to commit, working tree clean

Admin@Home-PC MINGW64 ~/Documents/GitHub/testing (master)
$ git push
Username for 'https://github.com': giswqs
Counting objects: 3, done.
Delta compression using up to 8 threads.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 450 bytes | 0 bytes/s, done.
Total 3 (delta 0), reused 0 (delta 0)
To https://github.com/giswqs/testing.git
  588bdb0..de4c965  master -> master

Admin@Home-PC MINGW64 ~/Documents/GitHub/testing (master)
$
```



Check changes on GitHub

➤ <https://github.com/giswqs/testing>

The screenshot shows the GitHub interface for the repository 'giswqs/testing'. At the top, there are tabs for Code, Issues (0), Pull requests (0), Projects (0), Wiki, Pulse, Graphs, and Settings. Below the tabs, it says 'This is a testing repo — Edit'. A summary bar shows '2 commits', '1 branch', '0 releases', and '1 contributor'. Below this, there are buttons for 'Branch: master', 'New pull request', 'Create new file', 'Upload files', 'Find file', and a green 'Clone or download' button. The commit history is listed below, with the latest commit 'giswqs add a lecture R markdown' (commit de4c965) 14 minutes ago. The commit 'Lecture_W15_Git.Rmd' is highlighted with a red box. Below the commit history, there is a section for 'README.md' which contains the text 'testing' and 'This is a testing repo'.

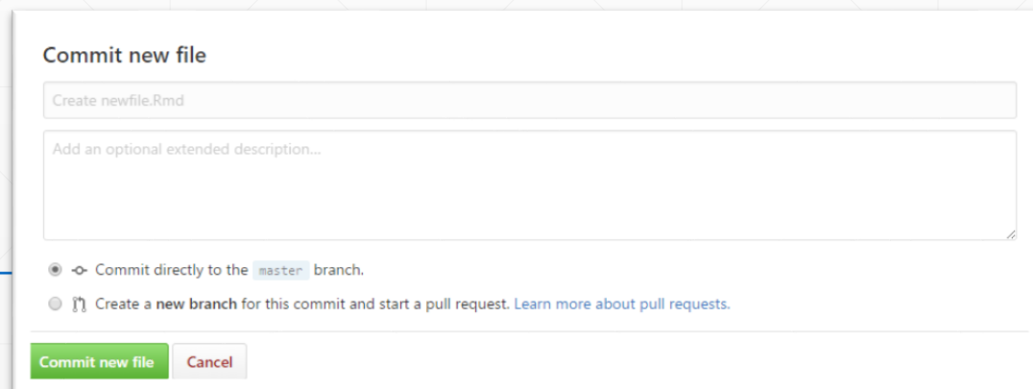
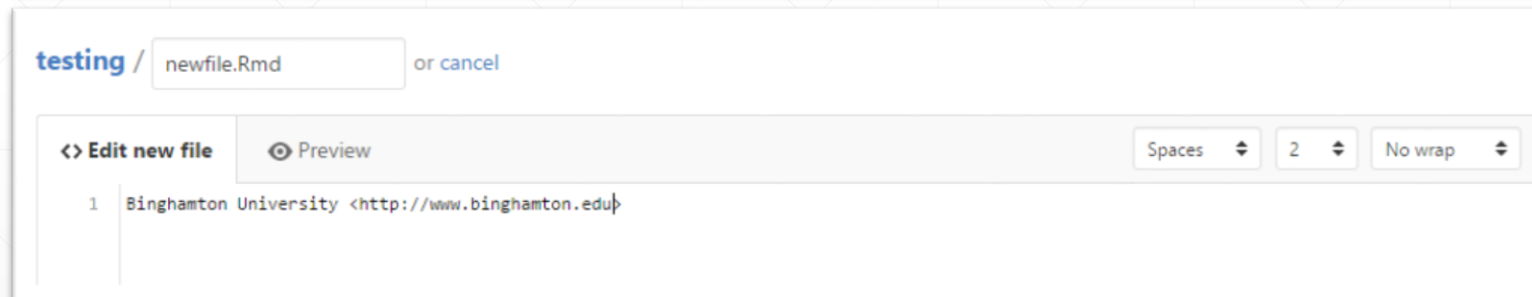
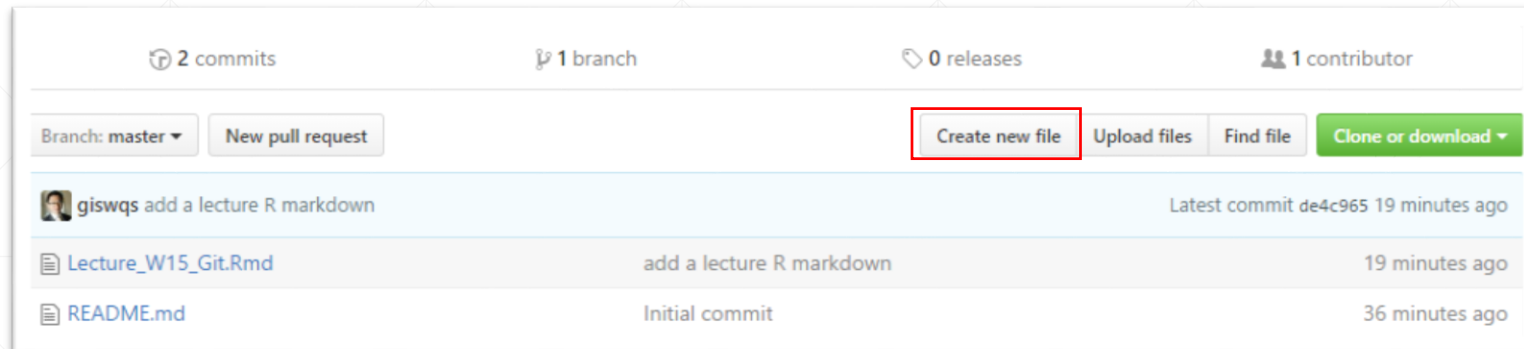
Commit	Message	Time
giswqs	add a lecture R markdown	14 minutes ago
Initial commit	Initial commit	31 minutes ago

testing

This is a testing repo

Make changes on GitHub

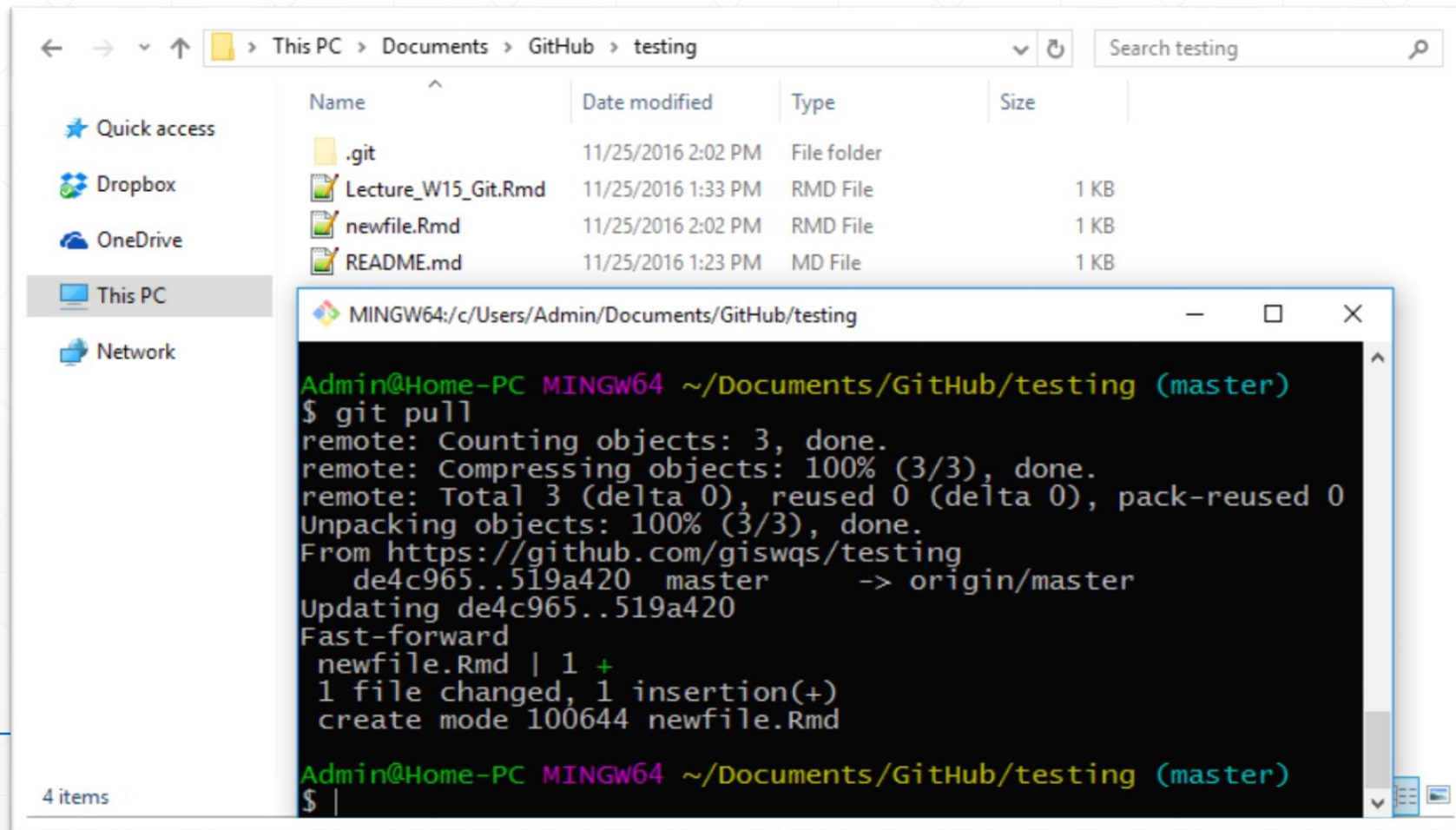
➤ Create a new file



Pull GitHub changes to local repo

➤ Pull GitHub changes to local repo

- ***git pull***



The screenshot shows a Windows File Explorer window with the address bar set to 'This PC > Documents > GitHub > testing'. The left sidebar shows 'Quick access' with links to 'Dropbox', 'OneDrive', 'This PC', and 'Network'. The main pane displays a table of files:

Name	Date modified	Type	Size
.git	11/25/2016 2:02 PM	File folder	
Lecture_W15_Git.Rmd	11/25/2016 1:33 PM	RMD File	1 KB
newfile.Rmd	11/25/2016 2:02 PM	RMD File	1 KB
README.md	11/25/2016 1:23 PM	MD File	1 KB

Below the File Explorer, a terminal window titled 'MINGW64:/c/Users/Admin/Documents/GitHub/testing' is open. It shows the output of the 'git pull' command:

```
Admin@Home-PC MINGW64 ~/Documents/GitHub/testing (master)
$ git pull
remote: Counting objects: 3, done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
From https://github.com/giswqs/testing
   de4c965..519a420  master    -> origin/master
Updating de4c965..519a420
Fast-forward
 newfile.Rmd | 1 +
 1 file changed, 1 insertion(+)
 create mode 100644 newfile.Rmd

Admin@Home-PC MINGW64 ~/Documents/GitHub/testing (master)
$ |
```


GitHub Pages

➤ Create your website and host it on GitHub

- <https://pages.github.com/>

➤ Create a new repo: ***[username].github.io***

Create a new repository

A repository contains all the files for your project, including the revision history.

Owner

Repository name

 geog533 ▾

/ geog533.github.io ✓

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

Description (optional)

This is the website 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** ▾

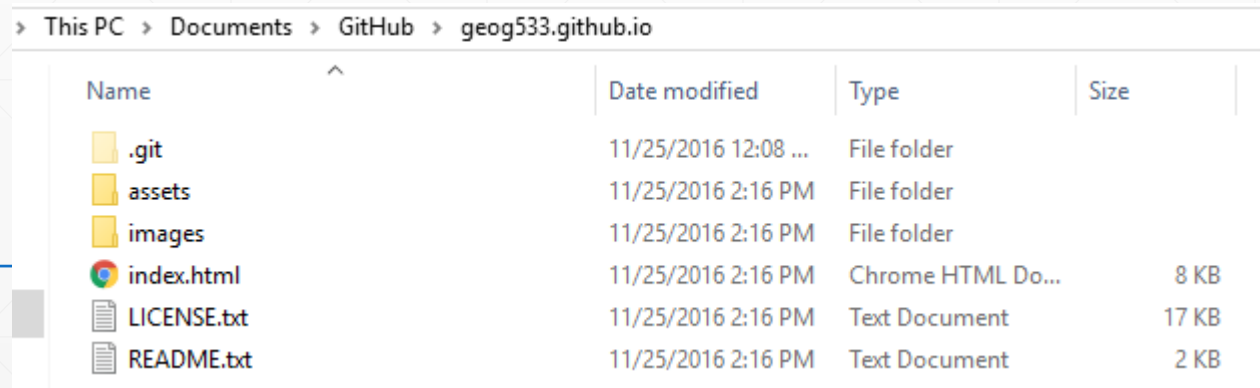
Add a license: **None** ▾



Create repository

Website template

- Clone the GitHub repo to local PC
 - ***git clone https://github.com/geog533/geog533.github.io.git***
- Download a website template and copy files to the repo
 - <https://html5up.net/>
- Commit changes
 - ***git add .***
 - ***git commit -m "add website files"***
- Push changes to GitHub
 - ***git push***



Name	Date modified	Type	Size
.git	11/25/2016 12:08 ...	File folder	
assets	11/25/2016 2:16 PM	File folder	
images	11/25/2016 2:16 PM	File folder	
index.html	11/25/2016 2:16 PM	Chrome HTML Do...	8 KB
LICENSE.txt	11/25/2016 2:16 PM	Text Document	17 KB
README.txt	11/25/2016 2:16 PM	Text Document	2 KB

Preview the website

➤ <https://geog533.github.io>

The screenshot shows the GitHub interface for the repository **geog533 / geog533.github.io**, which is a fork of **giswqs/testing**. The repository has 0 Watchers, 0 Stars, and 1 Fork. The main navigation bar includes links for Code, Pull requests (0), Projects (0), Wiki, Pulse, Graphs, and Settings. Below this, a message states "This is a testing repo — Edit". A summary bar indicates 4 commits, 1 branch, 0 releases, and 1 contributor. Action buttons include "Branch: master", "New pull request", "Create new file", "Upload files", "Find file", and "Clone or download". A note states "This branch is even with giswqs:master." with links for "Pull request" and "Compare". The commit history shows a single commit by **giswqs** titled "add website files" from 3 minutes ago. The file list includes **assets**, **images**, **LICENSE.txt**, **README.txt**, and **index.html**, all added in the same commit.

File	Commit Message	Time
assets	add website files	3 minutes ago
images	add website files	3 minutes ago
LICENSE.txt	add website files	3 minutes ago
README.txt	add website files	3 minutes ago
index.html	add website files	3 minutes ago

Git Cheat Sheet

➤ <https://education.github.com/git-cheat-sheet-education.pdf>

SETUP

Configuring user information used across all local repositories

git config --global user.name "[firstname lastname]"

set a name that is identifiable for credit when review version history

git config --global user.email "[valid-email]"

set an email address that will be associated with each history marker

git config --global color.ui auto

set automatic command line coloring for Git for easy reviewing

SETUP & INIT

Configuring user information, initializing and cloning repositories

git init

initialize an existing directory as a Git repository

git clone [url]

retrieve an entire repository from a hosted location via URL

STAGE & SNAPSHOT

Working with snapshots and the Git staging area

git status

show modified files in working directory, staged for your next commit

git add [file]

add a file as it looks now to your next commit (stage)

git reset [file]

unstage a file while retaining the changes in working directory

git diff

diff of what is changed but not staged

git diff --staged

diff of what is staged but not yet committed

git commit -m "[descriptive message]"

commit your staged content as a new commit snapshot

Git Cheat Sheet

➤ <https://education.github.com/git-cheat-sheet-education.pdf>

BRANCH & MERGE

Isolating work in branches, changing context, and integrating changes

git branch

list your branches. a * will appear next to the currently active branch

git branch [branch-name]

create a new branch at the current commit

git checkout

switch to another branch and check it out into your working directory

git merge [branch]

merge the specified branch's history into the current one

git log

show all commits in the current branch's history

SHARE & UPDATE

Retrieving updates from another repository and updating local repos

git remote add [alias] [url]

add a git URL as an alias

git fetch [alias]

fetch down all the branches from that Git remote

git merge [alias]/[branch]

merge a remote branch into your current branch to bring it up to date

git push [alias] [branch]

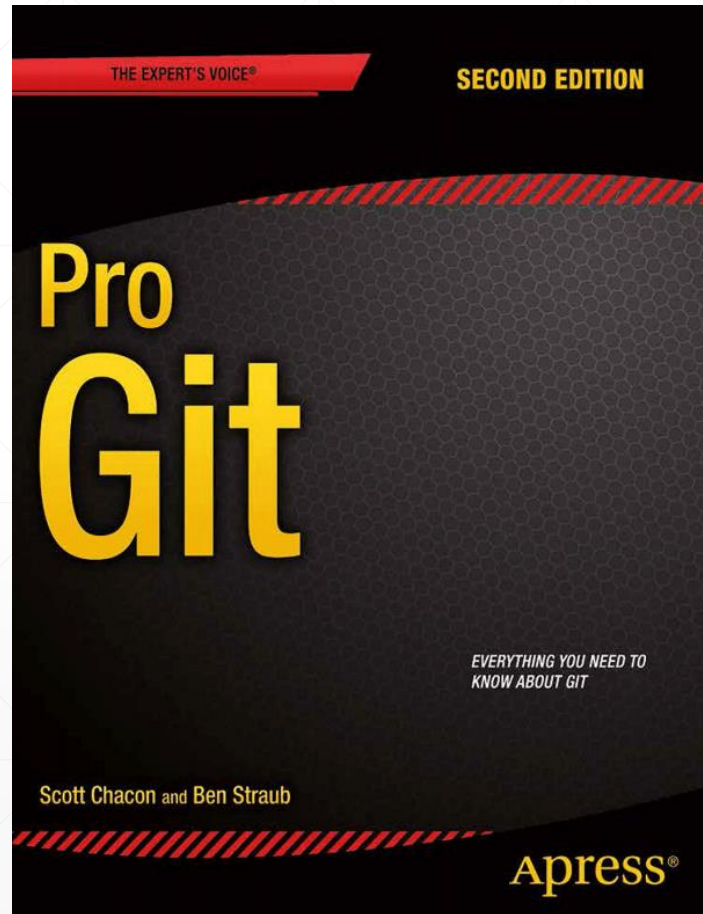
Transmit local branch commits to the remote repository branch

git pull

fetch and merge any commits from the tracking remote branch

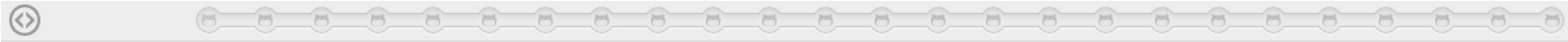
Git book

➤ <https://git-scm.com/book/en/v2>



Try Git

➤ <https://try.github.io/>



1.1 · Got 15 minutes and want to learn Git?

Git allows groups of people to work on the same documents (often code) at the same time, and without stepping on each other's toes. It's a distributed version control system.

Our terminal prompt below is currently in a directory we decided to name "octobox". To initialize a Git repository here, type the following command:

➔ `git init`

