Git - 0 to Pro Reference

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Tutorial link: https://www.youtube.com/watch?v=hrTQipWp6co

Command Line (Terminal / PowerShell)

`ls`	List the files and folders in the current folder
`cd ~/Desktop/folder`	Change the folder that the command line is running in

Note: git commands must be run inside the folder that contains all the code.

Creating Commits

In Git, version = commit
Version history = commit history

`git init`	Git will start tracking all changes in the current folder
`git status`	Show all changes since the previous commit
`git add <file|folder>`	Pick changes to go into next commit
`  git add file`	Pick individual file
`  git add folder/`	Pick all files inside a folder (and subfolders)
`  git add .`	Pick all files (in folder command line is running in)
`git commit -m "message"`	Creates a commit with a message attached
`git commit -m "message" --amend`	Update previous commit instead of creating new one
`git log`	View the commit history
`  git log --all`	Show all commits (not just current branch)
`  git log --all --graph`	Show branching visually in the command line

Configure Name & Email for Commits

```
git config --global user.name "Your Name"
git config --global user.email "email@example.com"
```

Working Area = contains changes start in the working area

Staging Area = contains changes that will go into the next commit

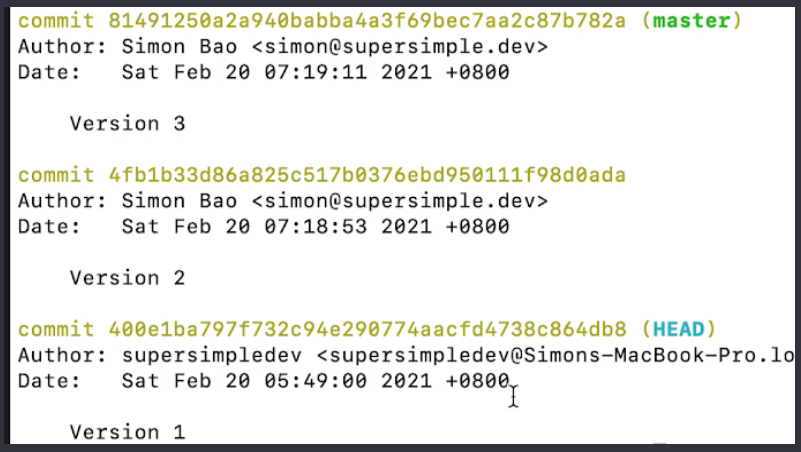
```
git add .                          working => staging
git commit -m "message"            staging => commit history

git reset <file|folder>            staging => working
  git reset file
  git reset folder/
  git reset .
git checkout -- <file|folder>      working => remove the  changes
  git checkout -- file
  git checkout -- folder/
  git checkout -- .
```

Viewing Previous Commits

```
git checkout <commit_hash|branch_name>
```

View a previous commit



master = branch name
1. You can `git checkout branch`
2. Always points to latest commit on the branch.

HEAD = indicates which commit you are currently viewing

Restoring to a Previous Commit

```
git checkout <hash|branch> <file|folder>
```

Restore the contents of files back to a previous commit

```
  git checkout <hash|branch> file          Restore a file
  git checkout <hash|branch> folder/       Restore all files in folder (& subfolders)
  git checkout <hash|branch> .             Restore all files in project
```

Other Features of Git

```
git config --global alias.shortcut <command>
  git config --global alias.s "status"
```

Creates an alias (a shortcut)

```
  git s = git status
```

`.gitignore`	Tell git which files/folders it SHOULD NOT track
`rm -rf .git`	Remove git from project

GitHub

Repository = a folder containing code where any changes to the code are tracked by git.
(To create a repository, we create a new folder on our computer, and then run `git init`)

GitHub = a service that lets us save our git repositories online. It also helps us:

- backup our code in case we delete it on our computer
- see the history of our code changes more easily
- alternatives include Bitbucket and GitLab

Local repository = a git repository saved on our computer
Remote repository = a git repository saved online (for example on GitHub)

Uploading Code to GitHub

`git remote add <remote_name> <url>`	Link a local repository to a remote repository and give a name for this link

```
git remote add origin https://github.com/SuperSimpleDev/repository1
^
```

The above command links a local repository to a GitHub repository (located at the url `https://github.com/SuperSimpleDev/repository1`) and gives it a name "origin"

`git remote`	List all remote repositories that are linked
`git remote -v`	List all remote repositories (but with more detail)
`git remote remove <remote_name>`	Removes a link to a remote repository
`git remote remove origin`	Removes the link to the remote repository named "origin"
`git config --global credential.username <username>`	Configure your GitHub username so you can get access to your Github repository
`git push <remote_name> <branch>`	Upload a branch of your git version history to your remote repository
`git branch`	Shows a list of available branches
`git log --all --graph`	Shows the branches visually in the history

```
  git push origin main
```
Upload the branch "main" to the remote repository named "origin"

```
git push <remote_name> <branch> --set-upstream
```
Sets up a shortcut for this branch and remote repository

```
  git push origin main --set-upstream
```
Next time you are on the `main` branch and you run `git push`, it will automatically push the `main` branch to `origin`

```
git push <remote_name> <branch> -f
```
Force-push the branch to the remote repository (it will overwrite what's on the remote repository)

Downloading Code from GitHub

```
git clone <url>
    git clone https://github.com/SuperSimpleDev/repository1
```
Download a remote repository from a `url`

```
git clone <url> <folder_name>
```
Download the repository and give it a different folder name

```
git fetch
```
Updates all remote tracking branches. Remote tracking branches (like `origin/main`) show what the branch looks like in the remote repository

```
git pull <remote_name> <branch>
```
Update the local branch with any updates from the remote repository (on GitHub)

```
  git pull origin main
```
Downloads any new commits from the `main` branch on `origin`, and updates the local `main` branch with those new commits

```
  git pull origin main --set-upstream
  ^
```
Sets up a shortcut so that the next time you are on the `main` branch and run `git pull`, it will automatically `git pull origin main`

Branching

Branching = create a copy of the version history that we can work on without affecting the original version history. This lets us work on multiple things (features + fixes) at the same time.

```
git branch <branch_name>
```
Creates a new branch

```
  git branch feature1
```
Create a new branch named `feature1`

```
git checkout <branch_name>
```
Switch to a different branch and start working on that branch

```
  git checkout feature1
```
Switch to the `feature1` branch. New commits will now be added to the `feature1` branch

```
* commit 9bb22ff9063a3e1134e5cea3fb289df492868cef (HEAD -> feature1, master)
| Author: Simon Bao <simon@supersimple.dev>
| Date:   Sat Jun 5 09:27:25 2021 +0800
|
|     version3
|
* commit 8464f5b7dc7d0271f8a00f9dc0b707b4ecc64301
| Author: Simon Bao <simon@supersimple.dev>
| Date:   Sat Jun 5 09:27:16 2021 +0800
|
|     version2
|
* commit 285addbf98ee4d450c226a410acf38ab16ba7696
  Author: Simon Bao <simon@supersimple.dev>
  Date:   Sat Jun 5 09:27:01 2021 +0800

      version1
```

HEAD = points to which branch we are currently working on
HEAD -> `feature1` = we are currently working on the `feature1` branch. Any new commits will be added to the `feature1` branch

`git branch -D <branch_name>` `git branch -D feature1`	Deletes a branch Deletes the `feature1` branch

Merging

`git merge <branch_name> -m "message"`	Merge the current branch (indicated by **HEAD ->**) with another branch (`<branch_name>`). Saves the result of the merge as a commit on the current branch
`git checkout main` `git merge feature1 -m "message"`	1. First switch to the `main` branch 2. Then merge the `main` branch with the `feature1` branch. The result of the merge will be added to `main` as a commit (a "merge commit")

Merge Conflicts

`<<<<<<< HEAD`
`code1`
`=======`
`code2`
`>>>>>>> branch`
	If there is a merge conflict (git doesn't know what the final code should be), it will add this in your code.
	
	(This is just for your convenience, the `<<<<<<<` and `>>>>>>>` don't have special meaning)

```
<<<<<<< HEAD
...             <-- Code in the current branch (indicated by HEAD ->)
=======
...             <-- Code in the branch that is being merged into HEAD
>>>>>>> branch
```

To resolve a merge conflict:

1. Delete all the extra code and just leave the final code that you want.

~~<<<<<<< HEAD~~
~~code1~~
~~=======~~ => code2
code2
~~>>>>>>> branch~~

2. If there are conflicts in multiple places in your code, repeat step 1 for all those places.

3. Create a commit.

```
git add .
git commit -m "message"
```

Feature Branch Workflow

A popular process that companies use when adding new features to their software.

1. Create a branch for the new feature (called a "feature branch").

```
git branch new-feature
git checkout new-feature
```

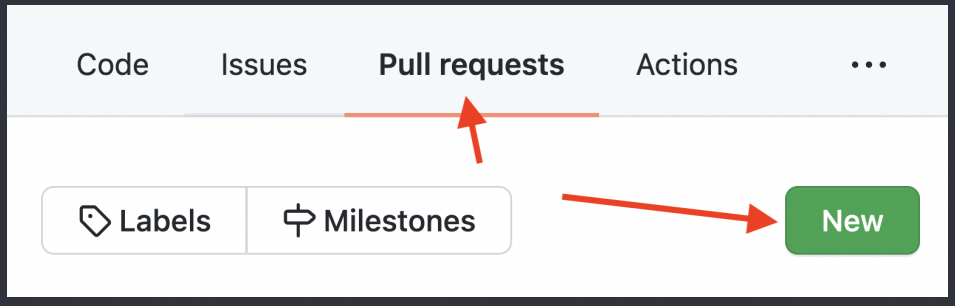
Make some changes to the code...

```
git add .
git commit -m "new feature message"
```

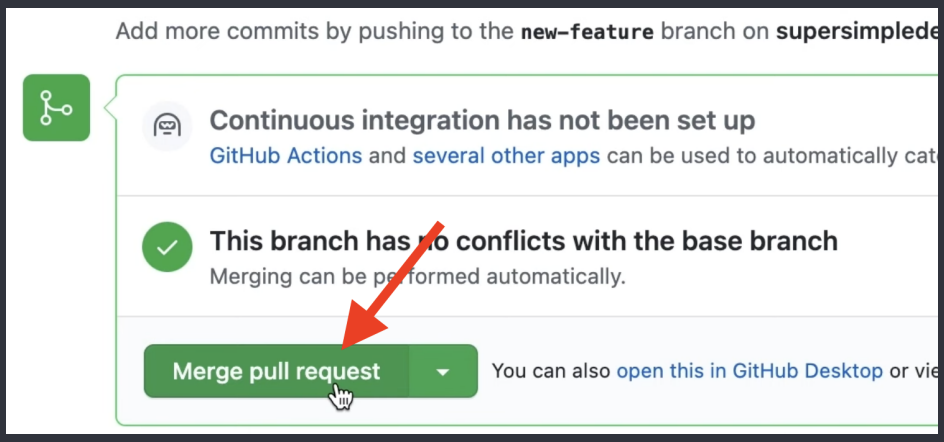
2. Upload the feature branch to GitHub.

```
git push origin new-feature
```

3. Create a pull request on GitHub (a pull request lets teammates do code reviews and add comments).



4. Merge the feature branch into the main branch (by opening the pull request in the browser and clicking "Merge pull request")



5. After merging, update the local repository (so that it stays in sync with the remote repository on GitHub).

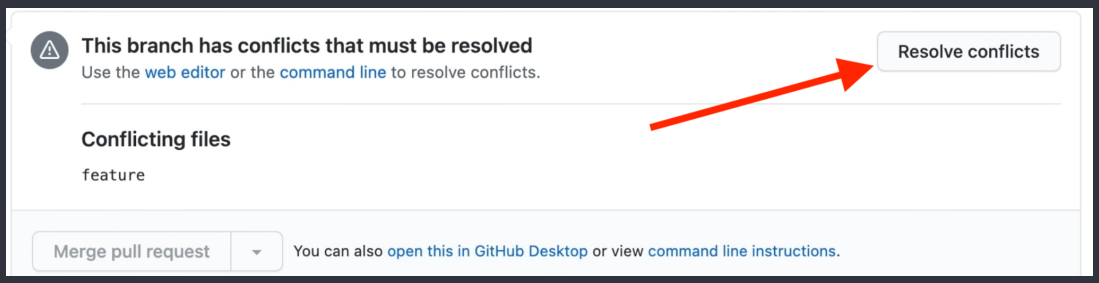
```
git checkout main
git pull origin main
```

Merge Conflicts in the Feature Branch Workflow

A merge conflict can happen if 2 or more pull requests change the same file and the same line.

We can either:

1. Resolve the merge conflict on GitHub.



2. Resolve the merge conflict on our computer.

1) Get the latest updates from `main`

```
git checkout main
git pull origin main
```

2) Get the latest updates from the feature branch.

```
git checkout feature4
git pull origin feature4
```

3) Merge `main` into the feature branch (`feature4`). Notice the direction of the merge: we want the merge commit to stay on the feature branch so our teammates can review it.

```
git checkout feature4
git merge master
```

4) Push the resolved feature branch to GitHub.

```
git push origin feature4
```

Now the pull request should be ready to merge again.