



GIT and Github

Git is a Version Control System (VCS). VCS is software that tracks and manage changes to files over time.

Installing GIT in MacOS

command to install git

```
brew install git
```

if already install, to update

```
brew update git
```

Configuring GIT

to check GIT version

```
git --version
```

Configuring the user name that git will associate with your work

```
git config --global user.name "your name"
```

to check git that you had git user name already use this command

```
git config --global user.name
```

Configuring Git user email. Git email address to be match with Github account

```
git config --global user.email sakibdalal73@gmail.com
```

to check git has email address already

```
git config --global user.email
```

Installing a GUI for GIT

Installing GitKraken GUI

[Thank You for Downloading GitKraken](#)

Basic UNIX Commands - Terminal

list the contents of directory , show hidden files

```
ls  
ls -a
```

open finder

```
open .
```

for windows

```
start .
```

print working directory - printout current path

```
pwd
```

change directory, come back to recent dir, main dir

```
cd dir_name  
cd ..  
cd ~
```

make new file's

```
touch filename.ext  
touch file1.txt file2.txt
```

make new folder or directory

```
mkdir dir-name
```

deleting files

```
rm file-name
```

deleting directory

```
rm -rf dir-name  
rmdir dir-name  
rmdir -r dir-name
```

clear terminal

```
command + K  
clear
```

Git Repository

Repository- a git repo is a workspace which tracks and manages files with a folder

git status command gives information on the current status of a git repository and its contents

```
git status
```

create a git repository

```
git init
```

```
git status  
ls -a
```

Committing

git add command is used to stage changes to be committed, is a way of telling git "please insert this change in our next commit."

```
git status  
touch mytext.txt  
git status  
nano mytext.txt  
touch mytext2.txt  
git status
```

```
# Output  
(base) sakibdalal@Sakibs-MacBook-Pro git % git status  
On branch master  
  
No commits yet  
  
Untracked files:  
(use "git add <file>..." to include in what will be committed)  
  mytext.txt  
  mytext2.txt  
  
nothing added to commit but untracked files present (use "git add" to track them)
```

git add command is use to add specific files to the staging area. Separate files with spaces to add multiple at once

Git add Command

```
git add file1 file2
```

```
git add mytext.txt  
git status
```

```
# Output:  
(base) sakibdalal@Sakibs-MacBook-Pro git % git status  
On branch master  
  
No commits yet  
  
Changes to be committed:  
(use "git rm --cached <file>..." to unstage)  
  new file:   mytext.txt
```

```
Untracked files:  
(use "git add <file>..." to include in what will be committed)  
mytext2.txt
```

```
git add mytext2.txt
```

```
# Output  
(base) sakibdalal@sakibs-MacBook-Pro git % git status  
On branch master  
  
No commits yet
```

```
Changes to be committed:  
(use "git rm --cached <file>..." to unstage)  
new file: mytext.txt  
new file: mytext2.txt
```

Git Commit Command

we use the git commit command to actually commit changes from the staging area. running git commit will commit all staged changes.

```
git commit -m "my message"
```

```
git commit -m "creating text files - stage 1"
```

```
# Output  
[master (root-commit) 58a34ad] creating text files - stage 1  
2 files changed, 2 insertions(+)  
create mode 100644 mytext.txt  
create mode 100644 mytext2.txt
```

```
git status
```

```
# Output  
On branch master  
nothing to commit, working tree clean
```

```
touch chapter01.txt  
git status
```

```
# Output
On branch master
Untracked files:
  (use "git add <file>..." to include in what will be committed)
    chapter01.txt

nothing added to commit but untracked files present (use "git add" to
stage them)

nano mytext.txt
# make some changes

git status

# Output
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
    modified:   mytext.txt

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    chapter01.txt

no changes added to commit (use "git add" and/or "git commit -a")
```

```
git add mytext.txt chapter01.txt

git status

# Output
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
    new file:   chapter01.txt
    modified:   mytext.txt
```

```
git commit -m "begin work on chapter 01"
```

```
# Output
```

```
[master 9c54509] begin work on chapter 01
 2 files changed, 1 insertion(+)
 create mode 100644 chapter01.txt

git status
```

Git Log Command

git log command the stages of commit done.

```
git log

# Output
commit 9c54509ec43322452f0f4a72b34ad8e48063c2ee (HEAD -> master)
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Fri Dec 8 13:02:45 2023 +0530

begin work on chapter 01

commit 58a34ad13bf190c18c440f6fad737be8b7e474bf # COMMIT HASH
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Fri Dec 8 12:52:02 2023 +0530

creating text files - stage 1
```

Git add all Command

it is use to add all stages changed

```
git add .
git status
```

Task :

👉 [Committing Basics Exercise](#)

```
mkdir Shopping
cd Shopping
git init
touch yard.txt groceries.txt
git status
git add .
git status
```

```
git commit -m "create yard and groceries list"  
git status  
git log
```

Atomic Commits

When possible, a commit should encompass a single feature, change, or fix. In other words, try to keep each commit focused on a single thing.

This makes it much easier to undo or rollback changes later on. It also makes your code or project easier to review.

```
git add individual_file_or_directory_to_add  
git commit -m "commit name"  
git status  
git log
```

Breaking down the project into individual commits can help in undoing the changes individually done before.

Write commits in Present tense

Default editor to commit in MAC

MacOS uses Vim as a default editor to commit changes

Configure VS Code to commit changes

Git - Setup and Config

This book is available in
English.

🔗 <https://git-scm.com/book/en/v2/Appendix-C:-Git-Commands-Setup-and-Config>

```
git config --global core.editor "code --wait"
```

```
git add .  
git commit # will open visual studio code to add commit description
```

```
this is my new commit in vscode
```

```
added new stuf in chapter01.txt  
# Please enter the commit message for your changes. Lines starting  
# with '#' will be ignored, and an empty message aborts the commit.
```

```
#  
# On branch master  
# Changes to be committed:  
#   modified:   chapter01.txt  
#
```

close the vs commit file and commit will be executed

Git log documents

[Git - git-log Documentation \(git-scm.com\)](#).

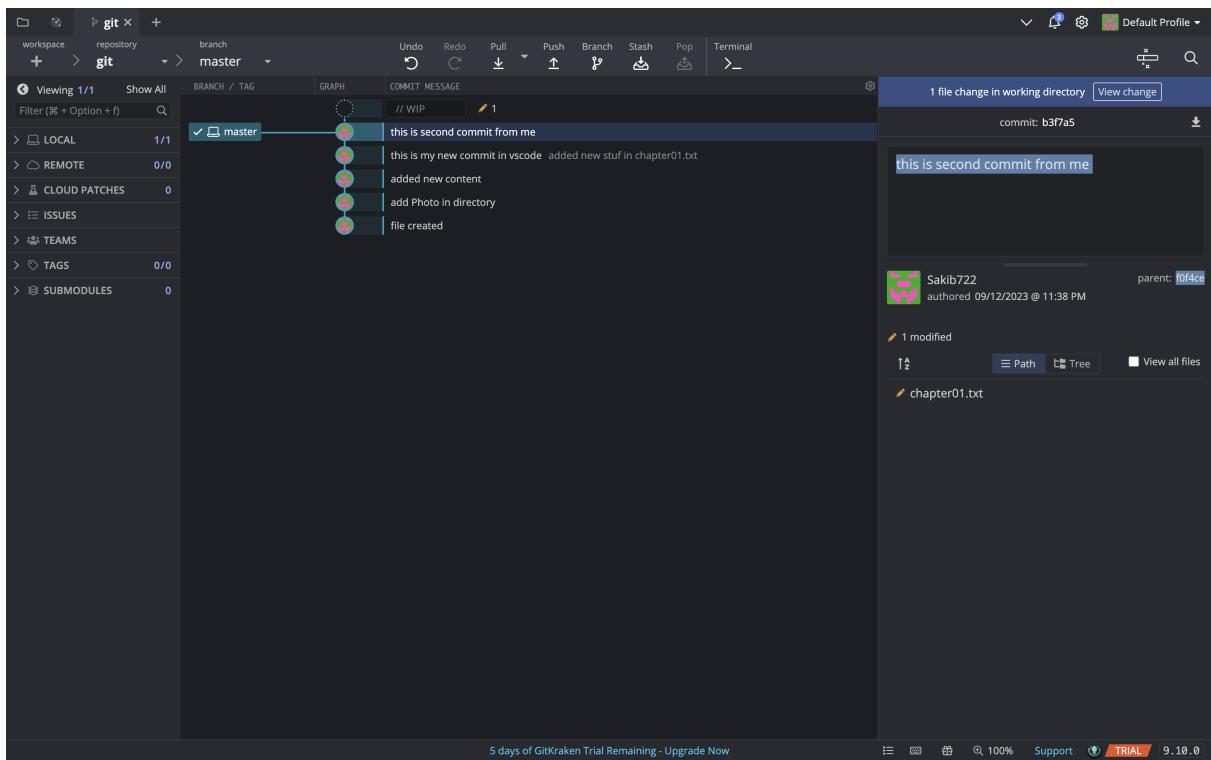
we need commit formatting from the document

```
git log --pretty=oneline  
git log --abbrev-commit  
  
git log --pretty=oneline --abbrev-commit
```

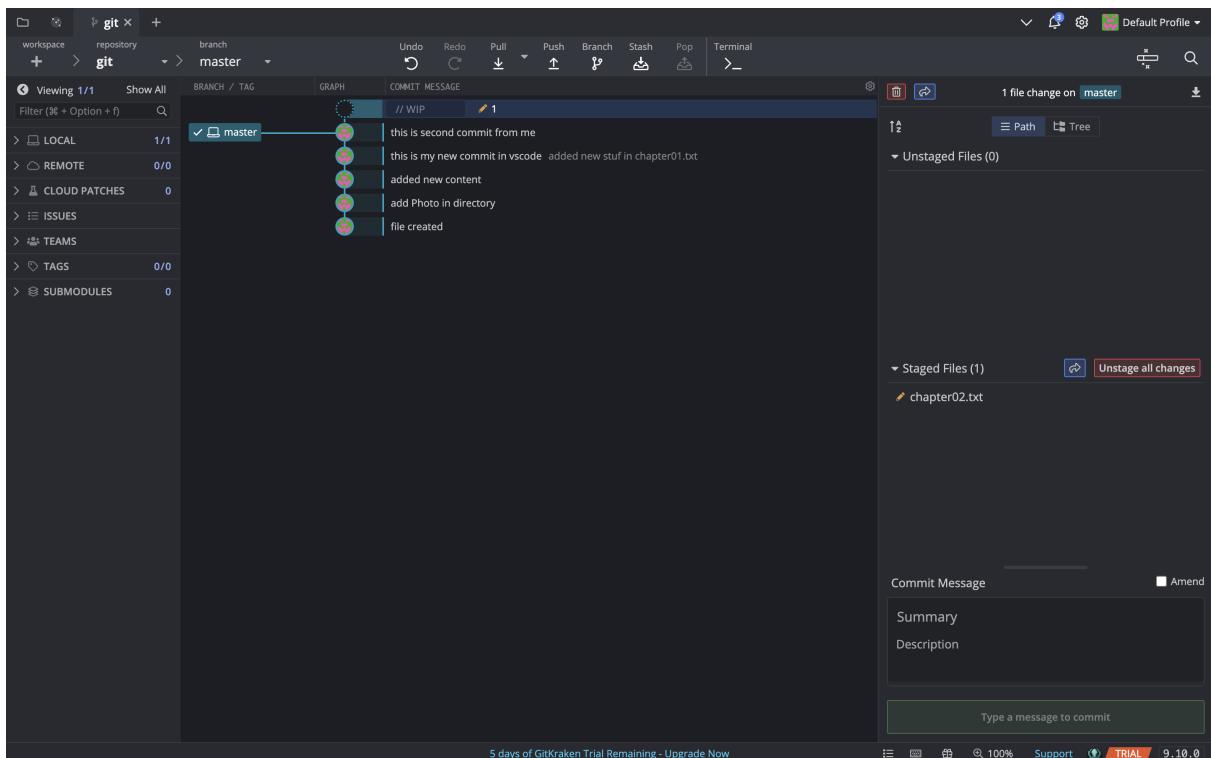
Remove extra lines in commit

```
git log --oneline  
  
# Output  
b3f7a59 (HEAD -> master) this is second commit from me  
f0f4ce0 this is my new commit in vscode  
62c8feb added new content  
4711594 add Photo in directory  
9b1f239 file created
```

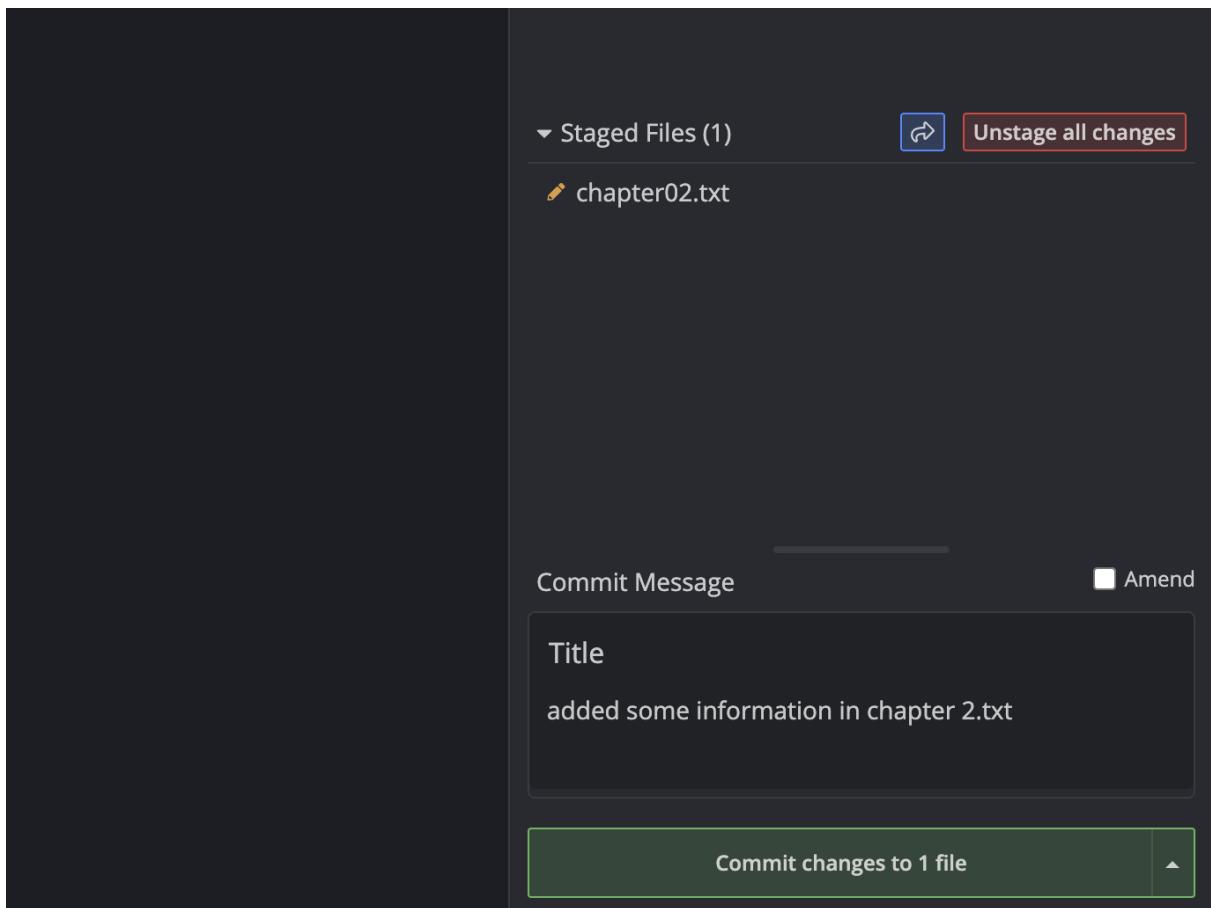
Commit using GUI - Git Kraken



View changes → stage file



Add commit Description and information and click on commit



new commit executed

The screenshot shows the GitHub desktop application interface. At the top, there's a toolbar with buttons for Undo, Redo, Pull, Push, Branch, Stash, and Pop. Below the toolbar, the current branch is set to 'master'. On the left, there's a sidebar with various status indicators like 'how All', '1/1', '0/0', and '0'. The main area displays a 'GRAPH' view of the commit history for the 'master' branch. The commits are represented by circular icons and a horizontal line connecting them. A blue header bar highlights the first commit, which has the message 'Title added some information in chapter 2.txt'. Subsequent commits have messages: 'this is second commit from me', 'this is my new commit in vscode added new stuf in chapter01.txt', 'added new content', 'add Photo in directory', and 'file created'. Each commit is preceded by a small circular icon.

Amending Commits

Suppose you just made a commit and then realised you forgot to include a file! Or, maybe you made a typo in the commit message that you want to correct.

Rather than making a brand new separate commit, you can “redo” the previous commit using the `--amend` option. (only for the currently done commit)

Syntax:

```
git commit -m "some commit"  
git add forgotten_file  
git commit --amend
```

example:

```
nano chapter01.txt  
touch chapter04.txt  
  
git add chapter01.txt  
git commit -m "chapter01 edited"
```

```
git add chapter04.txt  
git commit --amend # Opens VS code to edit commits
```

Ignoring Files

We can tell Git which file and directories to ignore in given repository, using a `.gitignore` file. This is useful for files you know you NEVER want to commit, including:

- Secrets, API keys, credentials, etc
- Operating System files (`.DS_Store` on MAC)
- log files
- Dependencies & packages

.gitignore

Create a file called `.gitignore` in the root of a repository. Inside the file, we can write patterns to tell Git which file and folders to ignore:

- `.DS_Store` will ignore file name `.DS_Store`
- `folderName/` will ignore an entire directory
- `*.log` will ignore any files with the `.log` extension

we can find a `.gitignore` file in githubs repositories

```
mkdir gitIgnore  
cd gitIgnore  
git init  
git status  
  
touch main.txt  
touch secrets_file.txt  
  
git status  
  
git add main.txt  
git commit -m "start the project"  
git status
```

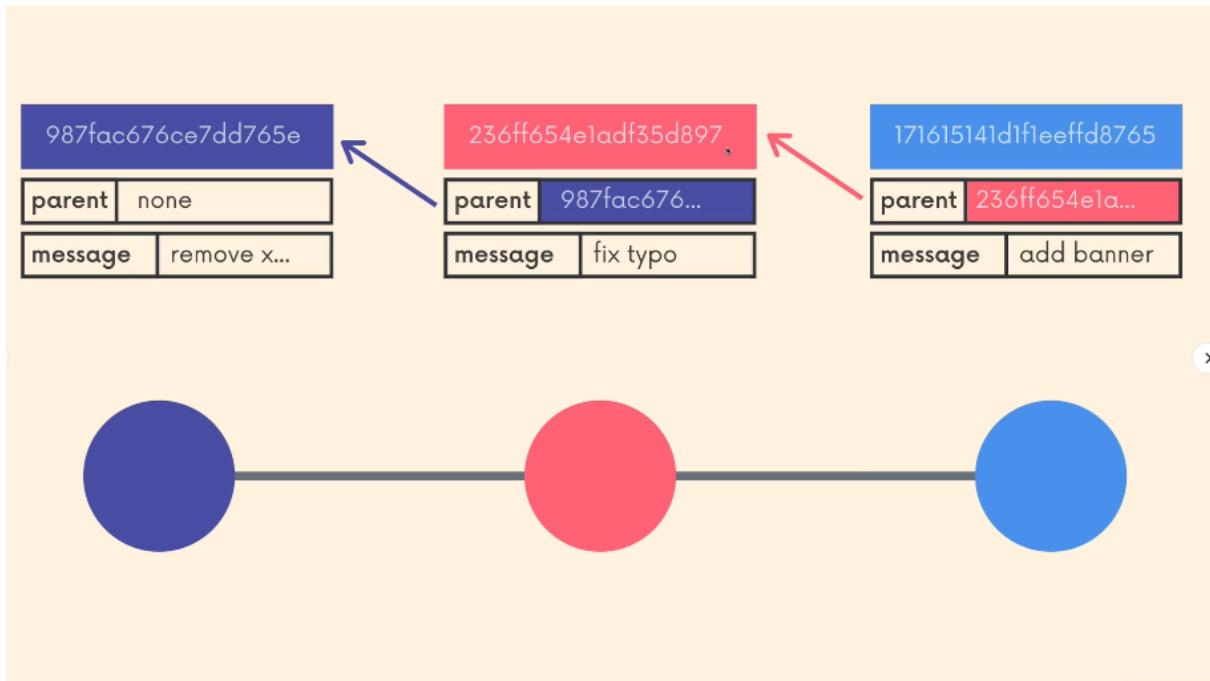
```
touch .gitignore  
nano .gitignore # add the file name to be ignored by git  
  
git status
```

```
git add.  
git commit -m "added .gitignore file"
```

git has a website which has the .gitignore file to be included in the git

<https://www.toptal.com/developers/gitignore>

Branching



Contexts

On large projects, we often work in multiple contexts:

1. You're working on 2 different color scheme variations for your website at the same time, unsure of which you like best
2. You're also trying to fix a horrible bug, but it's proving tough to solve. You need to really hunt around and toggle some code on and off to figure it out.
3. A teammate is also working on adding a new chat widget to present at the next meeting. It's unclear if your company will end up using it.
4. Another coworker is updating the search bar autocomplete.
5. Another developer is doing an experimental radical design overhaul of the entire layout to present next month.

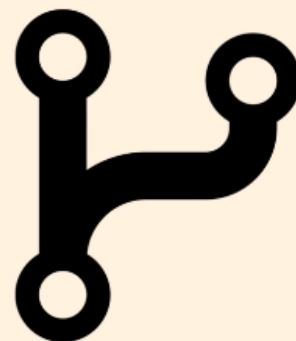
Branches

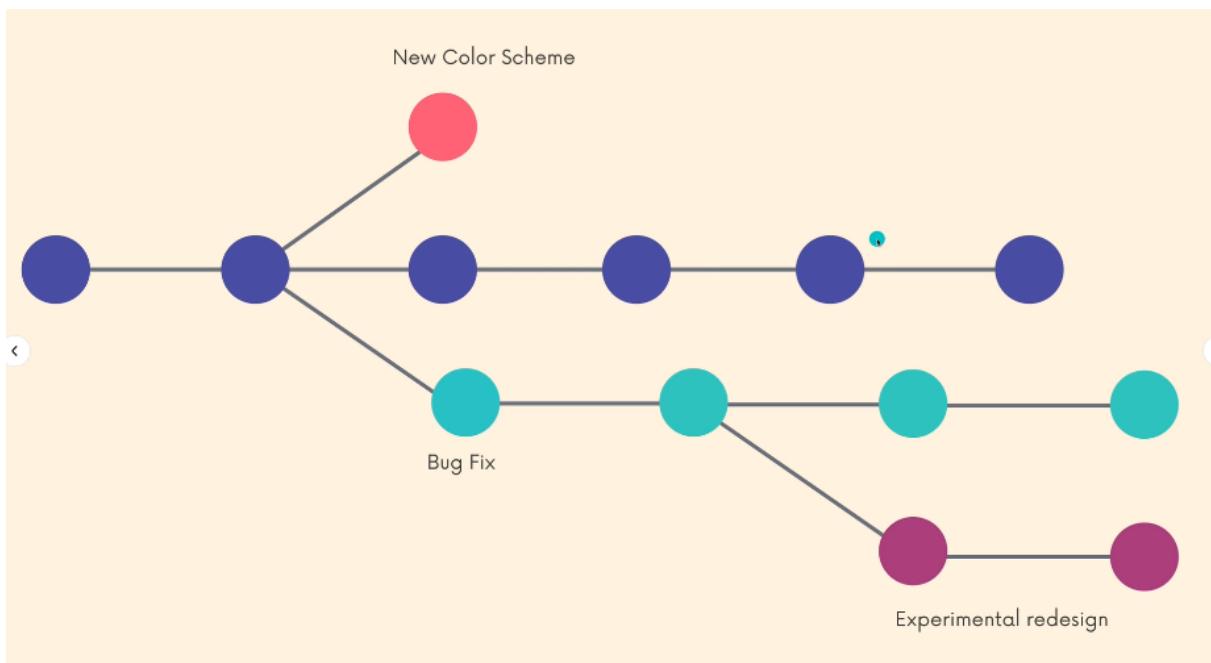
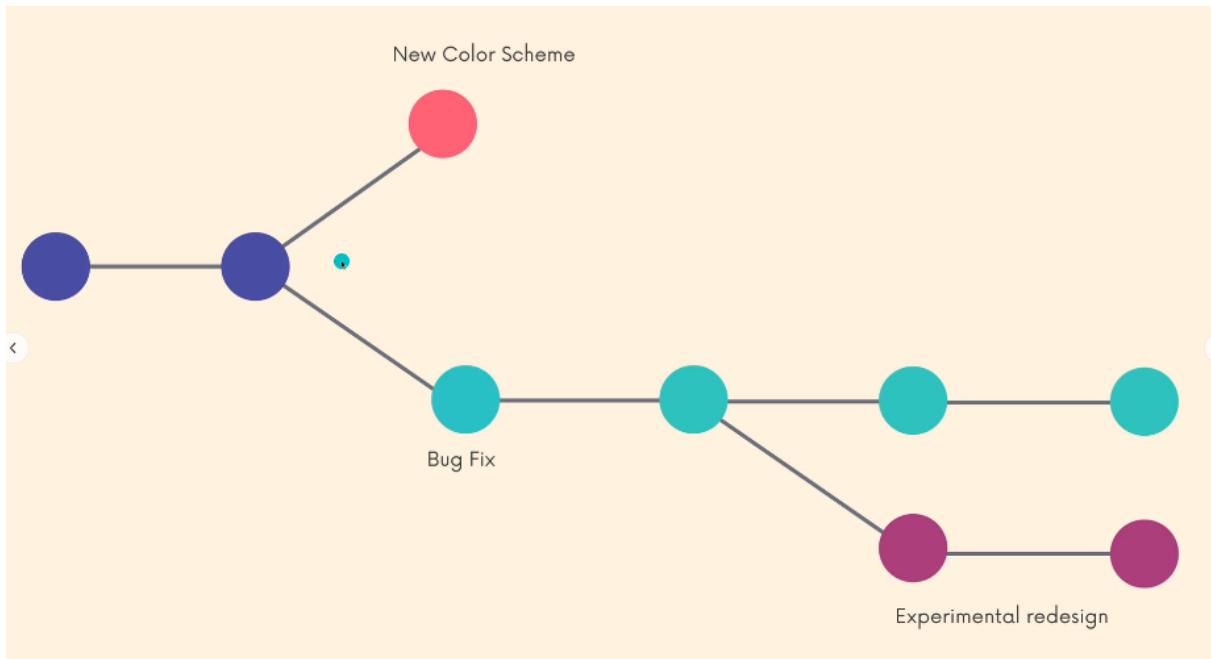
Branches are an essential part of Git!

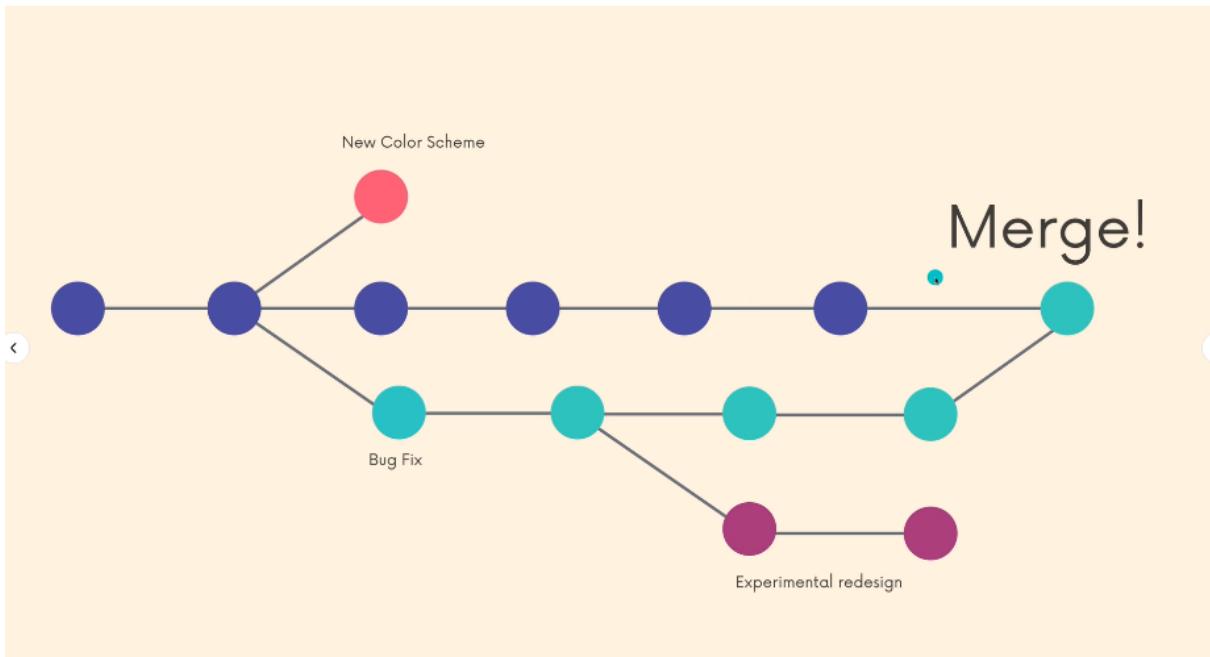
Think of branches as alternative timelines for a project.

They enable us to create separate contexts where we can try new things, or even work on multiple ideas in parallel.

If we make changes on one branch, they do not impact the other branches (unless we merge the changes)







Master Branch in Git

git status

On branch master

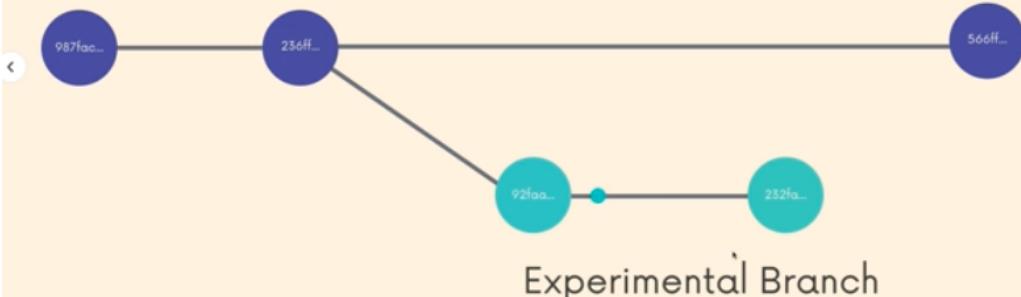
In git, we are always working on a branch “The default branch name is master”

It doesn’t do anything special or have fancy powers. It’s just like any other branch.



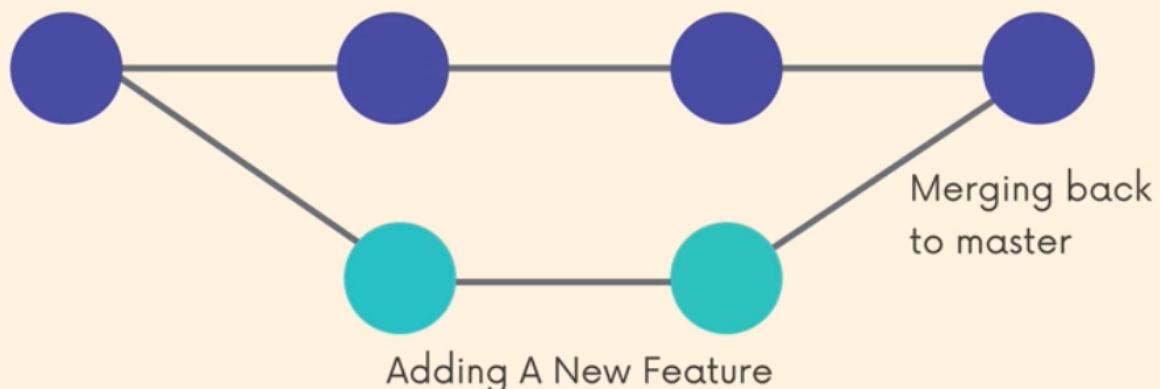
Branching

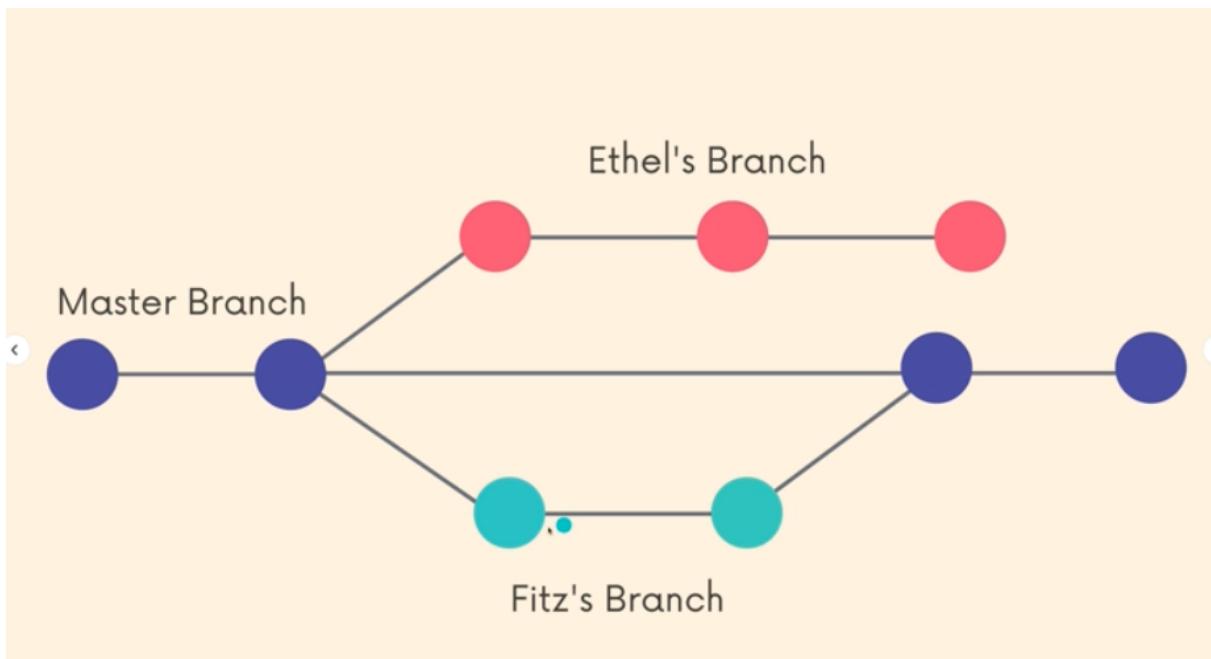
Master Branch



A Common Workflow

Master Branch





HEAD → master

```

● ○ ●
commit 40ff1edb998e1733978e6c16a93a2061d09cc646 (HEAD -> master)
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 15:42:29 2023 +0530

    edited chapter01.txt and added chapter04.txt

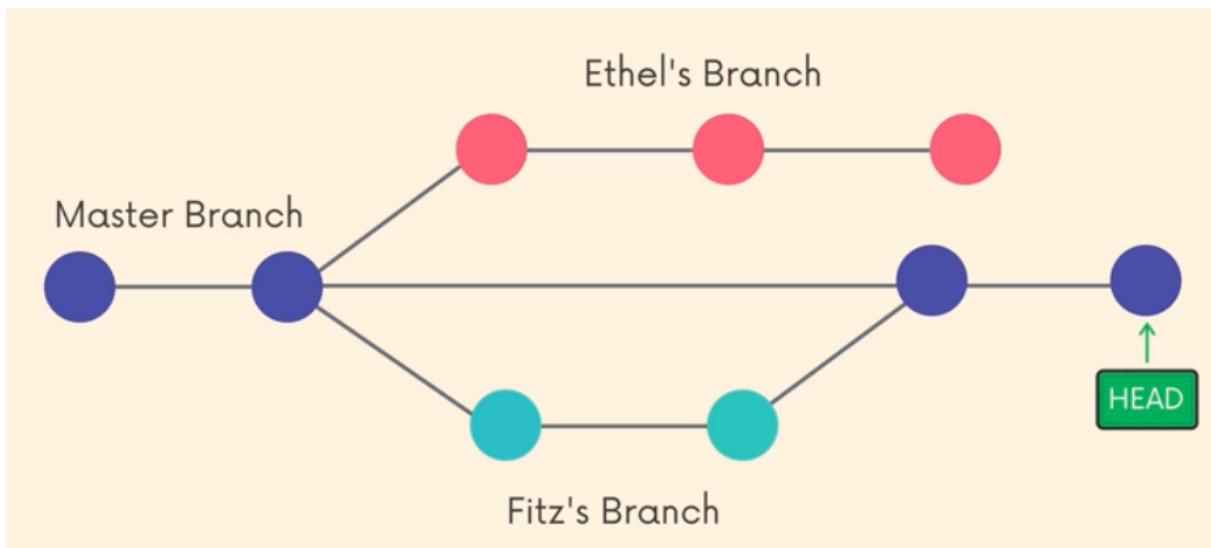
commit e5c382df4b332e4f37c9a463f76261157d11da79
  
```

HEAD

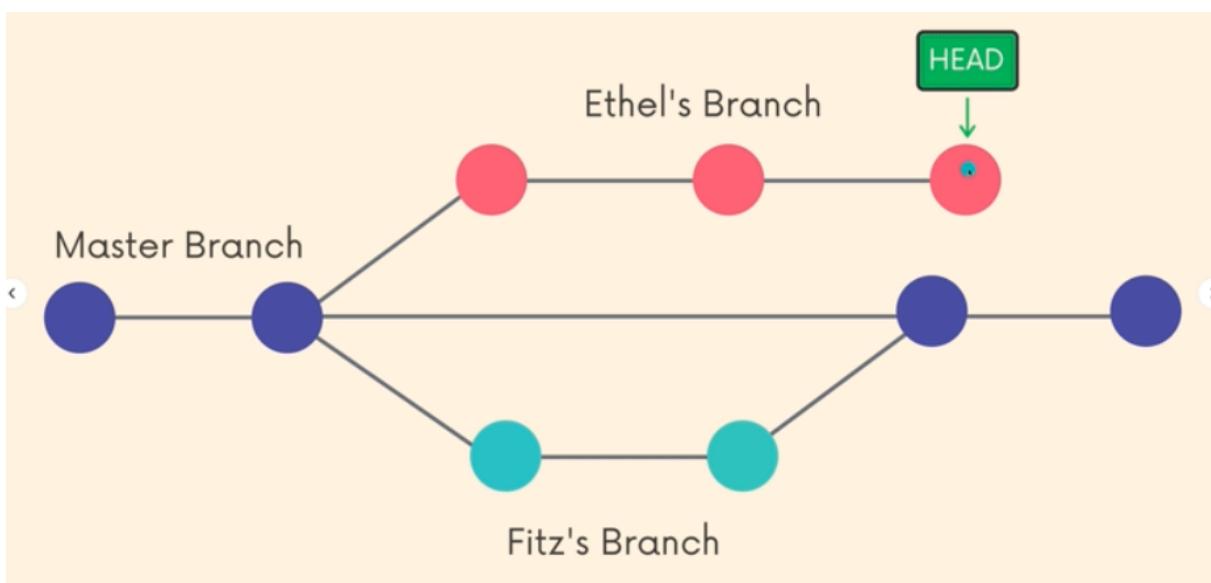
We'll often come across the term **HEAD** in Git.

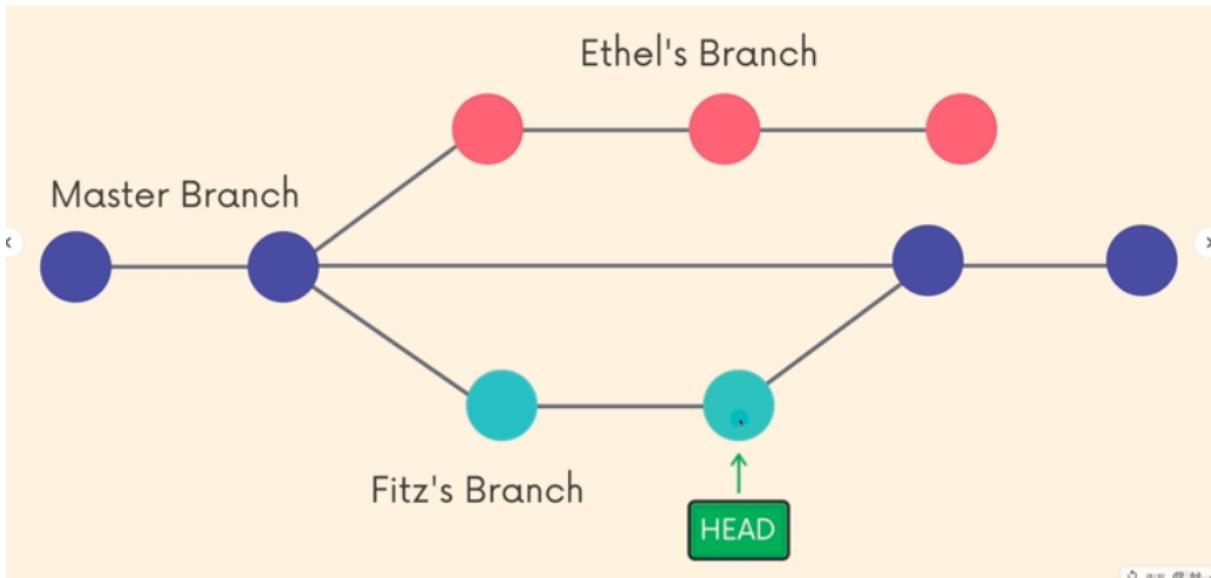
HEAD is simply a pointer that refers to the current "location" in your repository. It points to a particular branch reference.

So far, HEAD always points to the latest commit you made on the master branch, but soon we'll see that we can move around and HEAD will change!



head refers to last commit on master branch





Viewing Branches

Use `git branch` to view your existing branches. This default branch in every git repo is master, though you can configure this.

Look for the * which indicates the branch you are currently on.

```
git branch
```

```
# Output
* master
```

```
git branch -v
```

Creating Branches

Use `git branch <branch-name>` to make a new branch based upon the current HEAD. This just creates the branch. It does not switch you to that branch (the HEAD stays the same)

Syntax:

```
git branch <branch-name>
```



```
mkdir Branching-git
cd Branching-git
git init
git status

touch file_A.txt
nano file_A.txt

git add .
git commit -m "add file A"

git log
nano file_A.txt
git add .
git commit -m "edited file A"
git log --oneline

git branch
```

```
git branch A_branch. # new branch created as A_branch
```

```
git branch
```

```
git log
```

```
commit a98fc8b920c23f7ffef91ff80840a43aa31ee772 (HEAD -> master, A_branch)
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 17:51:22 2023 +0530

    edited file A

commit e30b7c85eabc56ed13c9094868124c8223ad8124
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 17:48:52 2023 +0530

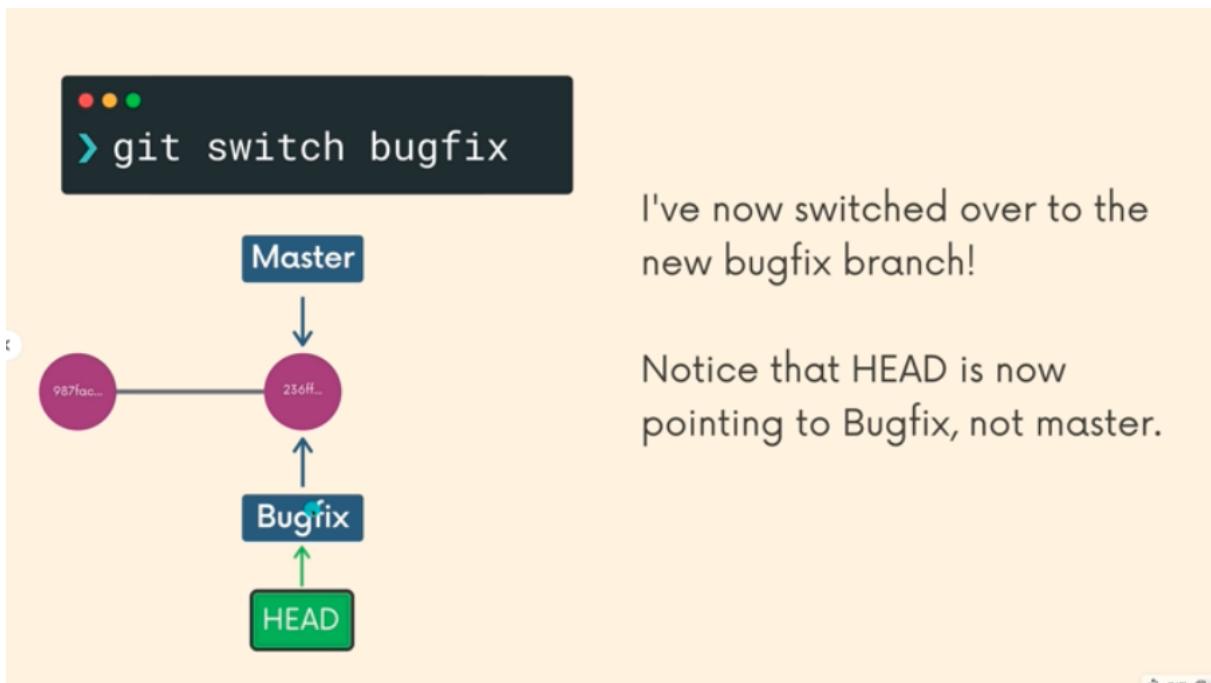
    add and create file A
(END)
```

Switching Branch

Once you have created a new branch, use `git switch <branch-name>` to switch to it.

Syntax:

```
git switch <branch-name>
```



```
git switch A_branch

# Output
Switched to branch 'A_branch'
```

```
git status  
git log
```

```
● ● ●  
commit a98fc8b920c23f7ffef91ff80840a43aa31ee772 (HEAD -> A_branch, master)  
Author: Sakib722 <sakibdalal73@gmail.com>  
Date: Sun Dec 10 17:51:22 2023 +0530  
  
    edited file A  
  
commit e30b7c85eabc56ed13c9094868124c8223ad8124  
Author: Sakib722 <sakibdalal73@gmail.com>  
Date: Sun Dec 10 17:48:52 2023 +0530  
  
    add and create file A  
(END)
```

```
nano A_file.txt  
git add .  
git commit -m "added line that we created new branch in file A"  
git log
```

```
● ● ●  
commit dab03e0e43caab358d4d10ae08ae08222fc5dff (HEAD -> A_branch)  
Author: Sakib722 <sakibdalal73@gmail.com>  
Date: Sun Dec 10 18:01:49 2023 +0530  
  
    added line about new branch created in file A  
  
commit a98fc8b920c23f7ffef91ff80840a43aa31ee772 (master)  
Author: Sakib722 <sakibdalal73@gmail.com>  
Date: Sun Dec 10 17:51:22 2023 +0530  
  
    edited file A  
  
commit e30b7c85eabc56ed13c9094868124c8223ad8124  
Author: Sakib722 <sakibdalal73@gmail.com>  
Date: Sun Dec 10 17:48:52 2023 +0530  
  
    add and create file A  
(END)
```

```
git switch master
```

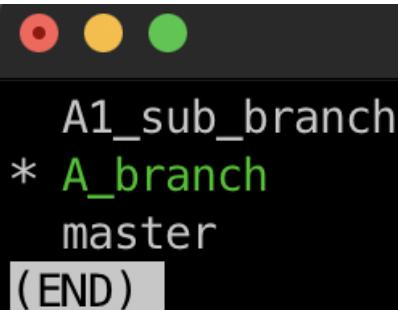
```
nano file_A.txt  
# no changes on this main brach will be done which was done on the A
```

```
git log
```



```
commit a98fc8b920c23f7ffef91ff80840a43aa31ee772 (HEAD -> master)  
Author: Sakib722 <sakibdalal73@gmail.com>  
Date: Sun Dec 10 17:51:22 2023 +0530  
  
    edited file A  
  
commit e30b7c85eabc56ed13c9094868124c8223ad8124  
Author: Sakib722 <sakibdalal73@gmail.com>  
Date: Sun Dec 10 17:48:52 2023 +0530  
  
    add and create file A  
(END)
```

```
git switch A_branch  
git log  
git branch A1_sub_branch  
git branch
```



```
A1_sub_branch  
* A_branch  
  master  
(END)
```

```
git log
```

```
● ● ●
commit dab03e0e43caab358d4d10ae08ae08222fc5dfff (HEAD -> A_branch, A1_sub_branch)
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 18:01:49 2023 +0530

    added line about new branch created in file A

commit a98fc8b920c23f7ffef91ff80840a43aa31ee772 (master)
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 17:51:22 2023 +0530

    edited file A

commit e30b7c85eabc56ed13c9094868124c8223ad8124
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 17:48:52 2023 +0530

    add and create file A
(END)
```

```
git switch
git branch
git log
```

```
● ● ●
* A1_sub_branch
  A_branch
  master
(END)
```

```
commit dab03e0e43caab358d4d10ae08ae08222fc5dff (HEAD -> A1_sub_branch, A_branch)
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 18:01:49 2023 +0530

    added line about new branch created in file A

commit a98fc8b920c23f7fef91ff80840a43aa31ee772 (master)
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 17:51:22 2023 +0530

    edited file A

commit e30b7c85eabc56ed13c9094868124c8223ad8124
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 17:48:52 2023 +0530

    add and create file A
(END)
```

Another way of switching

Another way of switching??

Historically, we used `git checkout <branch-name>` to switch branches. This still works.

The `checkout` command does a million additional things, so the decision was made to add a standalone switch command which is much simpler.

You will see older tutorials and docs using `checkout` rather than `switch`. Both now work.

```
git checkout <branch-name>
```

```
git checkout <branch-name>
```

Creating and Switching the branch in Git

Use `git switch` with `-c` flag to create a new branch AND switch to it all in one go

Remember `-c` as short for “create”

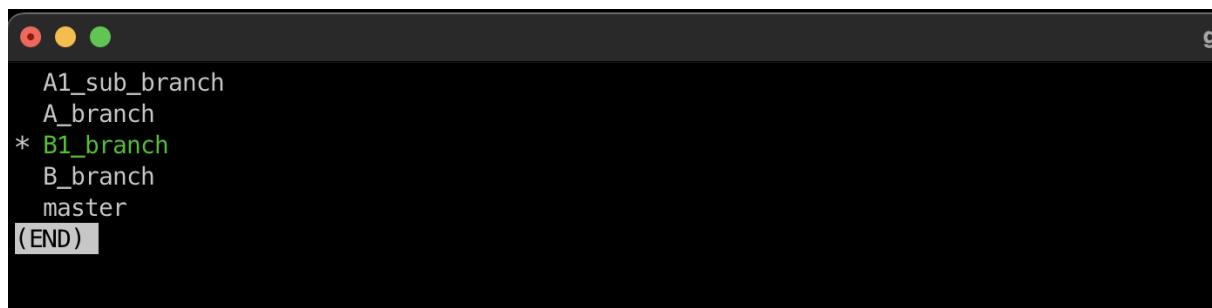
Syntax:

```
git switch -c <branch-name>
```

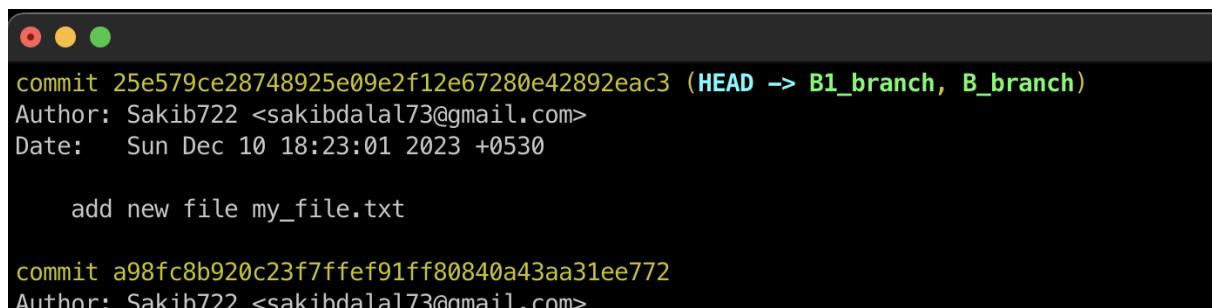
example:

```
git branch main
git switch -c B_branch
git switch -c B1_branch

git log
git branch
```



```
A1_sub_branch
A_branch
* B1_branch
B_branch
master
(END)
```



```
commit 25e579ce28748925e09e2f12e67280e42892eac3 (HEAD -> B1_branch, B_branch)
Author: Sakib722 <sakibdalal73@gmail.com>
Date:   Sun Dec 10 18:23:01 2023 +0530

    add new file my_file.txt

commit a98fc8b920c23f7ffef91ff80840a43aa31ee772
Author: Sakib722 <sakibdalal73@gmail.com>
```

Delete and Rename Branches

Delete a existing branch

```
git switch -c delete_me
```

Syntax:

```
git branch -d <branch-name>
```

Note: don't be at branch which you want's to delete, change the branch to delete.

Example:

```
git switch master  
git switch -c delete_me # Created delete_me branch  
git switch master  
  
git branch -d delete_me # Deleted delete_me branch # -d stand for de
```

Note: For forcefully delete the branch use

```
git branch -D <branch-name>
```

Rename the existing branch

-m

\$ --move '

Move/rename a branch and the corresponding reflog.

Note: to rename the branch we need to be on the branch which we wanted to rename.

```
git branch -m <new_name_of_branch>
```

example:

```
git switch master  
git switch -c new_branch  
# rename the new_branch to rename branch  
  
git branch -m rename
```

Branching Exercise

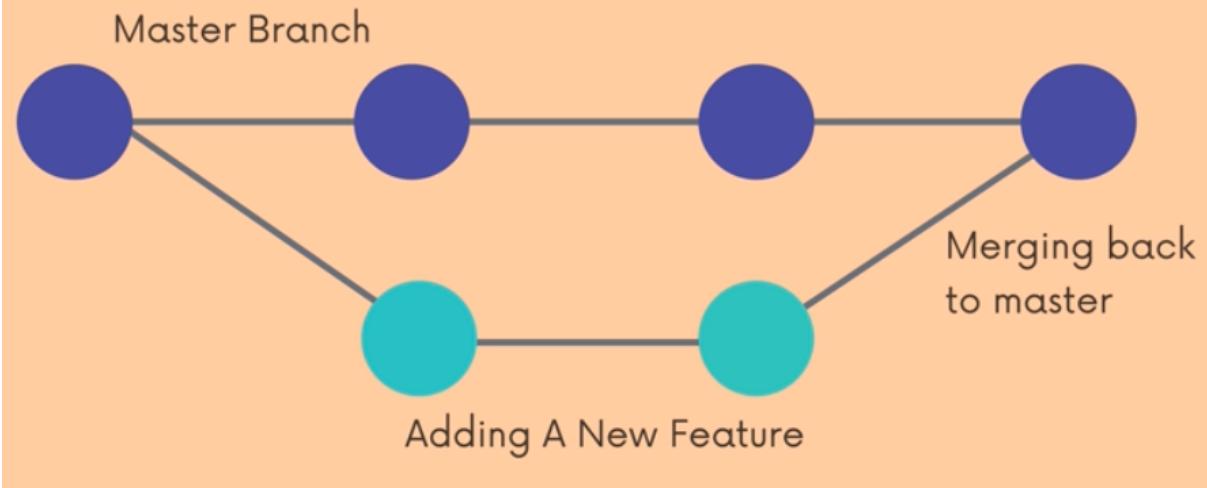
Merging Branches

Branching makes it super easy to work within self-contained contexts, but often we want to incorporate changes from one branch into another!

we can do this using the git merge command

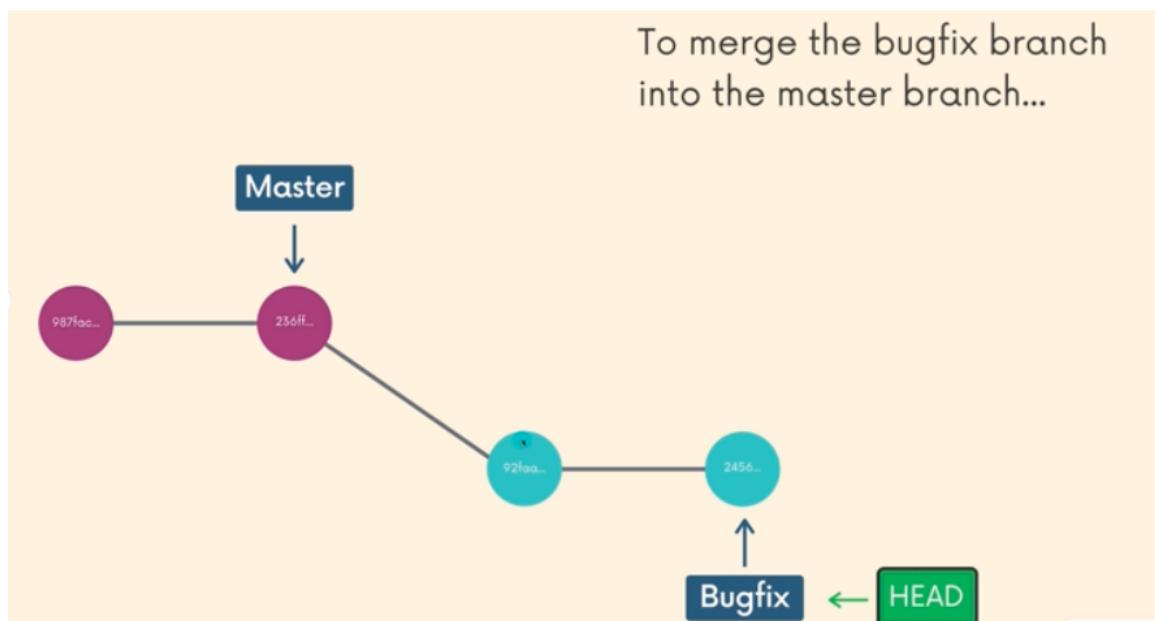
```
git merge <branch name>
```

A Common Workflow



Remember these two merging concepts:

- We merge branches, not specific commits
- We always merge to the current HEAD branch



Merging Made Easy

To merge, follow these basic steps:

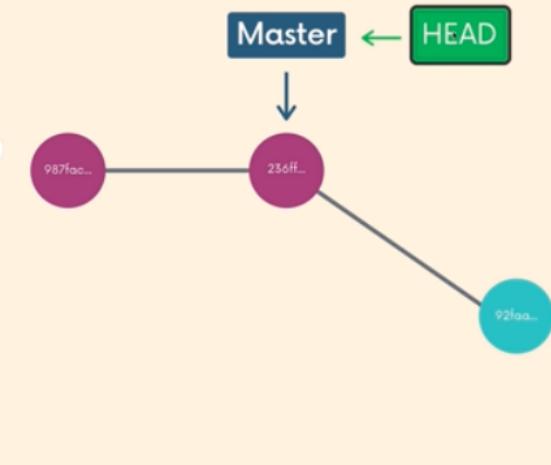
1. Switch to or checkout the branch you want to merge the changes into (the receiving branch)
2. Use the `git merge` command to merge changes from a specific branch into the current branch.

To merge the bugfix branch into master...

```
❯ git switch master  
❯ git merge bugfix
```

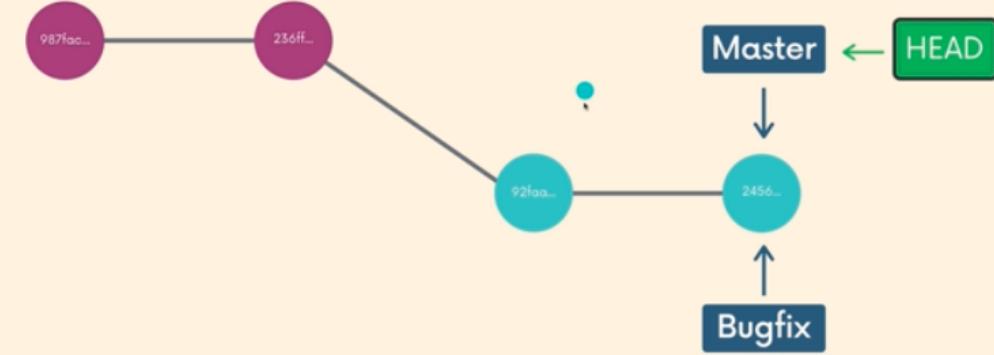
```
❯ git switch master
```

Switch to the master branch



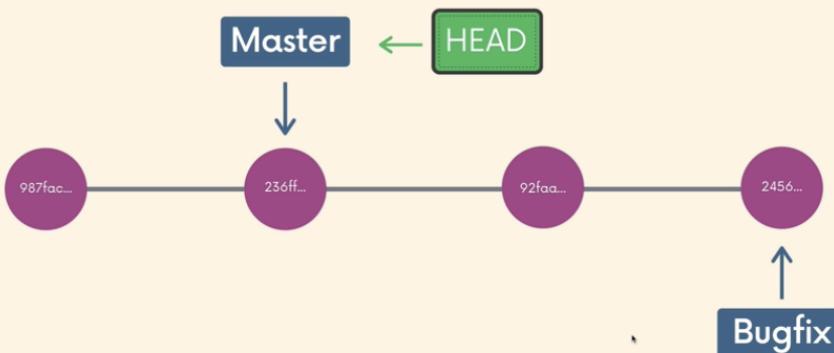
```
❯ git merge bugfix
```

Merge bugfix into master



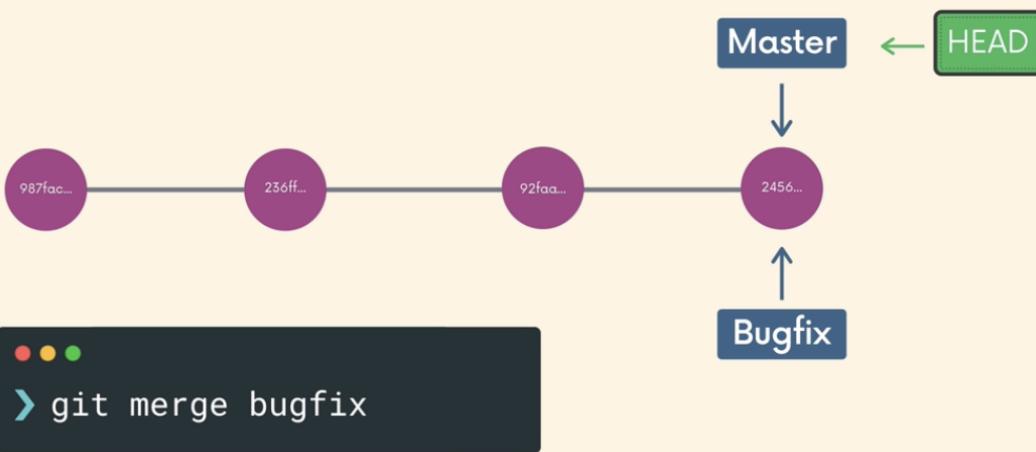
This is what it really looks like

Remember, branches are just defined by a branch pointer



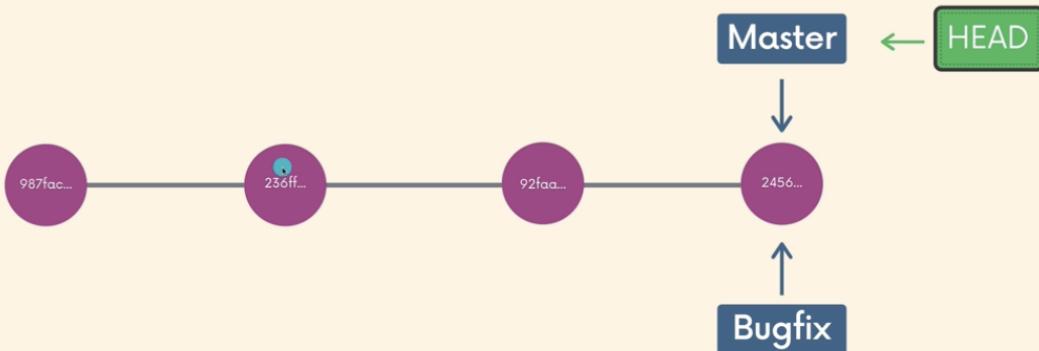
This is what it really looks like

Master & Bugfix now point to the same commit, until they diverge again



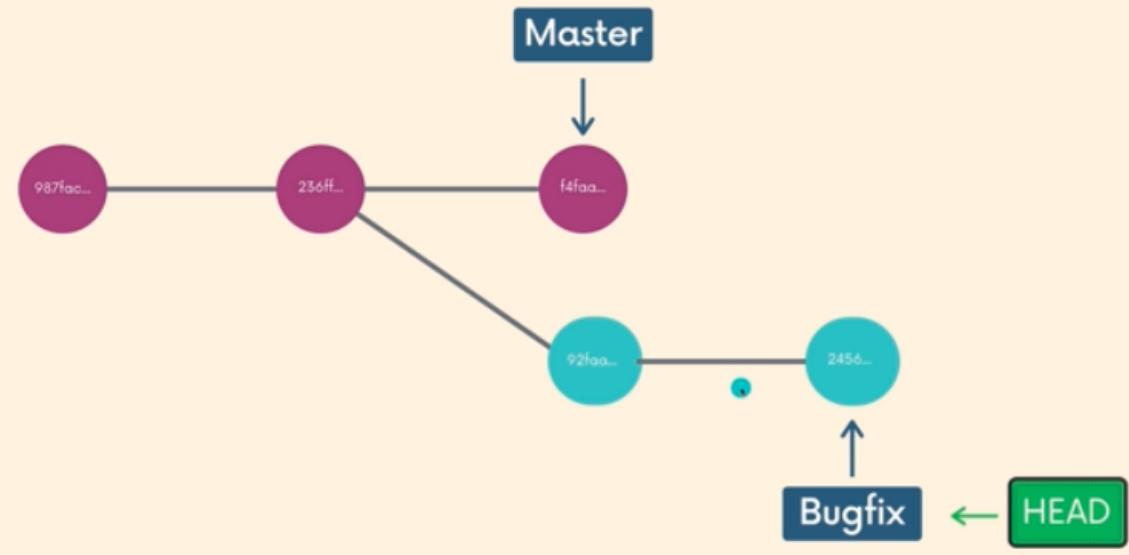
This Is Called A Fast-Forward

Master simply caught up on the commits from Bugfix



What if we add a commit on master?

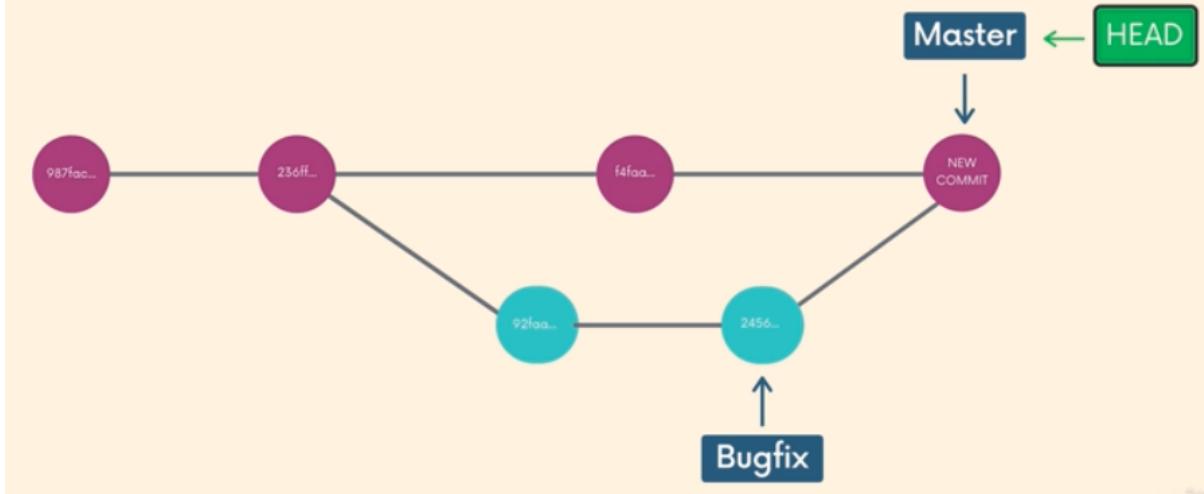
This happens all the time! Imagine one of your teammates merged in a new feature or change to master while you were working on a branch



this creates a conflict in files.

What happens when I try to merge?

Rather than performing a simple fast forward, git performs a "merge commit"
We end up with a new commit on the master branch.
Git will prompt you for a message.



Merge conflict

Heads Up!

Depending on the specific changes your are trying to merge, Git may not be able to automatically merge. This results in **merge conflicts**, which you need to manually resolve.





➤ CONFLICT (content): Merge conflict in blah.txt
Automatic merge failed; fix conflicts and then commit the result.

<<<<< HEAD

I have 2 cats

I also have chickens

=====

I used to have a dog :(

>>>>> bug-fix

WHAT THE...

When you encounter a merge conflict, Git warns you in the console that it could not automatically merge.

It also changes the contents of your files to indicate the conflicts that it wants you to resolve.

<<<<< HEAD

I have 2 cats

I also have chickens

=====

I used to have a dog :(

>>>>> bug-fix

Conflict Markers

The content from your current HEAD (the branch you are trying to merge content into) is displayed between the <<<<< HEAD and =====

<<<<< HEAD
I have 2 cats
I also have chickens
=====

I used to have a dog :(

>>>>> bug-fix..

Conflict Markers

The content from the branch you are trying to merge from is displayed between the ===== and >>>>> symbols.



Resolving Conflicts

Whenever you encounter merge conflicts, follow these steps to resolve them:

1. Open up the file(s) with merge conflicts
2. Edit the file(s) to remove the conflicts. Decide which branch's content you want to keep in each conflict. Or keep the content from both.
3. Remove the conflict "markers" in the document
4. Add your changes and then make a commit!

👉 [Git Merging Exercise](#)

Git Diff

We can use the git diff command to view changes between commits, branches, files, our working directory, and more.

We often use git diff alongside commands like git status and git log, to get a better picture of a repository and how it has changed over time.

Without additional options, git diff lists all the changes in working directory that are NOT staged for the next commit.

```
git diff
```

C.compares staging area and working directory

Example

```
mkdir gitfile
cd gitfile
git init
touch file.txt
nano file.txt
# edited and written this is my first file
git add .
git commit -m "first commit"

# edit file.txt again
nano file.txt
git status
```

```
git diff
```

```
# Output
```

```
diff --git a/file.txt b/file.txt
index 751b266..848291b 100644
--- a/file.txt
+++ b/file.txt
@@ -1 +1,2 @@
    this is me. My first commit ----- this line already existed in 1
+this it edit to check git diff work or not ----- this line shows 1
```

git diff command displays the changes done in the files before committing it.

Example 2:

Last Commit

```
red  
orange  
yellow  
green  
blue  
purple
```

rainbow.txt

New Changes

```
red  
orange  
yellow  
green  
blue  
indigo  
violet
```

rainbow.txt

```
git diff # before committing changes done
```

Git Diff Output

```
diff --git a/rainbow.txt b/rainbow.txt  
index 72d1d5a..f2c8117 100644  
--- a/rainbow.txt  
+++ b/rainbow.txt  
@@ -3,4 +3,5 @@ orange  
yellow  
green  
blue  
-purple  
+indigo  
+violet
```

Compared Files

For each comparison, Git explains which files it is comparing. Usually this is two versions of the same file.

Git also declares one file as "A" and the other as "B".

```
diff --git a/rainbow.txt b/rainbow.txt
index 72d1d5a..f2c8117 100644
--- a/rainbow.txt
+++ b/rainbow.txt
@@ -3,4 +3,5 @@ orange
 yellow
 green
 blue
-purple
+indigo
+violet
```

File Metadata

You really do not need to care about the file metadata.

The first two numbers are the hashes of the two files being compared. The last number is an internal file mode identifier.

```
diff --git a/rainbow.txt b/rainbow.txt
index 72d1d5a..f2c8117 100644
--- a/rainbow.txt
+++ b/rainbow.txt
@@ -3,4 +3,5 @@ orange
 yellow
 green
 blue
-purple
+indigo
+violet
```

Markers

File A and File B are each assigned a symbol.

- File A gets a minus sign (-)
- File B gets a plus sign (+)

```
diff --git a/rainbow.txt b/rainbow.txt
index 72d1d5a..f2c8117 100644
--- a/rainbow.txt
+++ b/rainbow.txt
@@ -3,4 +3,5 @@ orange
 yellow
 green
 blue
-purple
+indigo
+violet
```

Chunks

A diff won't show the entire contents of a file, but instead only shows portions or "chunks" that were modified.

A chunk also includes some unchanged lines before and after a change to provide some context

```
diff --git a/rainbow.txt b/rainbow.txt
index 72d1d5a..f2c8117 100644
--- a/rainbow.txt
+++ b/rainbow.txt
@@ -3,4 +3,5 @@ orange
yellow
green
blue
-purple
+indigo
+violet
```

Chunk Header

@@ -3,4 +3,5 @@

Each chunk starts with a chunk header, found between @@ and @@.

From file a, 4 lines are extracted starting from line 3.

From file b, 5 lines are extracted starting from line 3

```
diff --git a/rainbow.txt b/rainbow.txt
index 72d1d5a..f2c8117 100644
--- a/rainbow.txt
+++ b/rainbow.txt
@@ -3,4 +3,5 @@ orange
yellow
green
blue
-purple
+indigo
+violet
```

file a

@@ -3,4 +3,5 @@

file b

```
red
orange
yellow
green
blue
purple
```

```
red
orange
yellow
green
blue
indigo
violet
```

Changes

Every line that changed between the two files is marked with either a + or - symbol.

lines that begin with - come from file A

lines that begin with + come from file B

```
diff --git a/rainbow.txt b/rainbow.txt
index 72d1d5a..f2c8117 100644
```

```
--- a/rainbow.txt
```

```
+++ b/rainbow.txt
```

```
@@ -3,4 +3,5 @@ orange
```

yellow

green

blue

-purple

+indigo

+violet

Git Diff HEAD

git diff HEAD lists all changes in the working tree since last commit.

```
git diff HEAD
```

Git Diff --staged or --cached

git diff --staged or --cached will list the changes between the staging area and our last commit.

"Show me what will be included in my commit if i run git commit right now"

```
git diff --staged
git diff --cached
```

Diff-ing Specific Files

We can view the changes within a specific file by providing git diff with a filename.

```
git diff HEAD [filename]
```

```
git diff --staged [filename]
```

Example:

```
git diff HEAD file.txt
```

```
git diff --staged file.txt
```

Comparing Branches by using git diff command

git diff branch1 branch2 will list the changes between the tips of branch1 and branch2

```
git diff branch1 branch2
```

example:

```
git diff master A_branch
```

```
diff --git a/file.txt b/file.txt
index 94ebaf9..da7f847 100644
--- a/file.txt
+++ b/file.txt
@@ -1,4 +1,2 @@
-1
2
-3
4
(END)
```

```
git diff A_branch master
```

```
diff --git a/file.txt b/file.txt
index da7f847..94ebaf9 100644
--- a/file.txt
+++ b/file.txt
@@ -1,2 +1,4 @@
+1
2
+3
4
(END)
```

Comparing Commits by using git diff command

To compare two commits, provide git diff with the commit hashes of the commits in question.

```
git diff commit1 commit2
```

while commit1 and commit2 is the pointers of the commit which can be get using:

```
git log --oneline
```

```
373335c
0423e46
53042e7
61d8bc4
(END)
```

example:

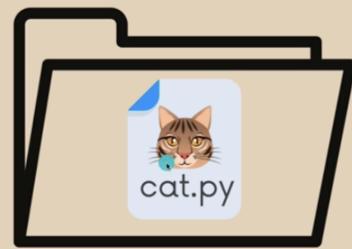
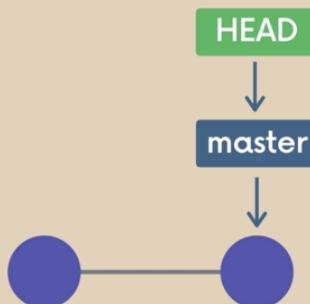
```
git diff 373335c 0423e46
```

```
diff --git a/file.txt b/file.txt
deleted file mode 100644
index 94eba9..0000000
--- a/file.txt
+++ /dev/null
@@ -1,4 +0,0 @@
-1
-2
-3
-4
(END)
```

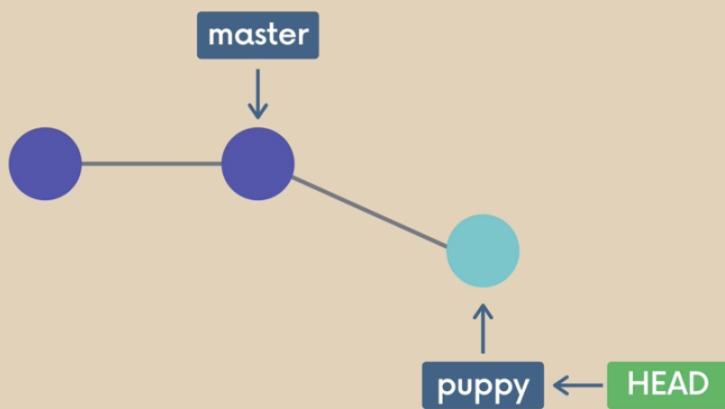
🎸 [Git Diff Exercise](#)

Git Stashing

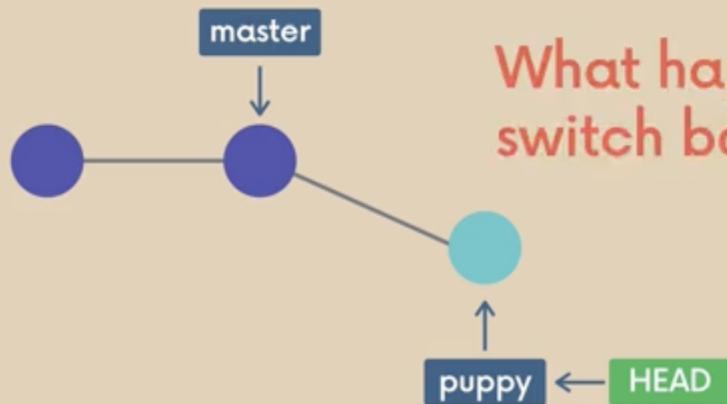
I'm on master



I make a new branch
and switch to it



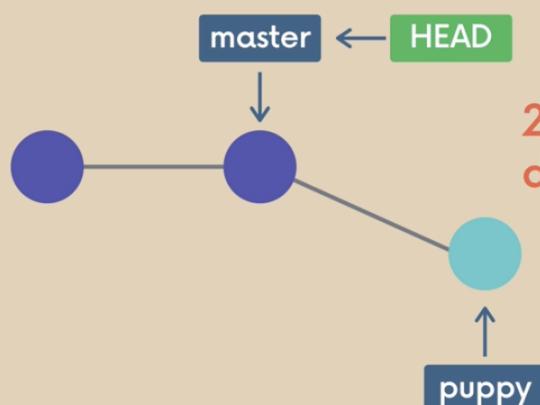
I do some new work, but don't make any commits



What happens when I switch back to master?



1. My changes come with me to the destination branch



2. Git won't let me switch if it detects potential conflicts

Example:

```
# master
touch file.txt
nano file.txt
git add .
git commit -m "start"
# A_branch
git switch -c A_branch
```

```
nano file.txt  
git status  
  
git switch master  
git add .  
git commit -m "01"
```

2nd Case use of stack

```
git switch -c B_branch  
nano file.txt  
git status  
  
git switch master  
# ERROR  
error: Your local changes to the following files would be overwritten by merge:  
      file.txt  
Please commit your changes or stash them before you switch branches  
Aborting
```

to solve this error we use **stash** in git.

Stashing

Git provides an easy way of stashing there uncommitted changes so that we can return to them later, without having to make unnecessary commits.

Git Stash

git stash is super useful command that helps you save changes that you are not yet ready to commit. You can stash changes ans then come back to them later.

Running git stash will take all uncommitted changes (staged and untagged) and stash them, reverting the changes in your working copy.

```
git stash  
  
# OR  
  
git stash apply
```

Git stash pop

Use git stash pop to remove the most recently stashed changes in your stash re-apply them to your working copy.

```
git stash pop
```

Example of git stash and git stash pop:

```
git init
git branch A
git switch A
touch file.txt
git status
git add .
git commit -m "First Commit"

git switch -c B
ls
nano file.txt
#"Hello World"
git status
git stash

git switch A
nano file.txt
# "A branch"
git add .
git commit -m "A branch"

git switch B
git stash pop
git status
git add .
git commit -m "Hello World"
```

Stashing Multiple Times

You can add multiple stashes onto the stack of stashes. They will all be stashed in the order you added them.

```
> git stash
# do some other stuff
> git stash
```

```
# do some other stuff  
> git stash
```

To display the stash list # multiple stash in one branch

```
git stash list
```

Applying Specific Stashes

git assumes you want to apply the recent stash when you run git stash apply, but you can also specify a particular stash like `git stash apply stash@{2}`

```
git stash list  
  
git stash apply stash@{id}
```

Dropping Stashes

To delete a particular stash, you can use `git stash drop <stash-id>`

```
git stash drop stash@{2}
```

Clear stash list

```
git stash clear
```

 [Stashing Exercise](#)

Time Traveling with commits

Checkout

We can use checkout to create branches, switch to new branches, restore files, and undo history.

```
git checkout <branch-name>  
  
or
```

```
git switch <branch-name>
```

We can use git checkout commit <commit-hash> to view a previous commit.

Remember, you can use the git log command to view commit hashes. We just need the first 7 digit of a commit hash.

example: # git log --oneline

```
git checkout d8194d6
```

Don't panic when you see the following message...

```
You are in 'detached HEAD' state. You can look around, make experiments and commit them, and you can discard any commits you make in this state without impacting any branches by switching back to a branch.
```

Example:

```
cd git
git init
git status

touch file.txt
nano file.txt
# hello

git status
git add .
git commit -m "1"

git log --oneline

nano file.txt
# hello world
git add .
git commit -m "2"
```

```
git log --oneline
# copy the first commit hash ex.d8194d6 # "1"

git checkout d8194d6
```

```

cat file.txt
# will display only "hello"

git log --oneline
# copy the second commit hash ex.23gn432 # "2"

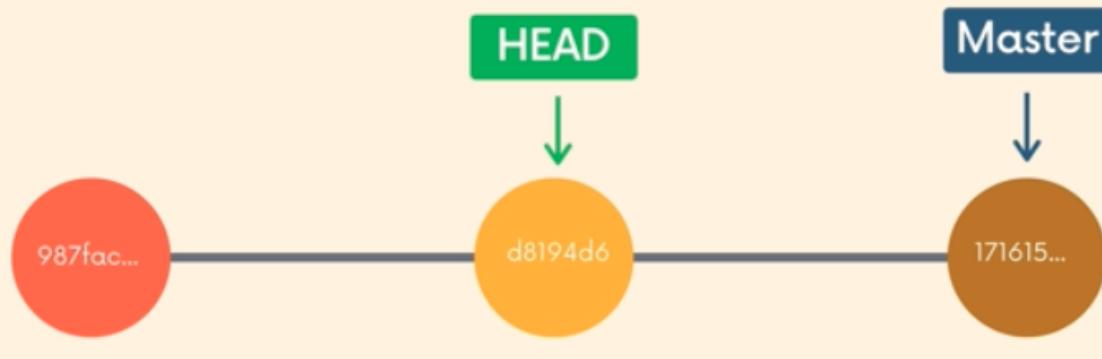
git checkout 23gn432
cat file.txt
# display "hello world"

```

we can also use git checkout <hash> in branches

When we checkout a particular commit,
HEAD points at that commit rather than
at the branch pointer.

git checkout d8194d6



Detached HEAD

Don't panic when this happens! It's not a bad thing!

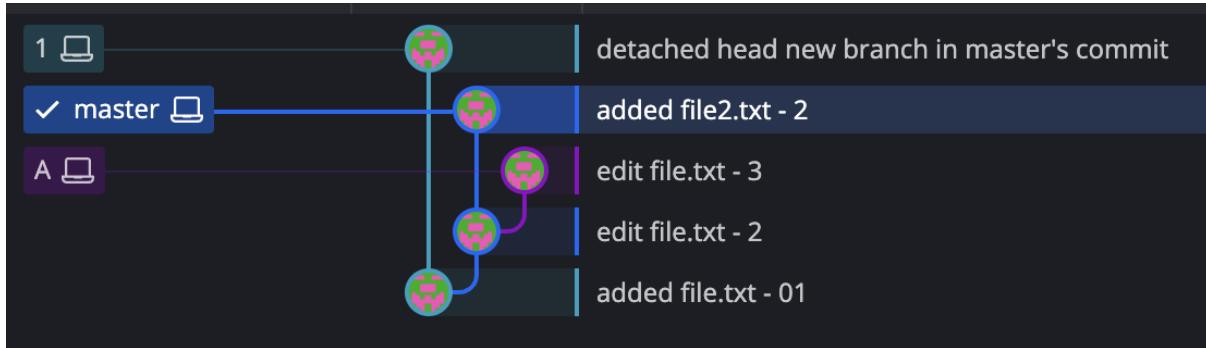
You have a couple options:

1. Stay in detached HEAD to examine the contents of the old commit. Poke around, view the files, etc.
2. Leave and go back to wherever you were before - reattach the HEAD
3. Create a new branch and switch to it. You can now make and save changes, since HEAD is no longer detached.

git checkout <commit-hash>

Creating a new branches in different commits is possible.

Example



```
cat .git/HEAD # to check head status
```

Re-attached HEAD

```
git checkout master
```

or

```
git switch master
```

Checkout HEAD

git checkout supports a slightly odd syntax for referencing previous commits relative to a particular commit.

HEAD~1 refers to the commit before HEAD(parent)

HEAD~2 refers to 2 commit before HEAD(grandparent)

```
git checkout HEAD~1
```

```
git checkout HEAD~2
```

git switch - will take you to previous HEAD position commit branch.

```
git switch -
```

Discarding Changes

Suppose you've made some changes to a file but don't want to keep them. To revert the file back to whatever it looked like when you last committed, you can use:

git checkout HEAD <filename> to discard any changes in the file, reverting back to the HEAD.

```
git checkout HEAD <file-name>
or
git checkout HEAD~n <file-name>
```

Example:

```
cd git
git init
git status

touch cat.txt
git add .
git commit -m "created cat.txt"
git status

nano cat.txt
# First Commit

git add .
git commit -m "First Commit"
git status
git log

nano cat.txt
# Second Commit

git add .
git commit -m "Second Commit"
git status
git log --oneline
```

```
# Undo changes / no commit should be done before undoing

nano cat.txt
# abc -- to be undo
git status
```

```
git checkout HEAD cat.txt  
# all changes done will be undo -- abc
```

Another Option for discard changes

Here's another option to revert a file

```
git checkout -- <file-name>
```

Rather than typing HEAD, you can substitute --followed by the file(s) you want to restore.

Restore # work same as checkout for discard changes

git restore is a brand new Git command that helps with undoing operations.

Because it is so new, most of the existing Git tutorials and books do not mention it, but it is worth knowing!

Recall that **git checkout** does a million different things, which many git users find very confusing. **git restore** was introduced alongside **git switch** as alternative to some of the users for **checkout**.

Unmodifying Files with Restore

Suppose you've made some changes to a file since your last commit. You've saved the file but then realise you definitely do NOT want those changes anymore!

To restore the file to the contents in the HEAD, use **git restore <file-name>**.

```
git restore <file-name>
```

Note: The above command is not “undoable” if you have uncommitted changes in the file, they will be lost!

Example:

```
cd git  
git init  
git status  
  
touch cat.txt  
git add .  
git commit -m "created cat.txt"
```

```
git status

nano cat.txt
# First Commit

git add .
git commit -m "First Commit"
git status
git log

nano cat.txt
# Second Commit

git add .
git commit -m "Second Commit"
git status
git log --oneline
```

```
# Undo changes / no commit should be done before undoing

nano cat.txt
# abc -- to be undo
git status

git restore cat.txt
# all changes done will be undo -- abc
```

git restore <file-name> restores using HEAD as the default source, but we can change that using the **--source** option.

For example, **git restore --source HEAD~1 home.html** will restore the contents of home.html to its state from the commit prior to HEAD. You can also use a particular commit hash as the source.

```
git restore --source HEAD~n <file-name>
```

Example:

```
# restoring the existing cat.txt file

nano cat.txt # type any thing and save
```

```
git log --oneline # displays 3 commits

git restore --source HEAD~1 cat.txt
cat cat.txt # first commit

git restore cat.txt
cat cat.txt # first commit # second commit
```

Restore staged file # due to accidental git add .

If you have accidentally added a file to your staging area with **git add** and you don't wish to include it in the next commit, you can use **git restore** to remove it from staging.

Use the **--staged** option like this:

```
git restore --staged <file-name>
```

Example:

Example:

```
cd git
git init
git status

touch cat.txt
git add .
git commit -m "created cat.txt"
git status

nano cat.txt
# First Commit

git add .
git commit -m "First Commit"
git status
git log

nano cat.txt
# Second Commit

git add .
git commit -m "Second Commit"
```

```
git status  
git log --oneline
```

```
touch secret.txt  
nano secret.txt  
# API = omfklesnkdlf23kwns3q  
  
nano cat.txt  
# Third Commit  
git status  
git add .  
  
# now i want to resore the secret file from the staged files  
git restore --staged secret.txt  
  
# now we can make a commit which does not contain secret.txt file  
git commit -m "Third Commit"  
  
git status  
git log --oneline
```

```
└ git status  
On branch master  
Changes to be committed:  
(use "git restore --staged <file>..." to unstage)  
modified:   secret.txt
```

Git Reset # reset a commit

Suppose you've just made a couple of commits on the master branch, but you actually meant to make them on a separate branch instead. To undo those commits, you can use **git reset**.

git reset <commit-hash> will reset the repo back to a specific commit. The commits are gone. this is also call as regular reset or plane reset.

```
git reset <commit-hash>
```

Example:

```
cd git  
git init
```

```
git status
```

```
touch cat.txt  
nano cat.txt  
    # First Commit  
git add .  
git commit -m "First Commit"
```

```
git log --oneline
```

```
nano cat.txt  
    # Second Commit  
git add .  
git commit -m "Second commit"
```

```
git log --oneline
```

```
nano cat.txt  
    # to be reset  
git add .  
git commit -m "reset this"
```

```
git log --oneline  
# copy the hash of "reset this" commit
```

```
git reset 11d8e4b # past the hash of commit  
# "reset this" commit will be deleted
```

we don't lose the changes in the files, while we loose the commits done before.

to restore the previously done changes we can use

```
git restore <file-name>
```

we can also create a new branch and commit the changes within new branch, while no changes will be happened on master branch.

Reset --hard

If you want to undo both the commits AND the actual changes in your files, you can use the --hard option.

for example, **git reset --hard HEAD~1** will delete the last commit and associated changes.

```
git reset --hard <commit-hash>

# for HEAD
git reset --hard HEAD~1
```

Example:

```
cd git
git init
git status
```

```
touch cat.txt
nano cat.txt
    # First Commit
git add .
git commit -m "First Commit"
```

```
git log --oneline
```

```
nano cat.txt
    # Second Commit
git add .
git commit -m "Second commit"
```

```
git log --oneline
```

```
nano cat.txt
    # to be reset
git add .
git commit -m "reset this"
```

```
git log --oneline
# copy the hash of "reset this" commit

git reset --hard 11d8e4b # past the hash of commit
# "reset this" commit will be deleted
```

or

```
git reset --hard HEAD~1
```

Git Revert

Yet another similar sounding and confusing command that has to do with undoing changes.

git revert

git revert is similar to **git reset** in that both “undo” changes, but they accomplish it in different ways.

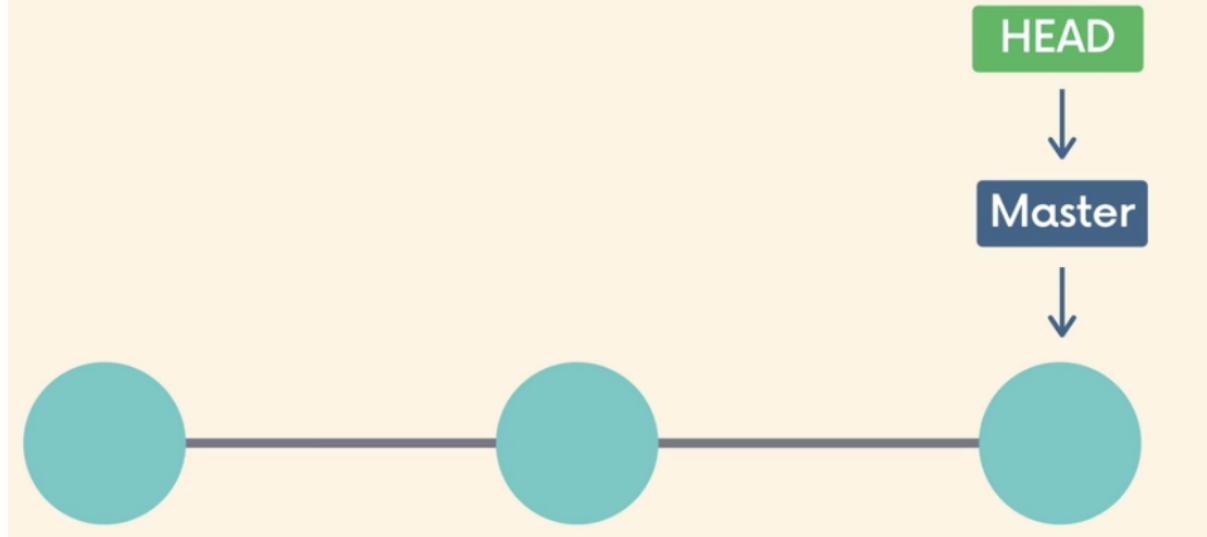
git reset actually moves the branch pointer backwards, eliminating commits.

git revert instead creates a branch new commit which reverses / undos the changes from a commit. Because it results in a new commit, you will be prompted to enter a commit message.

```
git revert <commit-hash>
```

Example:

"Undoing" With Reset





```
›git reset HEAD~2
```

HEAD



Master



The branch pointer is moved back to an earlier commit, erasing the 2 later commits



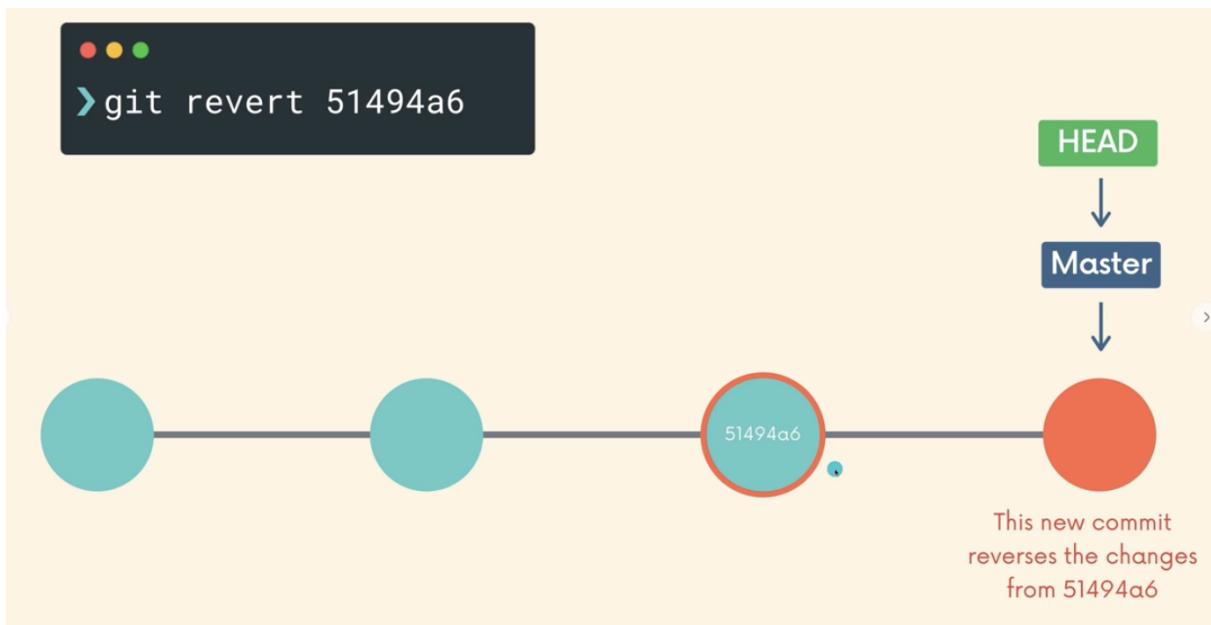
"Undoing" With Revert

HEAD



Master





=

Which One Should I Use?

Both `git reset` and `git revert` help us reverse changes, but there is a significant difference when it comes to collaboration (which we have yet to discuss but is coming up soon!)

If you want to reverse some commits that other people already have on their machines, you should use revert.

If you want to reverse commits that you haven't shared with others, use reset and no one will ever know!

Example2:

```
cd git
git init
```

```
git status
```

```
touch cat.txt  
nano cat.txt  
    # First Commit  
git add .  
git commit -m "First Commit"
```

```
git log --oneline
```

```
nano cat.txt  
    # Second Commit  
git add .  
git commit -m "Second commit"
```

```
git log --oneline
```

```
nano cat.txt  
    # to be revert  
git add .  
git commit -m "revert this"
```

```
git log --oneline  
# copy the hash of "revert this" commit  
  
git revert 11e2fe  
# editer will be open asking for entering new commit name  
# you will be switching to the new commit and the bad commit will be  
# you can access the bad commit by using hash or HEAD~n with checkout
```

🔗 [Undoing Things Exercise](#)

Github

What is Github

Github is a hostile platform for git repositories. You can put your own Git repos on Github and access them from anywhere and share them with people around the world.

Beyond hosting repos, Github also provides additional collaboration features that are not native to Git (but are super useful). Basically, Github helps people share and collaborate on repos.

Git

Git is the version control software that runs locally on your machine. You don't need to register for an account. You don't need the internet to use it. You can use Git without ever touching Github.

Github

Github is a service that hosts Git repositories in the cloud and makes it easier to collaborate with other people. You do need to sign up for an account to use Github. It's an online place to share work that is done using Git.

similar to Github:- GitLab, BitBucket, and Gerrit.

Open Source Projects

Today Github is the home of open source projects on the internet. Projects ranging from React to Swift are hosted on Github.

If you plan on contributing to open source projects, you'll need to get comfortable working with Github.

Exposure

Your Github profile showcases your own projects and contributions to other projects. It can act as a sort of resume that many employers will consult in the hiring process. Additionally, you can gain some clout on the platform for creating or contributing to popular projects.

Cloning

So far we've created our own Git repositories from scratch, but often we want to get a local copy of an existing repository instead.

To do this, we can clone a remote repository hosted on Github or similar websites. All we need is a URL that we can tell Git to clone for use.

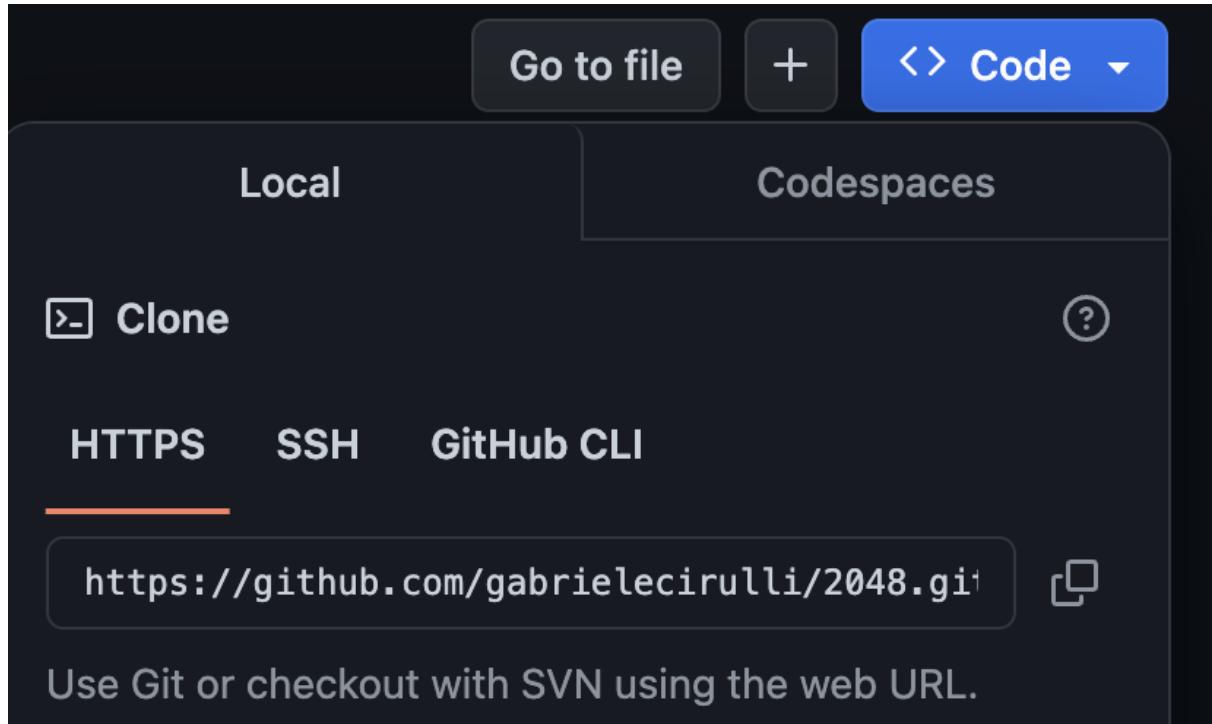
git clone

To clone a repo, simply run **git clone <url>**.

Git will retrieve all the files associated with the repository and will copy them to your local machine.

In addition, Git initialises a new repositories on your machine, giving you access to the full Git history of the cloned project.

```
git clone <url>
```



example:

```
git clone https://github.com/poteto/hiring-without-whiteboards.git
```

SSH Keys setup Github

You need to be authenticated on Github to do certain operations, like pushing up code from your local machine. Your terminal will prompt you every single time for Github email and password, unless..

You generate and configure an SSH key! Once configured, you can connect to Github without having to supply your username / password.

Checking SSH exists

① Open Terminal.

② Enter `ls -al ~/.ssh` to see if existing SSH keys are present.

```
$ ls -al ~/.ssh  
# Lists the files in your .ssh directory, if they exist
```

③ Check the directory listing to see if you already have a public SSH key. By default, the filenames of supported public keys for GitHub are one of the following.

- `id_rsa.pub`
- `id_ecdsa.pub`
- `id_ed25519.pub`

Checking for existing SSH keys - GitHub Docs

Before you generate an SSH key, you can check to see if you have any existing SSH keys.

⌚ <https://docs.github.com/en/authentication/connecting-to-github-with-ssh/checking-for-existing-ssh-keys>



Generate SSH Key

Generating a new SSH key and adding it to the ssh-agent - GitHub Docs

After you've checked for existing SSH keys, you can generate a new SSH key to use for authentication, then add it to the ssh-agent.

⌚ <https://docs.github.com/en/authentication/connecting-to-github-with-ssh/generating-a-new-ssh-key-and-adding-it-to-the-ssh-agent>



- ① Open Terminal.
- ② Paste the text below, replacing the email used in the example with your GitHub email address.

```
ssh-keygen -t ed25519 -C "your_email@example.com"
```

Note: If you are using a legacy system that doesn't support the Ed25519 algorithm, use:

```
ssh-keygen -t rsa -b 4096 -C "your_email@example.com"
```

This creates a new SSH key, using the provided email as a label.

```
> Generating public/private ALGORITHM key pair.
```

When you're prompted to "Enter a file in which to save the key", you can press **Enter** to accept the default file location. Please note that if you created SSH keys previously, ssh-keygen may ask you to rewrite another key, in which case we recommend creating a custom-named SSH key. To do so, type the default file location and replace id_ALGORITHM with your custom key name.

```
> Enter a file in which to save the key (/Users/YOU/.ssh/id_ALGORITHM):  
[Press enter]
```

- ③ At the prompt, type a secure passphrase. For more information, see "[Working with SSH key passphrases](#)."

```
> Enter passphrase (empty for no passphrase): [Type a passphrase]  
> Enter same passphrase again: [Type passphrase again]
```



Adding your SSH key to the ssh-agent ↵

Before adding a new SSH key to the ssh-agent to manage your keys, you should have checked for existing SSH keys and generated a new SSH key. When adding your SSH key to the agent, use the default macOS `ssh-add` command, and not an application installed by [macports](#), [homebrew](#), or some other external source.

- 1 Start the ssh-agent in the background.

```
$ eval "$(ssh-agent -s)"  
> Agent pid 59566
```

Depending on your environment, you may need to use a different command. For example, you may need to use root access by running `sudo -s -H` before starting the ssh-agent, or you may need to use `exec ssh-agent bash` or `exec ssh-agent zsh` to run the ssh-agent.

- 2 If you're using macOS Sierra 10.12.2 or later, you will need to modify your `~/.ssh/config` file to automatically load keys into the ssh-agent and store passphrases in your keychain.

- First, check to see if your `~/.ssh/config` file exists in the default location.

```
$ open ~/.ssh/config  
> The file /Users/YOU/.ssh/config does not exist.
```

- If the file doesn't exist, create the file.

```
touch ~/.ssh/config
```

- Open your `~/.ssh/config` file, then modify the file to contain the following lines. If your SSH key file has a different name or path than the example code, modify the filename path to match your current setup.

- Open your `~/.ssh/config` file, then modify the file to contain the following lines. If your SSH key file has a different name or path than the example code, modify the filename or path to match your current setup.

```
Host github.com
AddKeysToAgent yes
UseKeychain yes
IdentityFile ~/.ssh/id_ed25519
```

Notes:

- If you chose not to add a passphrase to your key, you should omit the `UseKeychain` line.
- If you see a `Bad configuration option: usekeychain` error, add an additional line to the configuration's `Host *.github.com` section.

```
Host github.com
IgnoreUnknown UseKeychain
```

- Add your SSH private key to the ssh-agent and store your passphrase in the keychain. If you created your key with a different name, or if you are adding an existing key that has a different name, replace `id_ed25519` in the command with the name of your private key file.

```
ssh-add --apple-use-keychain ~/.ssh/id_ed25519
```

Note: The `--apple-use-keychain` option stores the passphrase in your keychain for you when you add an SSH key to the ssh-agent. If you chose not to add a passphrase to your key, run the command without the `--apple-use-keychain` option.

The `--apple-use-keychain` option is in Apple's standard version of `ssh-add`. In Mac OS X versions prior to Monterey (12.0), the `--apple-use-keychain` and `--apple-load-`

created your key with a different name, or if you are adding an existing key that has a different name, replace `id_ed25519` in the command with the name of your private key file.

```
ssh-add --apple-use-keychain ~/.ssh/id_ed25519
```

Note: The `--apple-use-keychain` option stores the passphrase in your keychain for you when you add an SSH key to the ssh-agent. If you chose not to add a passphrase to your key, run the command without the `--apple-use-keychain` option.

The `--apple-use-keychain` option is in Apple's standard version of `ssh-add`. In MacOS versions prior to Monterey (12.0), the `--apple-use-keychain` and `--apple-load-keychain` flags used the syntax `-K` and `-A`, respectively.

If you don't have Apple's standard version of `ssh-add` installed, you may receive an error. For more information, see "[Error: ssh-add: illegal option -- apple-use-keychain](#)".

If you continue to be prompted for your passphrase, you may need to add the command to your `~/.zshrc` file (or your `~/.bashrc` file for bash).

- ④ Add the SSH public key to your account on GitHub. For more information, see "[Adding a new SSH key to your GitHub account](#)."

Steps:

```
ssh-keygen -t ed25519 -C "sakibdalal73@gmail.com"
Generating public/private ed25519 key pair.
Enter file in which to save the key (/Users/sakibdalal/.ssh/id_ed25519):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /Users/sakibdalal/.ssh/id_ed25519
Your public key has been saved in /Users/sakibdalal/.ssh/id_ed25519.pub
The key fingerprint is:
SHA256:WJPEQVgQbZ5Fw0cB+QkgwfMKaPyc2kZULGMBX6Y6htI sakibdalal73@gmail.com
The key's randomart image is:
+--[ED25519 256]--+
| ..o=++@B*.
| .+*+.B.+
| ...o+o o+B o
| o+o. .oo.+
| ++E.... S
| o .=.
| +
| . o
| .
+----[SHA256]----+
```

```
eval "$(ssh-agent -s)"
Agent pid 4361
```

```
open ~/.ssh/config
The file /Users/sakibdalal/.ssh/config does not exist.

touch ~/.ssh/config

nano ~/.ssh/config
```

```
Host github.com
  AddKeysToAgent yes
  UseKeychain yes
  IdentityFile ~/.ssh/id_ed25519
```

```
ssh-add --apple-use-keychain ~/.ssh/id_ed25519
Enter passphrase for /Users/sakibdalal/.ssh/id_ed25519:
Identity added: /Users/sakibdalal/.ssh/id_ed25519 (sakibdalal73@gmail.com)
```

Adding a new SSH key to your account

You can add an SSH key and use it for authentication, or commit signing, or both. If you want to use the same SSH key for both authentication and signing, you need to upload it twice.

After adding a new SSH authentication key to your account on GitHub.com, you can reconfigure any local repositories to use SSH. For more information, see "[Managing remote repositories](#)."

Note: GitHub improved security by dropping older, insecure key types on March 15, 2022.

As of that date, DSA keys (`ssh-dss`) are no longer supported. You cannot add new DSA keys to your personal account on GitHub.com.

RSA keys (`ssh-rsa`) with a `valid_after` before November 2, 2021 may continue to use any signature algorithm. RSA keys generated after that date must use a SHA-2 signature algorithm. Some older clients may need to be upgraded in order to use SHA-2 signatures.

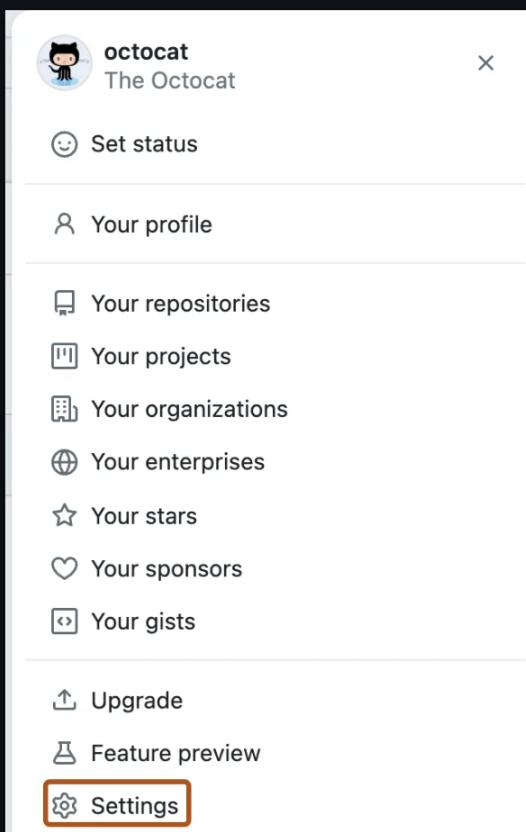
- 1 Copy the SSH public key to your clipboard.

If your SSH public key file has a different name than the example code, modify the filename to match your current setup. When copying your key, don't add any newlines or whitespace.

```
$ pbcopy < ~/.ssh/id_ed25519.pub
# Copies the contents of the id_ed25519.pub file to your clipboard
```

Tip: If `pbcopy` isn't working, you can locate the hidden `.ssh` folder, open the file in your favorite text editor, and copy it to your clipboard.

- ② In the upper-right corner of any page, click your profile photo, then click **Settings**.



- ③ In the "Access" section of the sidebar, click **SSH and GPG keys**.
④ Click **New SSH key** or **Add SSH key**.
⑤ In the "Title" field, add a descriptive label for the new key. For example, if you're using a personal laptop, you might call this key "Personal laptop".



- ⑥ Select the type of key, either authentication or signing. For more information about commit signing, see "[About commit signature verification](#)".
⑦ In the "Key" field, paste your public key.
⑧ Click **Add SSH key**.
⑨ If prompted, confirm access to your account on GitHub. For more information, see "[Sudo mode](#)".

Adding a new SSH key to your GitHub account - GitHub Docs

To configure your account on GitHub.com to use your new (or existing) SSH key, you'll also need to add the key to your account.

🔗 <https://docs.github.com/en/authentication/connecting-to-github-with-ssh/adding-a-new-ssh-key-to-your-github-account>



Steps:

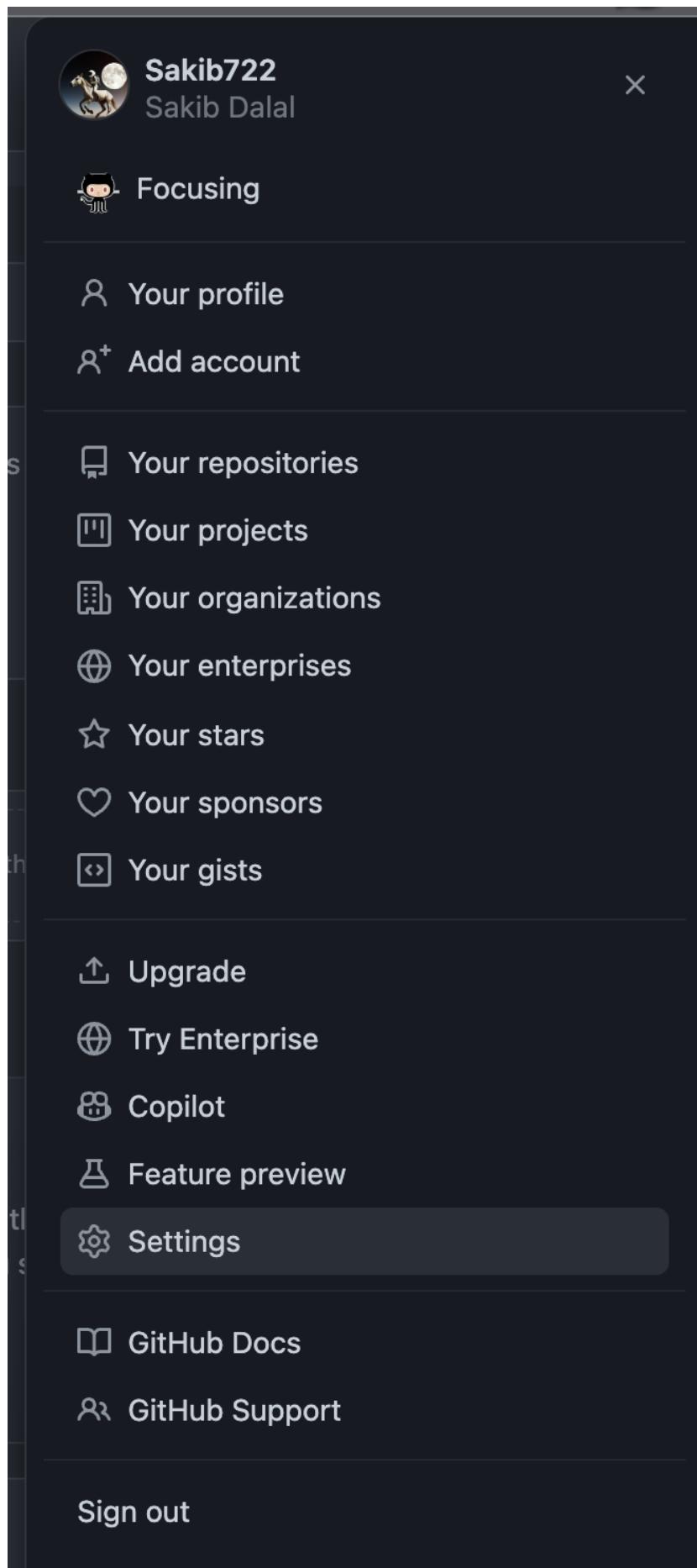
```
pbcopy < ~/.ssh/id_ed25519.pub
```

```
cd .ssh/
ls
cat id_ed25519
```

config id_ed25519 id_ed25519.pub known_hosts known_hosts.old

```
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAIM86fIpUtZuwG+EgFRMd+BR2YKIx0MRUSvCuS8GVVwXp sakibdalal73@gmail.com
```

copy the ssh





Sakib Dalal (Sakib722)

Your personal account

[Go to your personal profile](#)

Public profile

Account

Appearance

Accessibility

Notifications

Access

Billing and plans

Emails

Password and authentication

Sessions

SSH and GPG keys

Organizations

Enterprises

SSH keys

[New SSH key](#)

There are no SSH keys associated with your account.

Check out our guide to [generating SSH keys](#) or troubleshoot [common SSH problems](#).

Add new SSH Key

Title

MacBook

Key type

Authentication Key ▾

Key

ssh-ed25519

AAAAC3NzaC1lZDI1NTE5AAAAIM86fIpUtZuwG+EgFRMd+BR2YKIx0MRUSvCuS8GVVwXp
sakibdalal73@gmail.com

Add SSH key

SSH keys

New SSH key

This is a list of SSH keys associated with your account. Remove any keys that you do not recognize.

Authentication keys



MacBook

SHA256:WJPEQVgQbZ5Fw0cB+QkgwfMKaPyc2kZULGMBX6Y6htI

Delete

Added on Dec 20, 2023

SSH

Never used — Read/write

Check out our guide to [generating SSH keys](#) or troubleshoot [common SSH problems](#).

How to get code on Github

Option 1: Existing Repo

If you already have an existing repo locally that you want to get on Github.

- Create a new repo on Github
- Connect your local repo (add a remote)
- Push up your changes to Github

Option 2: Start From Scratch

If you haven't begun work on your local repo, you can

- Create a brand new repo on Github
- Clone it down to your machine
- Do some work locally
- Push up your changes to Github

Remote

Before we can push anything up to Github, we need to tell Git about our remote repository on Github. We need to setup a "destination" to push up to.

In Git, we refer to these "destinations" as remotes. Each remote is simply a URL where a hosted repository lives.

Viewing Remotes

To view any existing remotes for your repository, we can run `git remote` or `git remote -v` (verbose, for more info)

This just displays a list of remotes. If you haven't added any remotes yet, you won't see anything!

```
git remote -v
```

Create a New Github Repo

By using Option - 1

Adding a new Remote

A remote is really two things: a URL and a label. To add a new remote, we need to provide both to Git.

```
git remote add <name> <url>
```

Adding A New Remote

```
❯ git remote add origin  
https://github.com/blah/repo.git
```

Okay Git, anytime I use the name "origin", I'm referring to this particular Github repo URL.

Origin?

Origin is a conventional Git remote name, but it is not at all special. It's just a name for a URL. Where we clone a Github repo, the default remote name setup for us is called origin. You can change it. Most people leave it.

Adding A New Remote

```
❯ git remote add mygithuburl  
https://github.com/meh/repo.git
```

Okay Git, anytime I use the name "mygithuburl", I'm referring to this particular Github repo URL.

This is not a commonly used remote name.

...or create a new repository on the command line

```
echo "# git-repo" >> README.md  
git init  
git add README.md  
git commit -m "first commit"  
git branch -M main  
git remote add origin https://github.com/Sakib722/git-repo.git  
git push -u origin main
```



...or push an existing repository from the command line

```
git remote add origin https://github.com/Sakib722/git-repo.git  
git branch -M main  
git push -u origin main
```



...or import code from another repository

You can initialize this repository with code from a Subversion, Mercurial, or TFS project.

[Import code](#)

Example:

```
mkdir git  
cd git  
git init  
git status  
git remote -v  
  
git remote add origin https://github.com/Sakib722/git-repo.git  
git remote -v
```



A terminal window showing the output of the command `git remote -v`. The output lists two remotes: `origin` with the URL `https://github.com/Sakib722/git-repo.git`, where `(fetch)` and `(push)` are also specified.

```
▶ [apple] ~ ~/Downloads/git ➤ git master  
└─ git remote -v  
origin https://github.com/Sakib722/git-repo.git (fetch)  
origin https://github.com/Sakib722/git-repo.git (push)
```

Other commands

They are not commonly used, but there are commands to rename and delete remotes if needed.

```
git remote rename <old> <new>
```

```
git remote remove <name>
```

Pushing

Now that we have a remote set up, let's push some work up to Github! To do this, we need to use the **git push** command.

We need to specify the remote we want to push up to AND the specific location branch we want to push up to that remote.

```
git push <remote> <branch>
```

example:

```
git push origin master  
# tells git to push up the master branch to our original remote
```

Note: Before doing this use this code

git remote add for ssh not for https <url> from Github

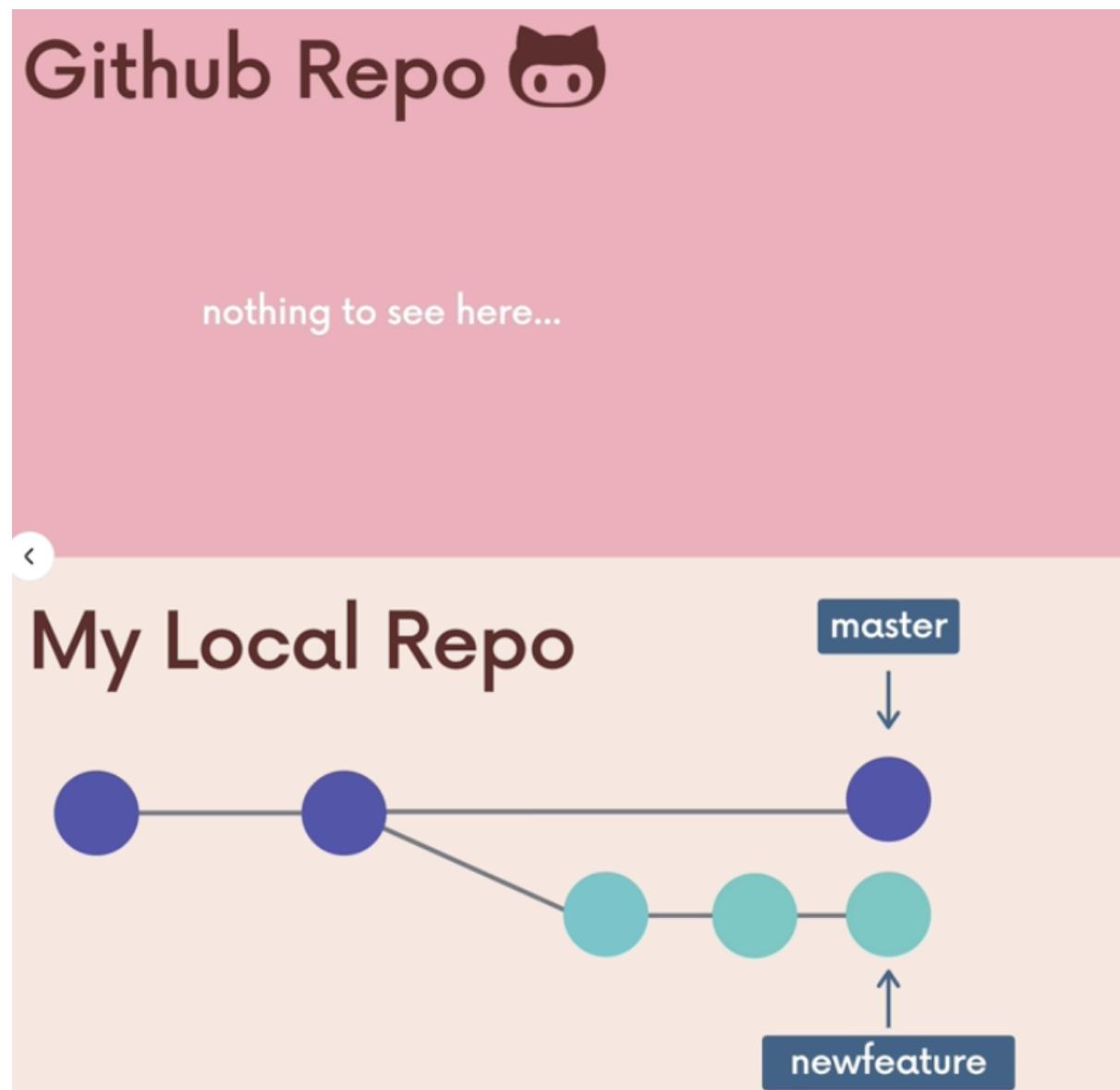
```
cd /Users/sakibdalal/.ssh/
```

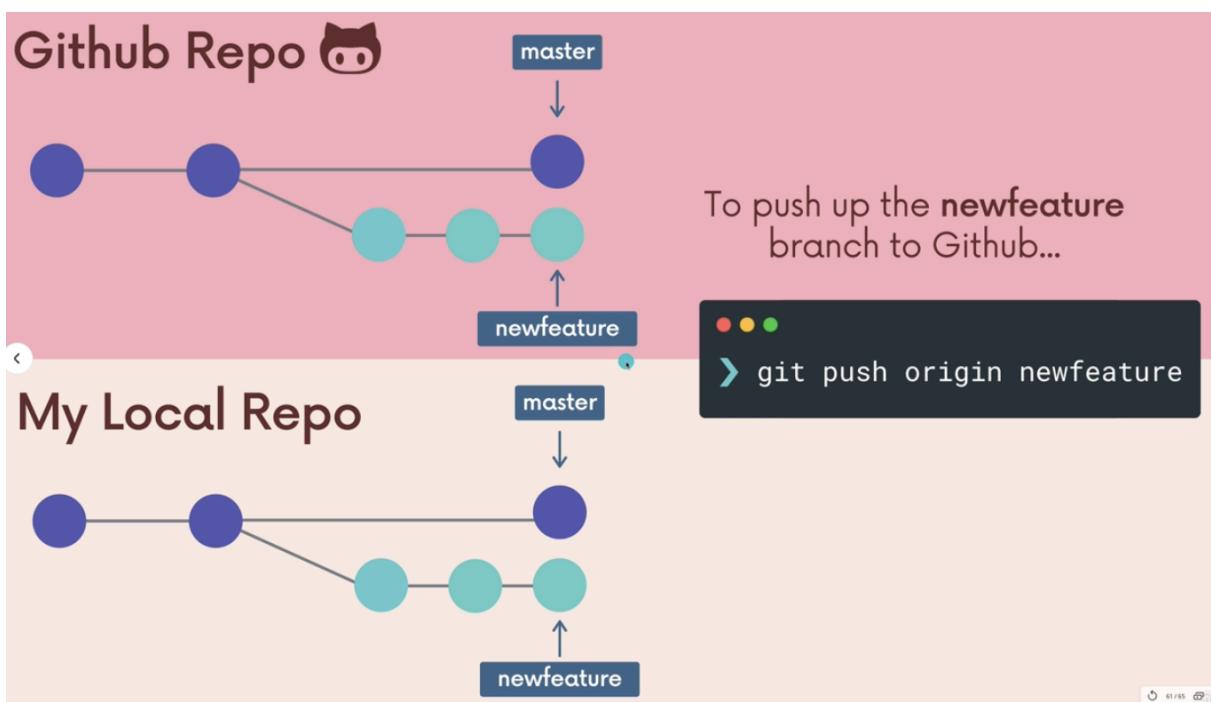
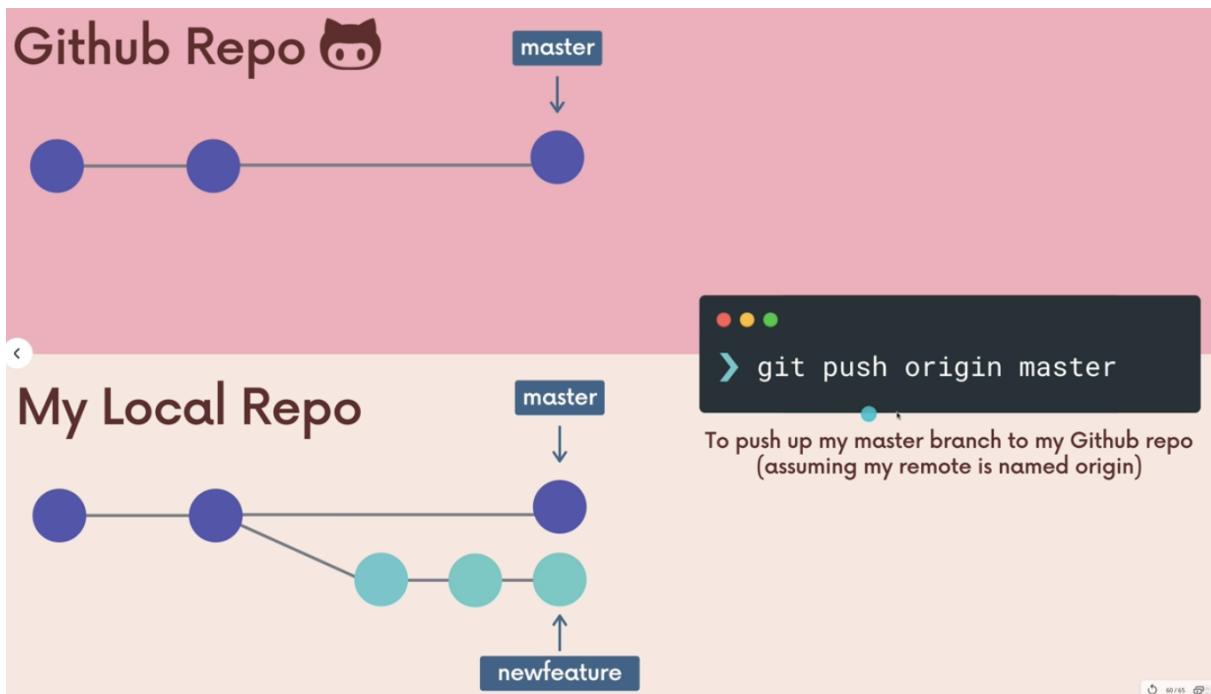
```
ssh-add -l
```

```
git config core.sshCommand "ssh -v"
```

```
ssh-add -K ~/.ssh/id_ed25519
```

In Background Example





Note:

We always need to **git push** after a change, commit in a repo.

Push In Detail

While we often want to push a local branch up to a remote branch of the same name, we don't have to!

To push our local pancake branch up to a remote branch called waffle we could do:

```
git push origin pancake:waffle
```

```
git push <remote-name> <local-branch-name>:<remote-branch-name>
```

example:

```
git push origin pancake:waffle
```

The -u option # git push -u

The -u option allows us to set the upstream (connection pointing to remote machine) of the branch we're pushing. You can think of this as a link connecting our local branch to a branch on Github.

Running **git push -u origin master** sets the upstream of the local master branch so that it tracks the master branch on the origin repo.

```
git push -u origin master
```

```
git push -u <remote-name> <branch-name>
```

or

```
git push -u origin B:C
```

```
git push -u <remote-name> <local-branch-name>:<remote-branch-name>
```

Once we've set the upstream for a branch, we can use the git push shorthand while push our current branch to the upstream.

we can use only **git push** to push to the Github repo

```
git push
```

By using Option - 2 # Start from Scratch

Create a NEW Github Repository.

We will clone the repository from Github to local machine.

Note: set HTTPS instead of SSH and copy the URL link, if you are using SSH then refer to SSH url link.

on terminal:

```
git clone <url>
```

example:

```
# with https show error as we do not set https  
git clone https://github.com/Sakib722/Option-2.git  
  
# use ssh  
git clone git@github.com:Sakib722/Option-2.git
```

as we set the remote already in Github repo so we can check the remote name by using

```
git remote -v
```

Note: where in Github instead of using master branch we uses main.

Working with Remote repo's

Remote Tracking Branches

“At the time you last communicated with this remote repository, here is where x branch was pointing”

They follow this pattern <remote> / <branch>. (eg origin / master)

- origin/master references the state of the master branch on the remote repo named origin
- upstream/logoRedesign references the state of the logoRedesign branch on the remote named upstream (a common remote name)

Remote Branches

Run **git branch -r** to view the remote branches our local repository knows about.

```
git branch -r  
  
# Output: origin/master, origin/<other-branches>
```

You can checkout these remote branch pointers

```
git checkout origin/master
Note: switching to 'origin/master'.
You are in 'detached HEAD' state. You can look
around, make experimental changes and commit
them, and you can discard any commits you make
in this blah blah blah
```

Detached HEAD! Don't panic. It's fine.

Fetching and Pulling

Question: cloning a repository in to a local machine will bring only the main or master branch while if a repository consist of multiple branches what should we do?

Remote Branches

Once you've cloned a repository, we have all the data and Git history for the project at that moment in time. However, that does not mean it's all in my workspace!

The Github repo has a branch called puppies, but when I run **git branch** I don't see it on my machine! All I see is the master branch. What's going on?

If we do **git branch -r** we can see all the branches on the remote side.

```
git branch -r
```

Workspace

master

Remote

origin/master

origin/puppies

By default, my master branch is already tracking origin/master.

I didn't connect these myself!

I want to work on the puppies branch locally! I could `git checkout origin/puppies`, but that puts me in detached HEAD.

```
git checkout origin/master
```

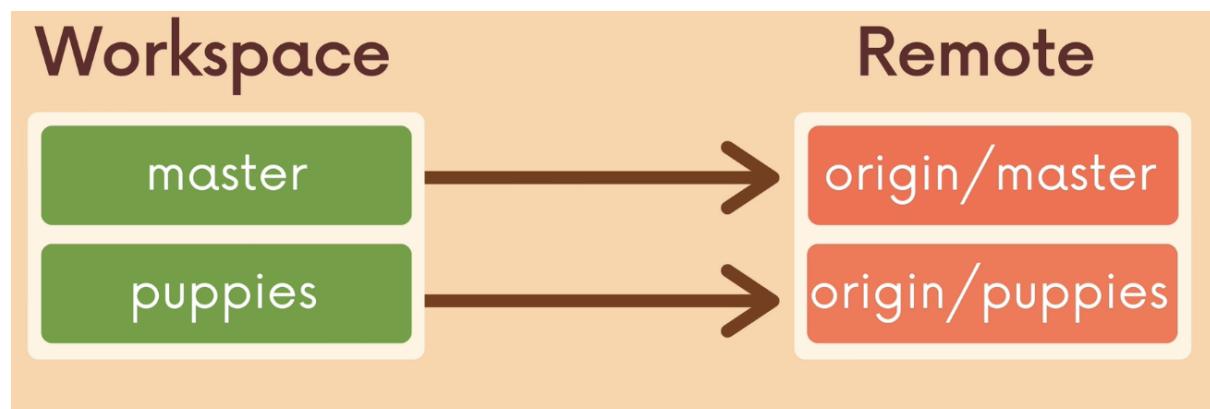
I want my own local branch called **puppies**, and I want it to be connected to **origin/puppies**, just like my local **master** branch is connected to **origin/master**.

Solution:

Run `git switch <remote-branch-name>` to create a new local branch from the remote branch of the same name.

```
git switch <remote-branch-name>  
  
#  
git switch puppies
```

`git switch puppies` makes me a local puppies branch AND sets it up to track the remote branch `origin/puppies`.



```
git branch  
  
# main and puppies
```

NOTE!

the new command `git switch` makes this super easy to do!
It used to be slightly more complicated using `git checkout`



```
› git checkout --track origin/puppies
```

```
git checkout --track <remote-name>/<remote-branch-name>
```

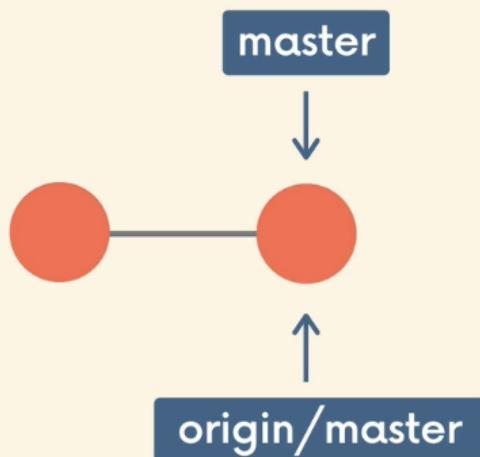
Git Fetch

Example when to use

Github



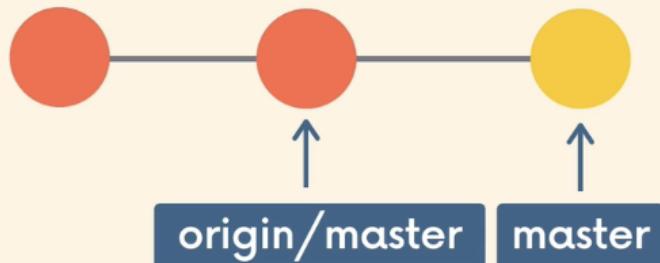
Local



Github

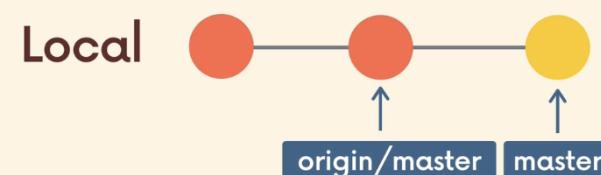


Local

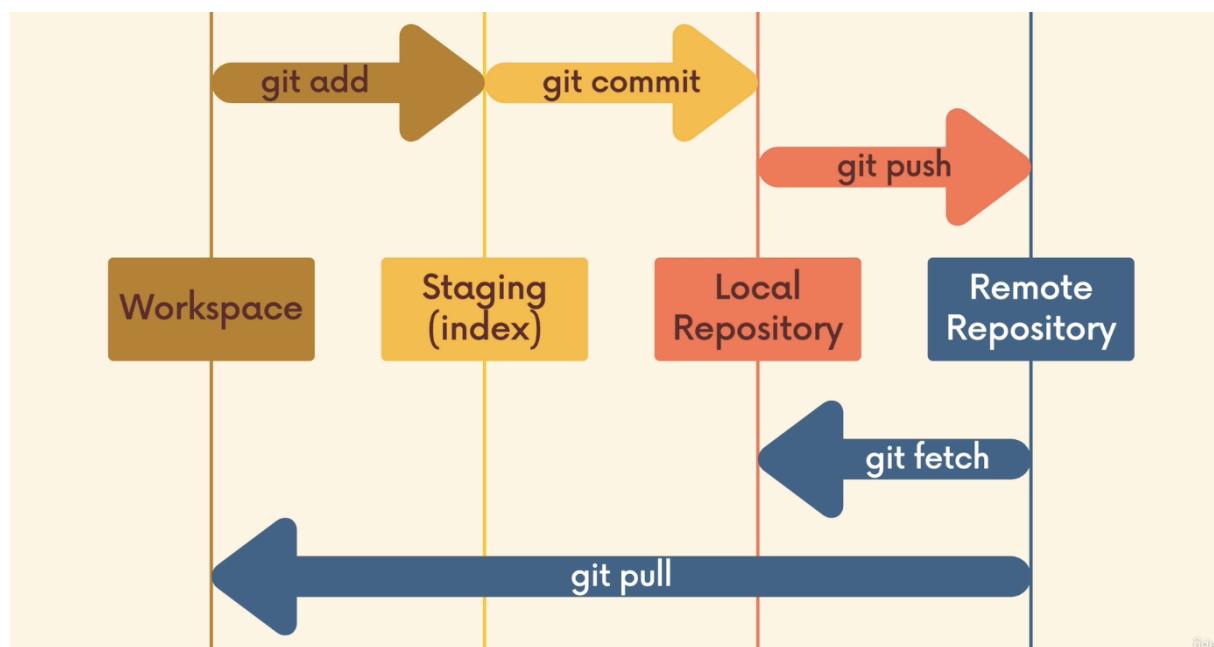




Github Uh oh! The remote repo has changed! A teammate has pushed up changes to the master branch, but my local repo doesn't know!



How do I get those changes???



Fetching

Fetching allows us to download changes from a remote repository, But those changes will not be automatically integrated into our working files.

It lets you see what others have been working on, without having to merge those changes into your local repo.

Think of as “please go and get the latest information from Github, but don’t screw up my working directory”.

Git Fetch

The **git fetch <remote-name>** command fetches branches and history from a specific remote repository. It only updates remote tracking branches.

```
git fetch <remote>
```

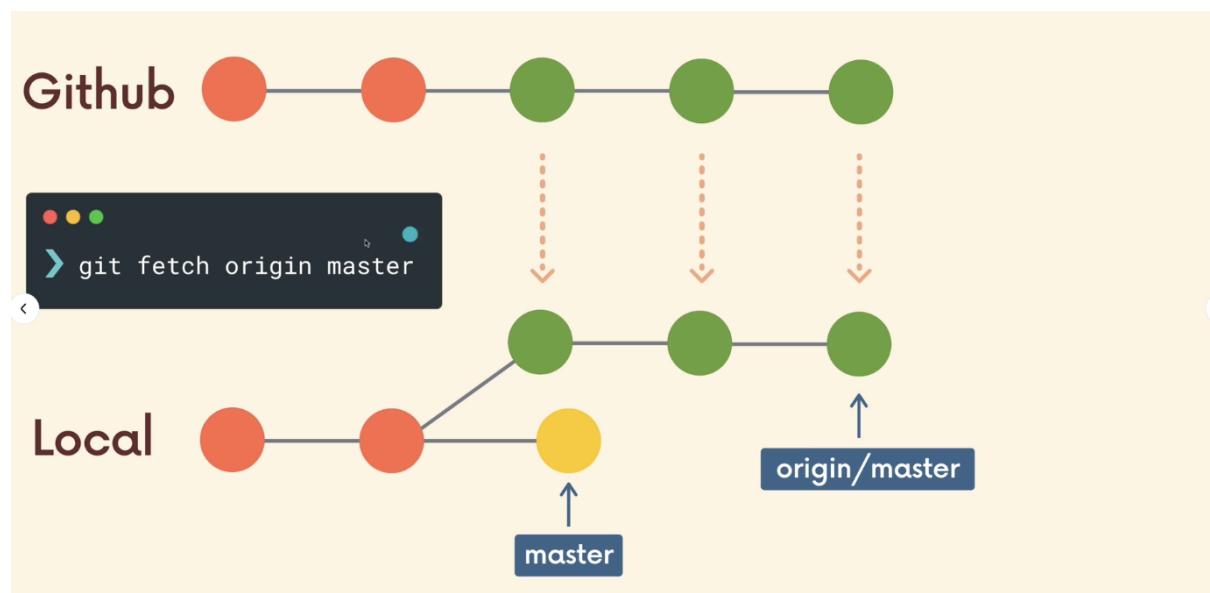
git fetch origin would fetch all changes from the origin remote repository.

We can also fetch a specific branch from a remote using **git fetch <remote-name> <branch-name>**

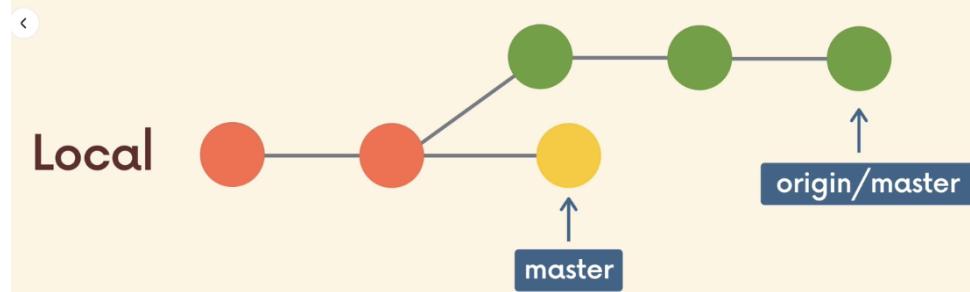
```
git fetch <remote-name> <branch-name>
```

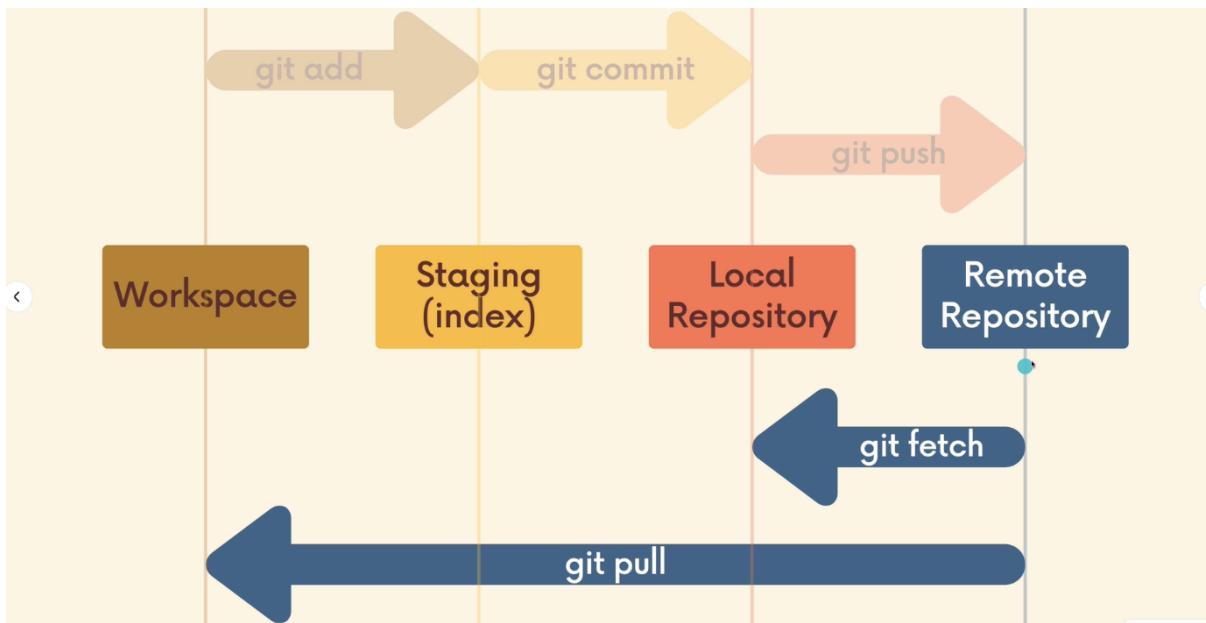
For example, **git fetch origin master** would retrieve the latest information from the master branch on the origin remote repository.

Hence:



I now have those changes on my machine, but if I want to see them I have to **checkout origin/master**. My master branch is untouched!





Pulling

git pull is another command we can use to retrieve changes from a remote repository. Unlike **fetch**, **pull** actually updates a remote repository. Unlike **fetch**, **pull** actually updates our **HEAD** branch with whatever changes are retrieved from the remote.

“go and download data from Github AND immediately update my local repo with those changes.”

git pull = git fetch + git merge

update the remote tracking branch
with the latest changes from the
remote repository

update my current branch with
whatever changes are on the remote
tracking branch

Git Pull

To pull, we specify the particular remote and branch we want to pull using **git pull <remote> <branch>**. Just like with **git merge**, it matters WHERE we run this command from. Whatever branch we run it from is where the changes will be merge into.

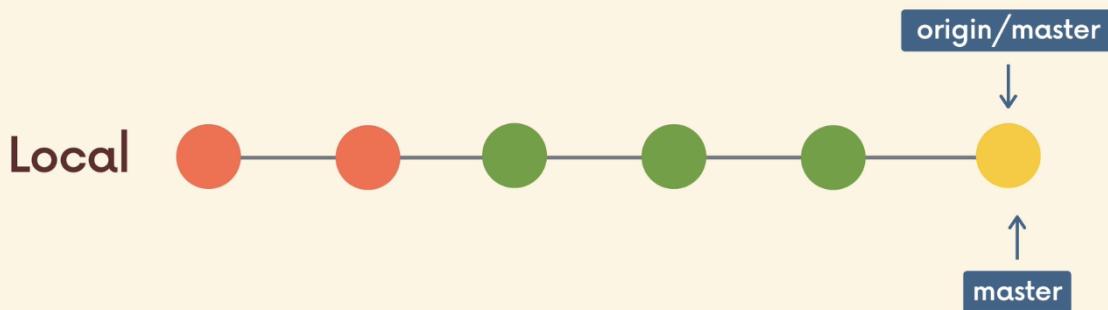
```
git pull <remote-name> <branch-name>
```

git pull origin master would fetch the latest information from the origin's master branch and merge those changes into our current branch.

Note: pulls can result in merge conflicts.



I now have the latest commits from origin/master on my local master branch (assuming I pulled while on my master branch)



I have a commit locally that is not on Github.
When I pulled, it was merged with the new commits.
As with any other merge, this can result in merge conflicts.

An even easier syntax!

If we run `git pull` without specifying a particular remote or branch to pull from, git assumes the following:

- remote will default to origin
- branch will default to whatever tracking connection is configured for your current branch.

```
● ● ●
> git pull
```

Note: this behavior can be configured, and tracking connections can be changed manually. Most people don't mess with that stuff

Workspace

master

Remote

origin/master

puppies

origin/puppies

When I'm on my local
master branch...

● ● ●
› git pull

pulls from origin/master
automatically

Workspace

master

Remote

origin/master

puppies

origin/puppies

When I'm on my local
puppies branch...

● ● ●
› git pull

pulls from origin/puppies
automatically

git fetch

- Gets changes from remote branch(es)
- Updates the remote-tracking branches with the new changes
- Does not merge changes onto your current HEAD branch
- Safe to do at anytime

git pull

- Gets changes from remote branch(es)
- Updates the current branch with the new changes, merging them in
- Can result in merge conflicts
- Not recommended if you have uncommitted changes!

Public Vs. Private Repos

Public Repos

Public repos are accessible to everyone on the internet. Anyone can see the repo on Github.

Private Repos

Private repos are only accessible to the owner and people who have been granted access.



404 error will show up if the repository is been private by owner Github account.

Adding Collaborators To Repos

The screenshot shows a GitHub repository named "Sakib722 / My_Python_Repo". The main navigation bar includes links for Code, Issues, Pull requests, Actions, Projects, Security, and a three-dot menu. A notification at the top states "Sakib5001 has been added as a collaborator on the repository." Below the notification, the "Who has access" section is displayed. It shows that the repository is a "PUBLIC REPOSITORY" visible to anyone. Under "DIRECT ACCESS", it lists "1 has access to this repository. 0 collaborators. 1 invitation." A "Manage" button is available for this section. On the left sidebar, under the "Access" heading, the "Collaborators" tab is selected, showing "1 collaborator". Other tabs include "Moderation options", "Branches", "Tags", "Rules", "Actions", "Webhooks", "Environments", "Codespaces", and "Pages". Under "Security", there are links for "Code security and analysis", "Deploy keys", and "Secrets and variables". The "Manage access" section on the right allows users to add people, select all, or search for collaborators. A specific entry for "sakib dalal" is shown, indicating an invite pending response.

Go to the specific repo setting and select collaborator's. In collaborators select add people, type the username or email you want to allow access to the repo.

READMEs

A README file is used to communicate important information about a repository including:

- What the project does
- How to run the project
- Why it's noteworthy
- Who maintains the project

If you put a README in the root of your project, Github will recognise it and automatically display it on the repos home page.

README.md

READMEs are Markdown files, ending with the .md extension. Markdown is a convenient syntax to generate formatted text. It's easy to pick up.

Markdown:

```
markdown-it demo  
https://markdown-it.github.io/
```

```
touch README.md  
# with .md extinction as Markdown
```

Github Gists

Github Gists are a simple way to share code snippets and useful fragments with others. Gists are much easier to create, but offer far fewer features than a typical Github repository.

The screenshot shows the GitHub mobile application interface. On the left, the main dashboard features sections for 'Repositories' (with a search bar), 'Recent activity' (with a placeholder message about actions across GitHub), and 'Home' (with a section for 'Updates to your homepage feed' and a 'Learn more' button). On the right, a dark-themed sidebar menu is open, displaying various options: 'Focusing', 'Your profile', 'Add account', 'Your repositories', 'Your projects', 'Your organizations', 'Your enterprises', 'Your stars', 'Your sponsors', 'Your gists' (which is highlighted with a grey background), 'Upgrade', 'Try Enterprise', 'Copilot', 'Feature preview', 'Settings', 'GitHub Docs', 'GitHub Support', and 'Sign out'. The top right corner of the sidebar has a close ('X') button.

Select “Your gists”

Create your own gists and share or keep it private.

GitHub Pages

Github Pages are public webpages that are hosted and published via Github. They allow you to create a website simply by pushing your code to Github.

Github pages is a hosting service for static webpages, so it does not support server-side code like Python, Ruby Just HTML/CSS/JS.

web pages will be having domain as **.github.io** we can customise.

User Site

You get one user site per Github account. This is where you could host a portfolio site or some form of personal website. The default url is based on your Github username, following this pattern: `username.github.io` though you can change this!

Project Sites

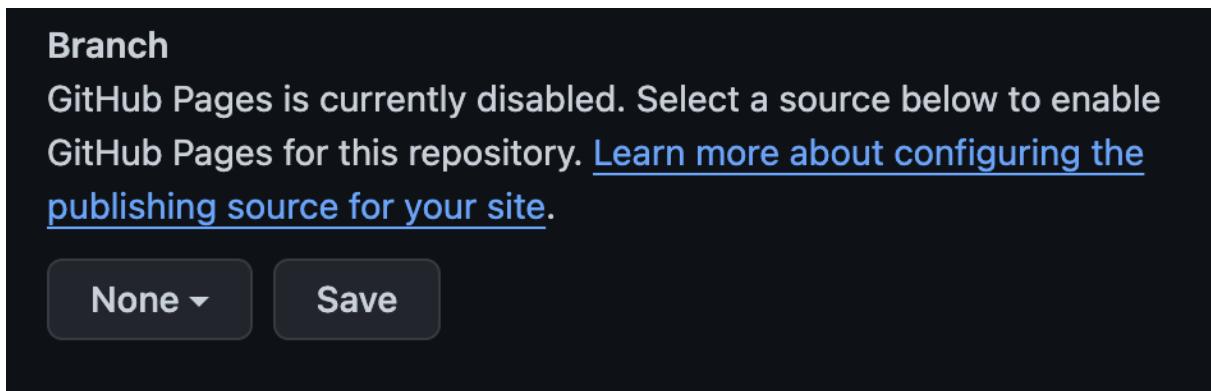
You get unlimited project sites! Each Github repo can have a corresponding hosted website. It's as simple as telling Github which specific branch contains the web content. The default urls follow this pattern: `username.github.io/repo-name`

Steps:

- Make a new repository.
- Make local machine repo.
- Include a **Index.html** file on the repo to be displayed on Github.
- got to Github and select Github Pages from **Repository Settings**.
- Select Pages

The screenshot shows the 'General' settings page for a GitHub repository. The left sidebar lists various settings sections: General, Access, Collaborators, Moderation options, Code and automation, Branches, Tags, Rules, Actions, Webhooks, Environments, Codespaces, and Pages. The 'Pages' section is currently selected, indicated by a blue bar at the bottom. The main content area is titled 'GitHub Pages'. It contains a descriptive text: 'GitHub Pages is designed to host your personal, organization, or project pages from a GitHub repository.' Below this is a 'Build and deployment' section with a 'Source' dropdown set to 'Deploy from a branch'. A 'Branch' dropdown is shown with the message 'GitHub Pages is currently disabled. Select a source below to enable GitHub Pages for this repository.' Buttons for 'None' and 'Save' are present. At the bottom, there are 'Visibility' and 'GITHUB ENTERPRISE' buttons.

- In pages select the branch



- Select main branch.
- open the url provided by Github.

Git Collaborative Workflows

Centralised Workflow

AKA Everyone Works On Master/Main

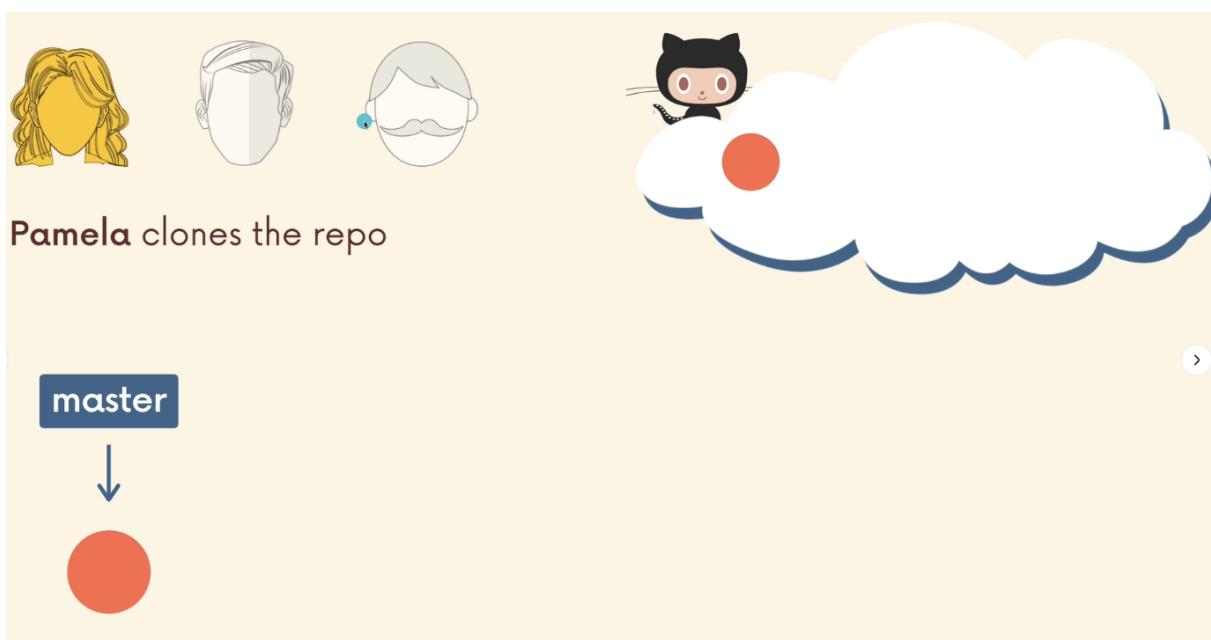
AKA The Most Basic Workflow Possible

The simplest collaborative workflow is to have everyone work on the master branch (or main, or any other SINGLE branch).

It's straightforward and can work for tiny teams, but it has quite a few shortcomings!

Example:

We have three different collaborations.





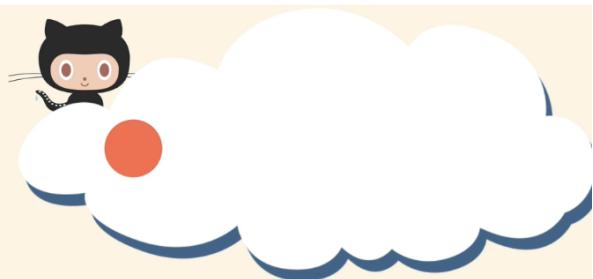
David clones the repo



master



Forrest clones the repo



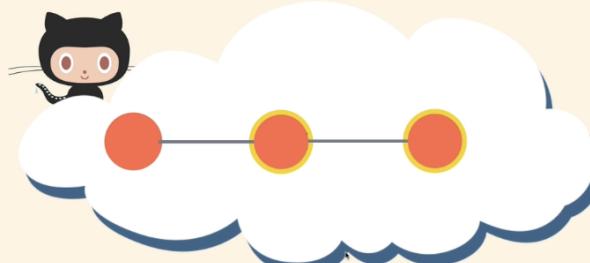
master





Forrest gets to work on a new feature! Adding and Committing all day long!

master



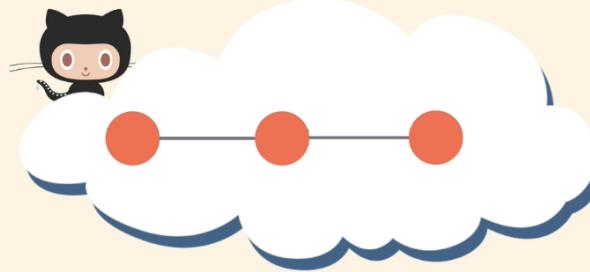
Forrest now **pushes** up his new work to Github

master





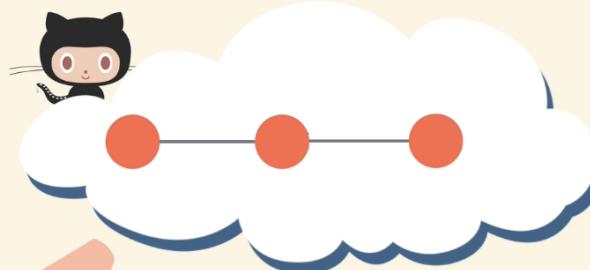
Pamela has also been hard at work on her own new feature.



master



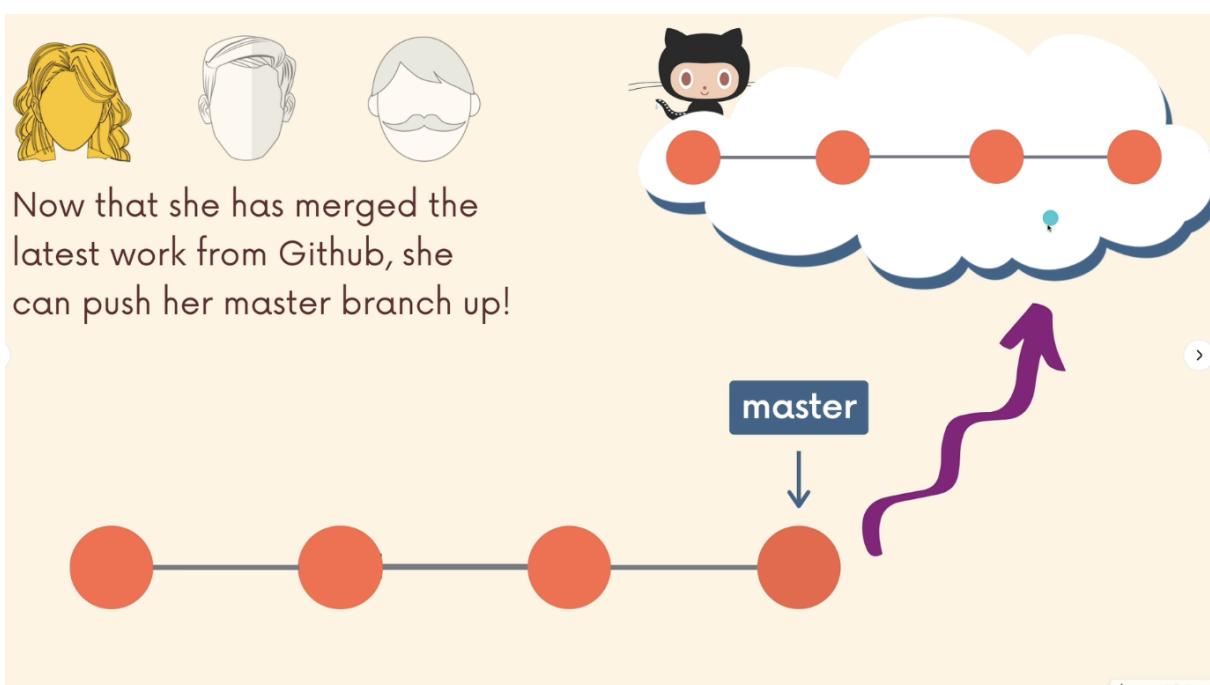
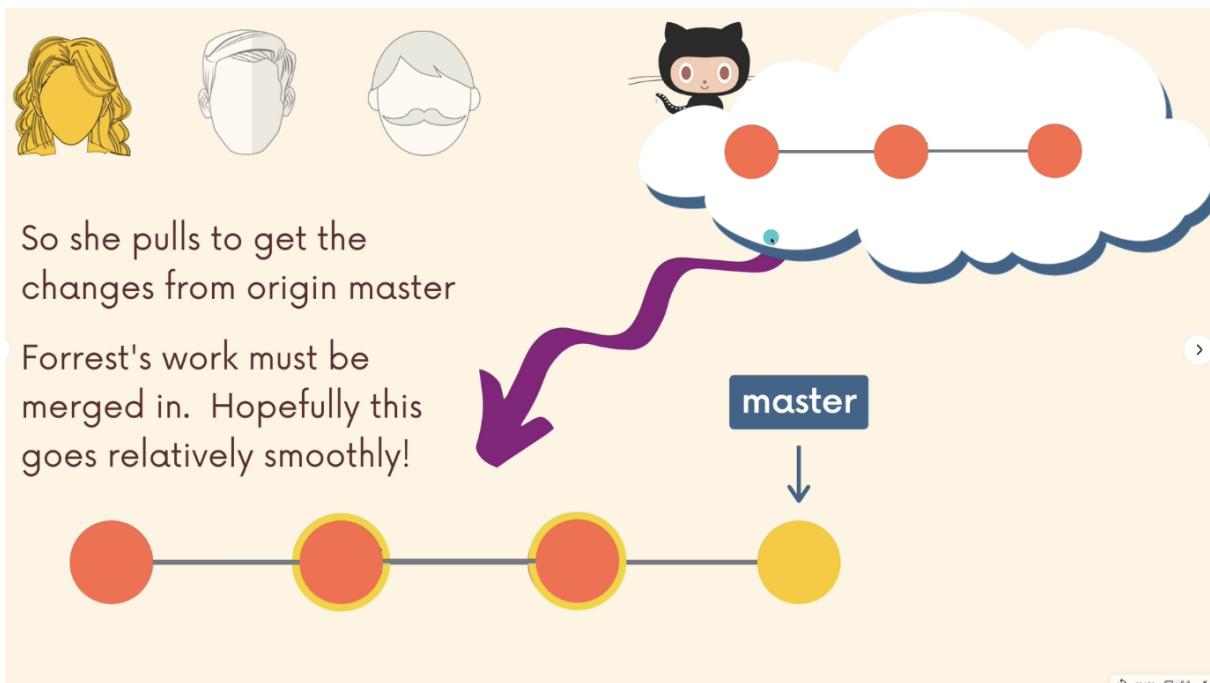
She tries to **push** her new work up to Github, but she runs into trouble!

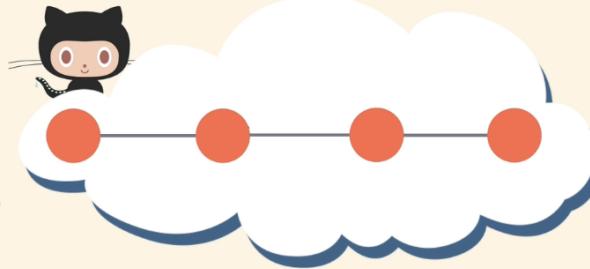


master



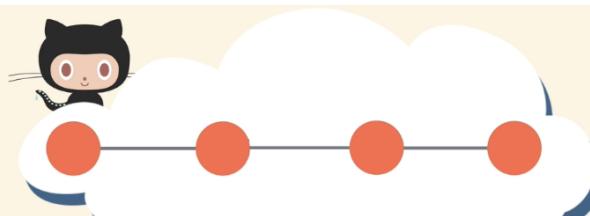
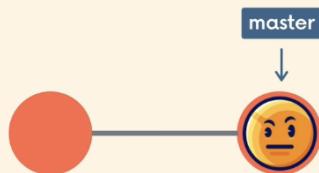
Failed to push. Updates were rejected because the tip of your current branch is behind its remote counterpart. Merge the remote changes (e.g. 'git pull') before pushing again.





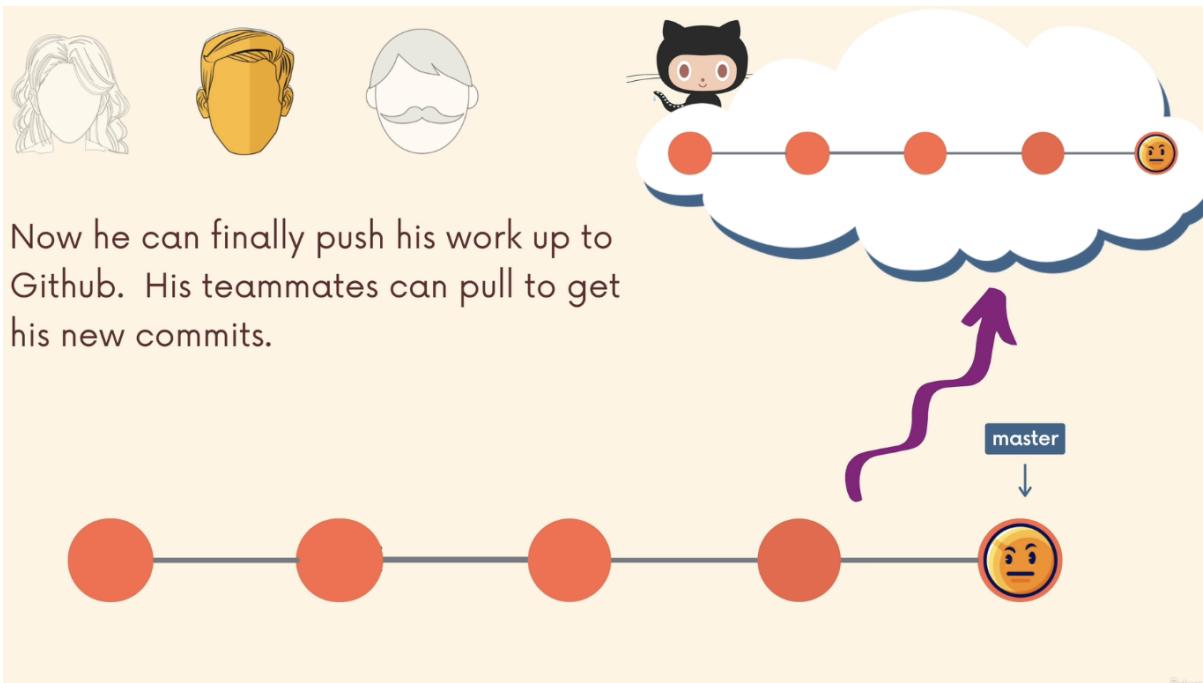
David working on a new feature, but is having some doubts.

He'd like to share his commits with the rest of the team to start a discussion.



Before he can even share these iffy commits, he has to **pull** from Github and **merge** them in to master





The Problem:

While it's nice and easy to only work on the master branch, this leads to some serious issues on teams!

- Lots of time spent resolving conflicts and merging code, especially as team size scales up.
- No one can work on anything without disturbing the main codebase. How do you try adding something radically different in? How do you experiment?
- The only way to collaborate on feature with another teammate is to push incomplete code to master. Other teammates now have broken code.

Note: Use **git stash** before git pull a repository into local machine.

Enter Feature Branches

Don't work on master branches work on feature branches.

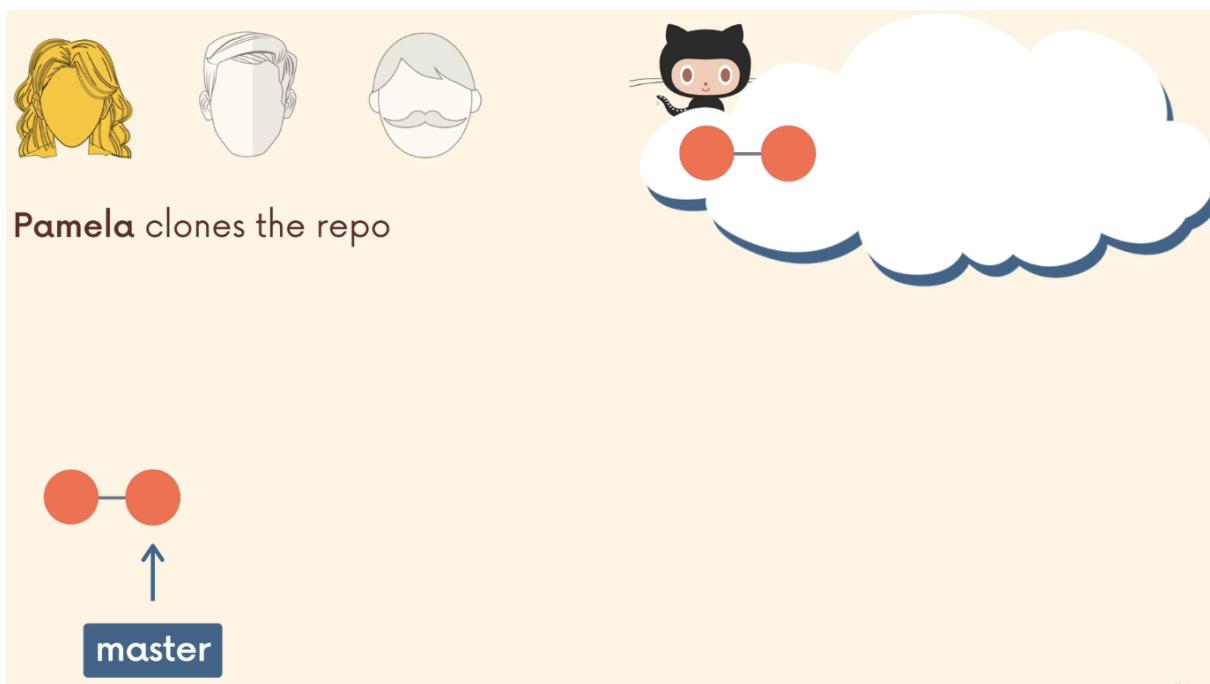
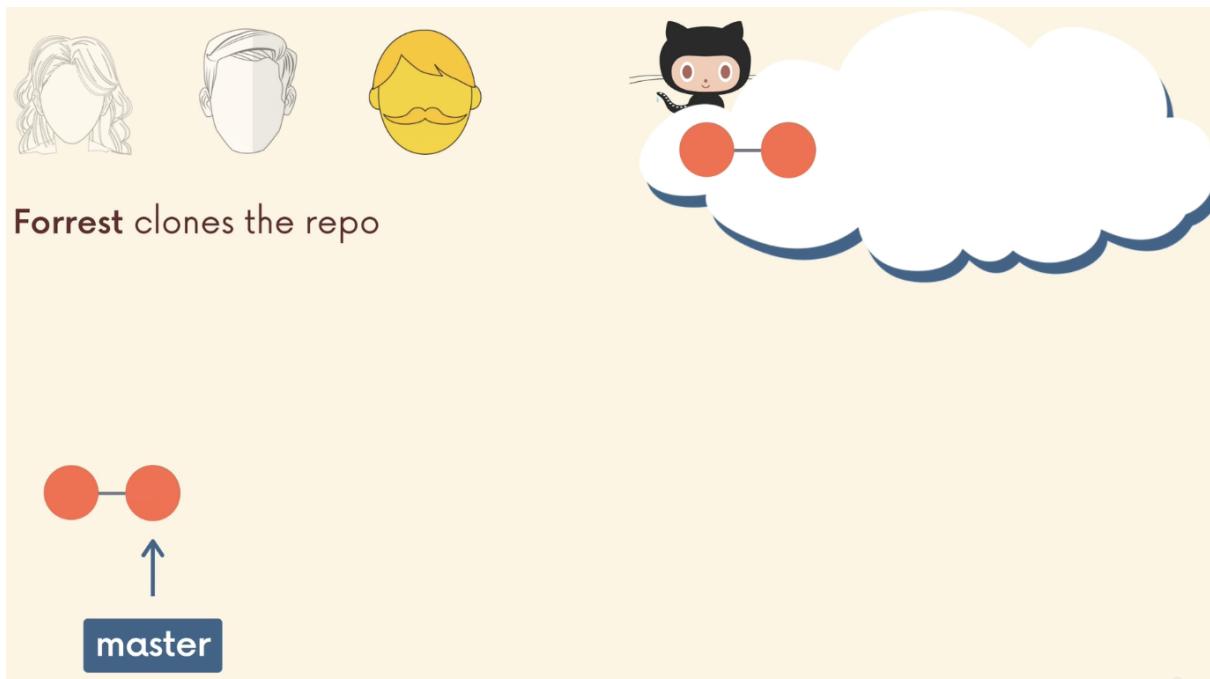
Feature Branch

Rather than working directly on master/main, all new development should be done on separate branches!

- Treat master/main branch as the official project history
- Multiple teammates can collaborate on single feature and share code back and forth without polluting the master/main branch.

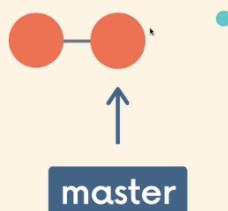
- Master/main branch won't contain broken code (or at least, it won't unless someone messes up).

Example:

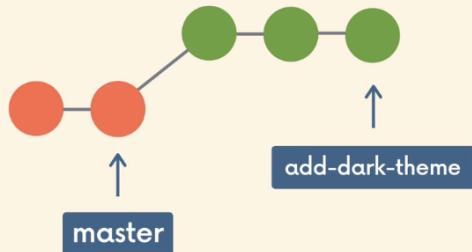


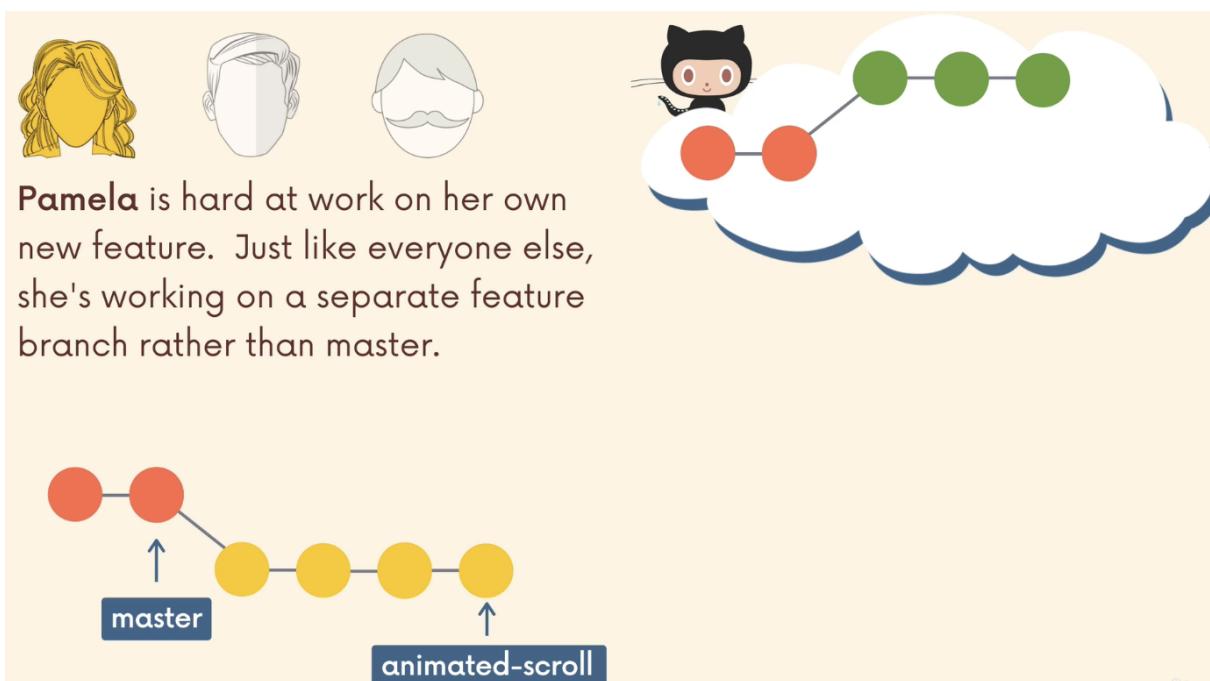
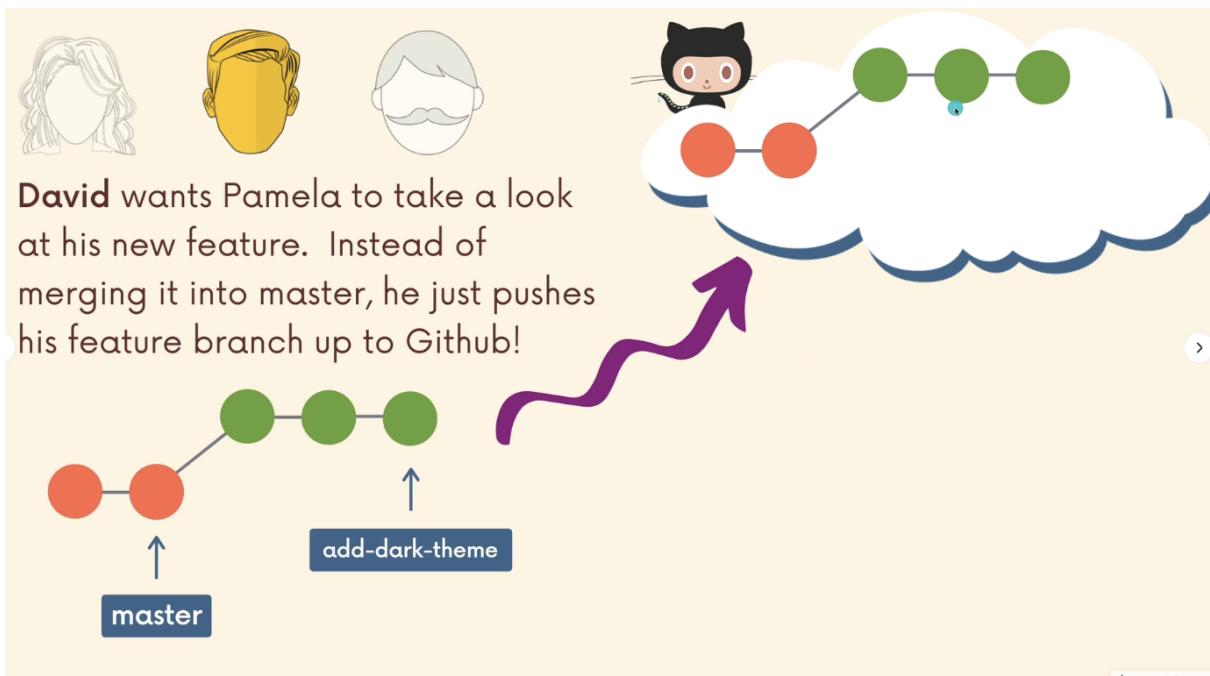


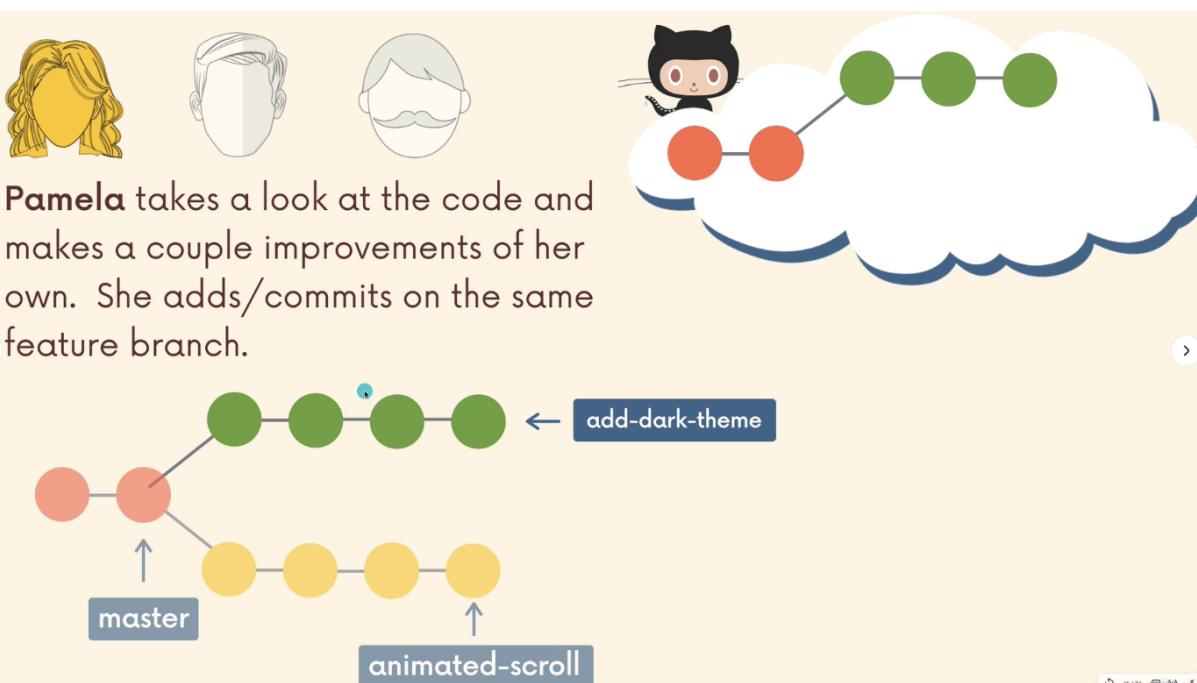
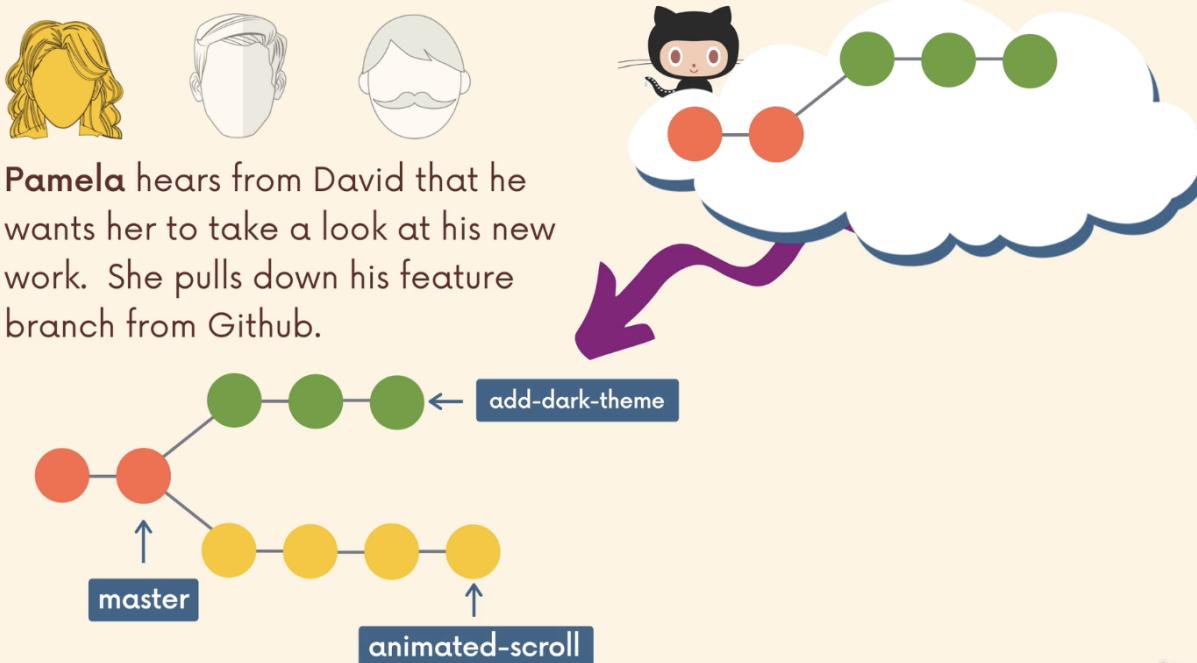
David clones the repo

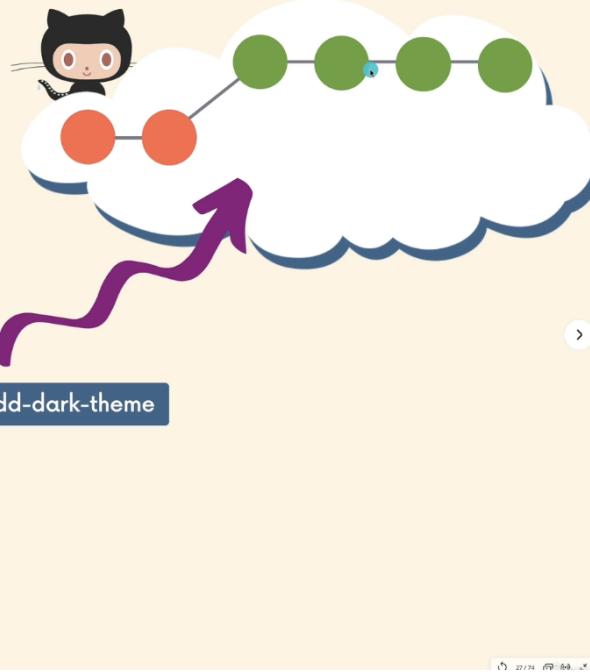


David starts work on a new feature. He does all this work on a separate branch!





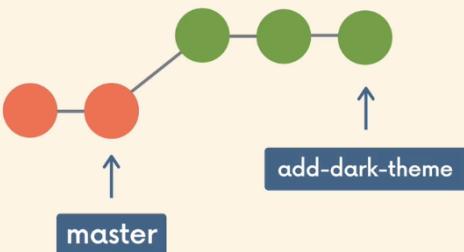
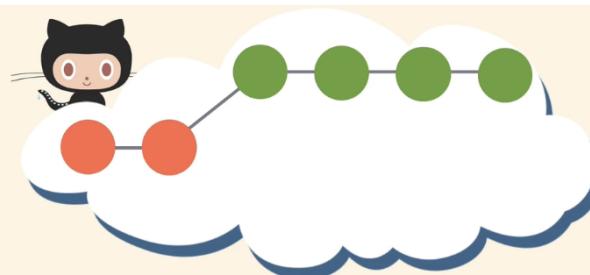


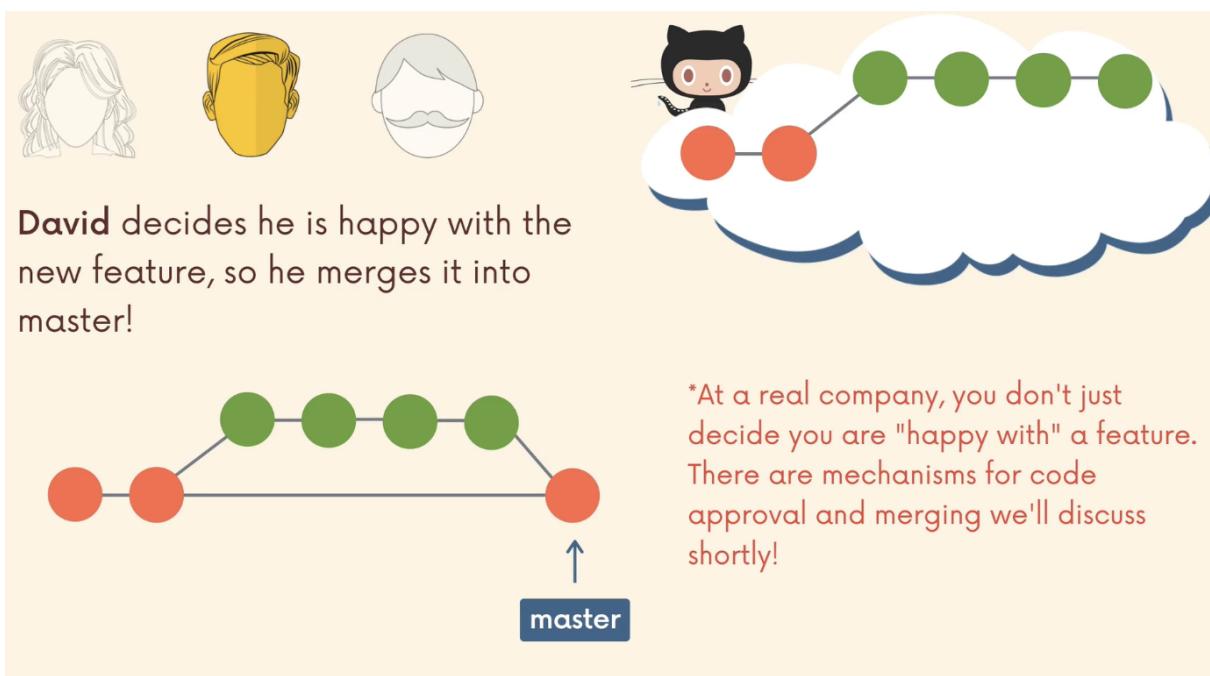
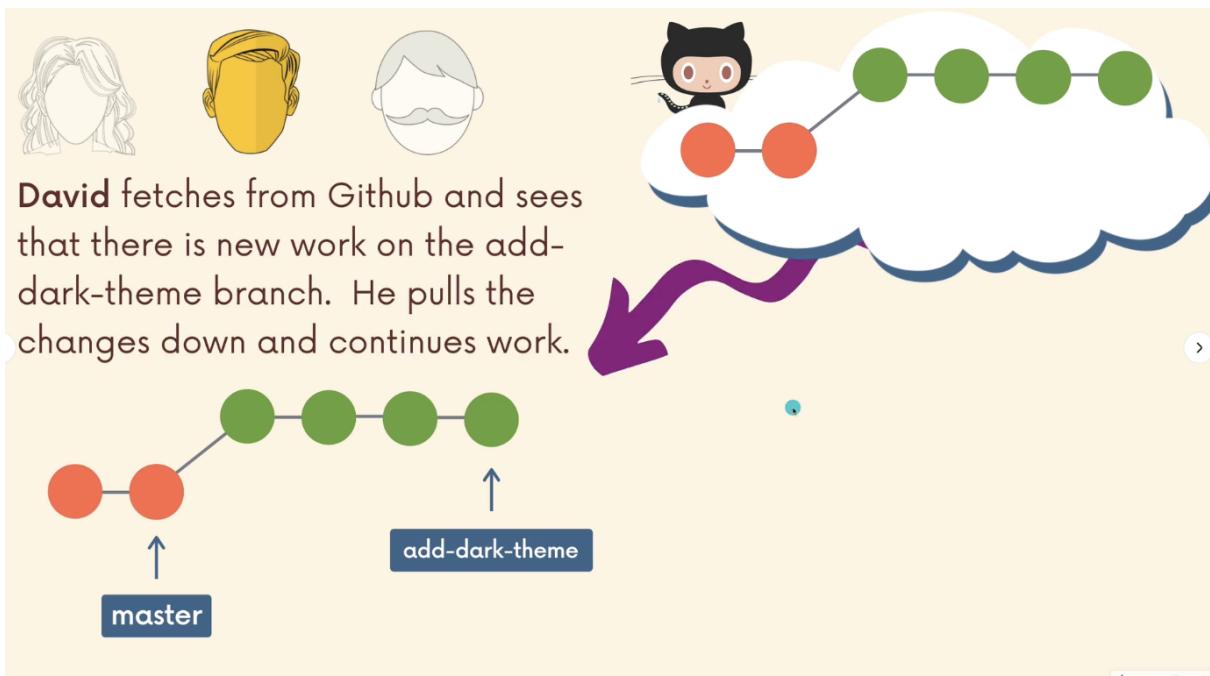


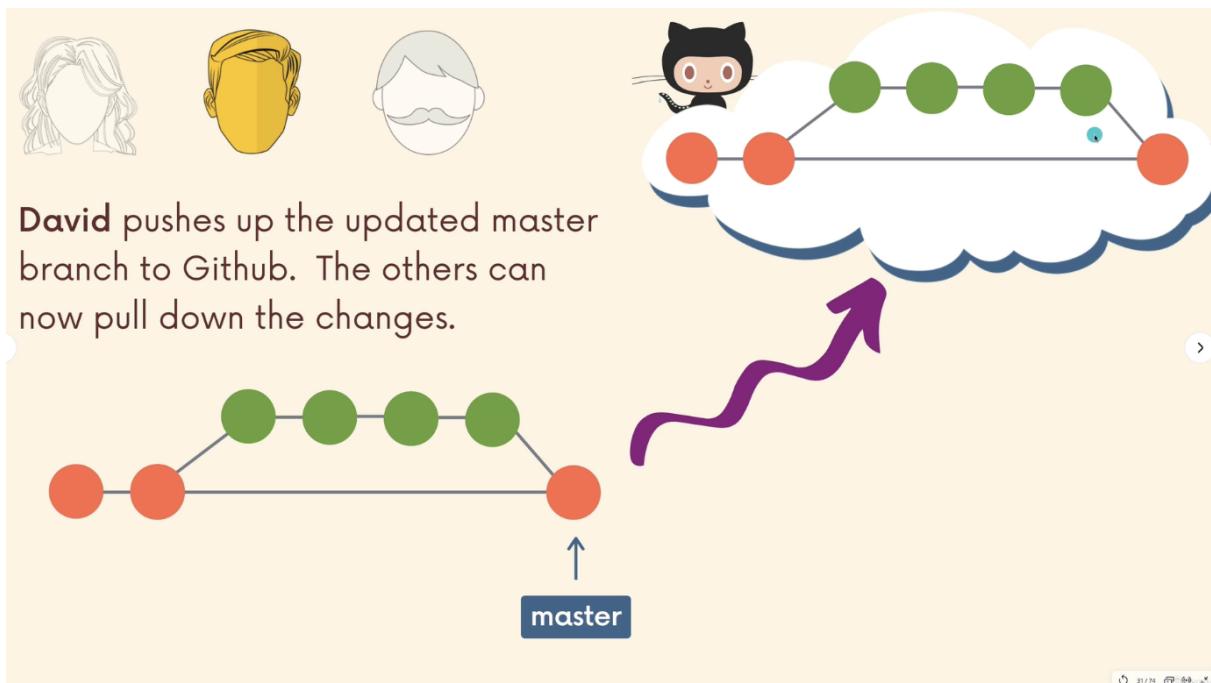
Pamela pushes up her new work on the add-dark-theme feature branch so that David can pull them down.



David returns to work the next morning. After an hour on reddit he decides he should actually do some work.







Merging in Feature Branches

At some point new work on feature branches will need to be merged in to the master branch! There are a couple of options for how to do this..

1. Merge at will, without any sort of discussion with teammates. JUST DO IT WHENEVER YOU WANT.
2. Send an email or chat message or something to your team to discuss if the changes should be merged in.
3. Pull Requests!

Pull Requests

Pull Request are a feature built in to products like Github & Bitbucket. **They are not native to Git itself.**

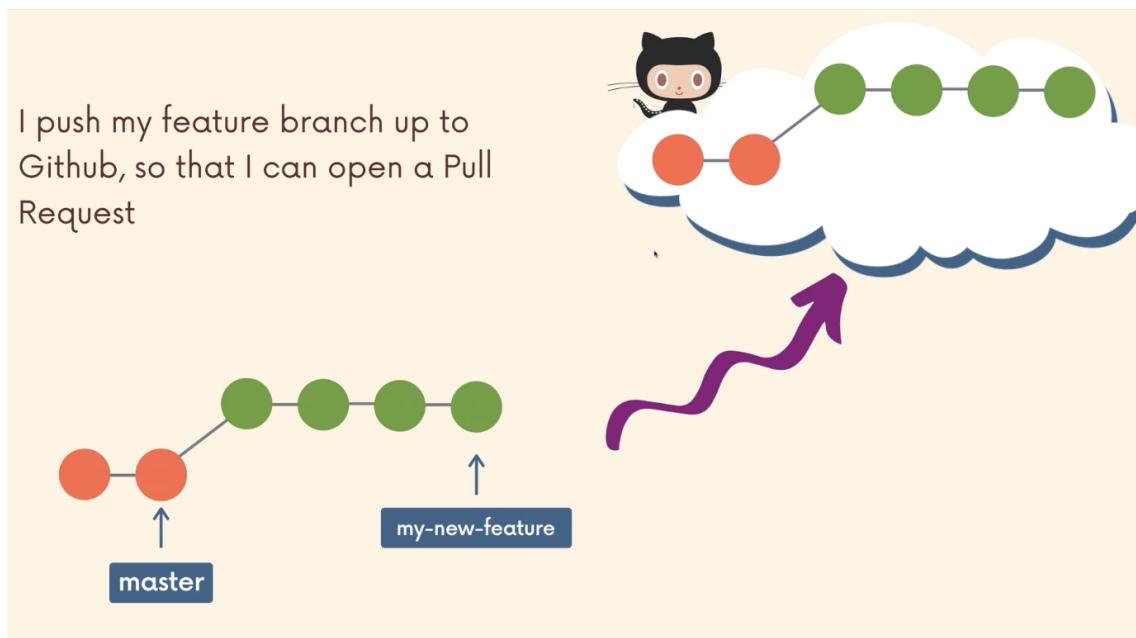
They allow developers to alert team-members to new work that needs to be reviewed. They provide a mechanism to approve or reject the work on a given branch. They also help facilitate discussion and feedback on the specified commits.

The Workflow

1. Do some work locally on feature branch
2. Push up the feature branch to Github
3. Open a pull request using the feature branch just pushed up to Github.

4. Wait for the PR to be approving and merged. Start a discussion on the PR. This part depends on the team structure.

Process:



My Github

The screenshot shows a GitHub repository interface. At the top, it says "my-new-feature had recent pushes less than a minute ago" and has a "Compare & pull request" button. Below that, it shows "my-new-feature" selected, with "5 branches" and "0 tags". There are buttons for "Go to file", "Add file", and "Code". It states "This branch is 2 commits ahead of master." with "Pull request" and "Compare" buttons. The commit history for "my-new-feature" shows three commits:

- Colt Steele and Colt Steele add another new file (d3faa08, 32 seconds ago, 9 commits)
- anotherNewFile.txt (add another new file, 32 seconds ago)
- newfeature.txt (add new feature, 1 minute ago)
- playlist.txt (merge, 5 days ago)

This screenshot shows a GitHub repository page for the 'my-new-feature' branch. At the top, a green button says 'Compare & pull request'. Below it, there's a summary: 'my-new-feature' has 5 branches and 0 tags. A link to 'Go to file' and a 'Code' dropdown are also present. It's noted that this branch is 2 commits ahead of 'master'. A 'Pull request' button is highlighted with a red box.

Commits:

- d3faa08 32 seconds ago (9 commits)
Colt Steele and Colt Steele add another new file
- anotherNewFile.txt add another new file 32 seconds ago
- newfeature.txt add new feature 1 minute ago
- playlist.txt merge 5 days ago

A diagram illustrates the commit history. It starts with a 'master' branch represented by a single orange circle. An arrow points upwards to a sequence of four green circles, representing four commits. Another arrow points upwards from the fourth green circle to a blue box labeled 'my-new-feature'.

My Github

This screenshot shows the same GitHub repository page as above, but with a green box overlaid on the 'Pull request' button. The text 'I click the PR button' is written in white inside the box.

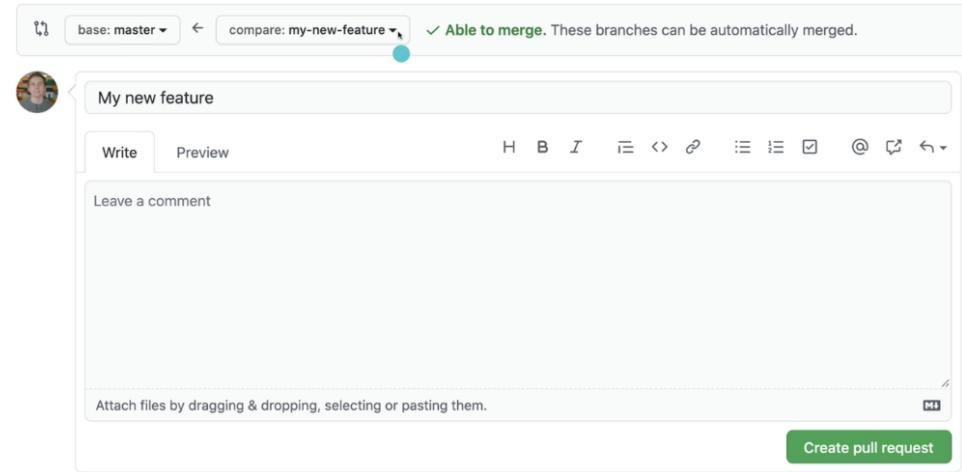
Commits:

- d3faa08 32 seconds ago (9 commits)
Colt Steele and Colt Steele add another new file
- anotherNewFile.txt add another new file 32 seconds ago
- newfeature.txt add new feature 1 minute ago
- playlist.txt merge 5 days ago

My Github

Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also [compare across forks](#).



Select the base branch to merge with eg. main and compare branch to be merge.

My Boss's Github...



A screenshot of a GitHub comment. It shows a profile picture of a woman, the 'Write' tab selected, and a preview of the comment content. The comment text reads: 'Hey Colt, this is on the right track but it needs a bit more work before it's ready to be merged in. Please fix x & y and z and then report back. Add those commits to this PR. Ping me when it's ready. Thanks!' Below the comment is a file attachment section with a placeholder 'Attach files by dragging & dropping, selecting or pasting them.' and a note 'No file chosen'. At the bottom right are two buttons: 'Close with comment' and 'Comment'.

My boss leaves some feedback for me. She asks me to make a couple changes before she merges the pull request.

Colt commented 2 minutes ago • edited

Added in new feature. This should be descriptive and helpful.

Colt Steele added 2 commits 6 days ago

- o add indie songs 399d0b9
- o add hot chip 75e6c6d

Boss commented 44 seconds ago

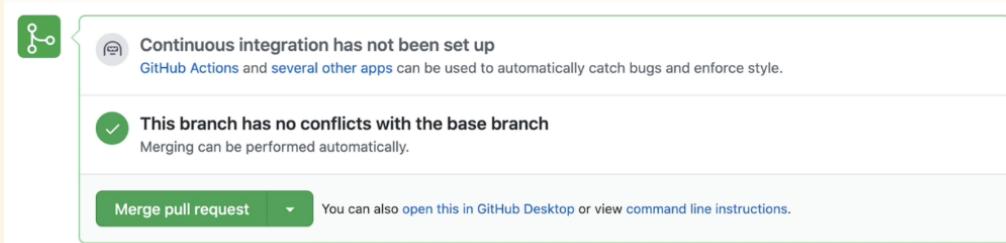
Hey Colt, this is on the right track but it needs a bit more work before it's ready to be merged in. Please fix x & y and z and then report back. Add those commits to this PR. Ping me when it's ready. Thanks!

Colt commented 21 seconds ago

Ok, sounds good! I'll get to work on fixing x & y & z!

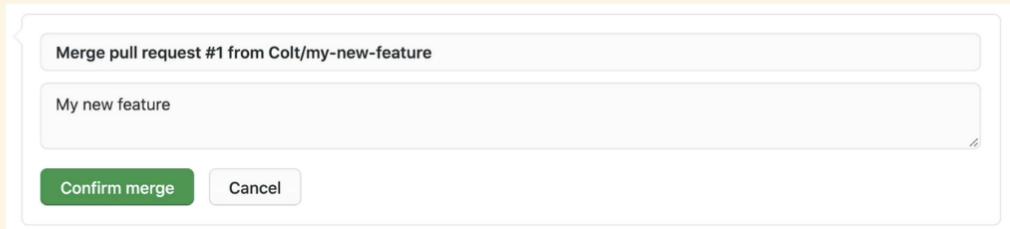
I can respond! We can discuss and give feedback!

My Boss's Github...



Once I make the requested changes, my boss (or whoever is in charge of merging) can merge in my pull request!

My Boss's Github...



Once I make the requested changes, my boss (or whoever is in charge of merging) can merge in my pull request!

The above text will be used in the resulting merge commit.

Merging Pull Requests With Conflicts

Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also compare across forks.

A screenshot of a GitHub pull request page. The top bar shows "base: main" and "compare: new-heading". A red message says "Can't automatically merge. Don't worry, you can still create the pull request." The main area shows a commit titled "change heading to bock bock". A comment from "StevieChicks" says "I am a chicken and I changed the heading to say "bock bock" I hope you like it!". Below the commit is another commit with the same title. A note says "Add more commits by pushing to the new-heading branch on Colt/feature-bran...". A warning message at the bottom left says "This branch has conflicts that must be resolved" and "Resolve conflicts". On the right side, there are sections for "Reviewers" (Colt), "Suggestions" (None), "Assignees" (None), "Labels" (None yet), "Projects" (None yet), and "Milestone" (None). At the bottom, there are buttons for "Merge pull request" and "View command line instructions".

We can edit the conflict by clicking on the edit button on the Github page or we can also do it manually using git. Click on the **command line instructions** option, it will provide steps to

resolve conflict.

The screenshot shows a GitHub pull request interface. At the top, there's a navigation bar with 'HTTPS', 'Git', and 'Patch' buttons, and a URL field containing 'https://github.com/Colt/feature-branch-workflow.git'. Below the navigation bar, a section titled 'Checkout via command line' provides instructions for manually merging changes. It includes two code snippets: one for pulling changes from 'origin' and merging them into a new branch, and another for pushing the merged changes back to 'origin'. The interface also features standard GitHub UI elements like file icons and a comment section.

```
git fetch origin
git switch new-heading
git merge main

git checkout main
git pull origin main
git merge main
# resolve the conflict

git add .
git commit -m "Resolve Conflict"
git switch main
git merge new-heading # or --no-ff new-heading
git branch -D new-heading
git push origin main
```

My Boss's Local Machine

My boss can merge the branch and resolve the conflicts locally...

Switch to the branch in question. Merge in master and resolve the conflicts.

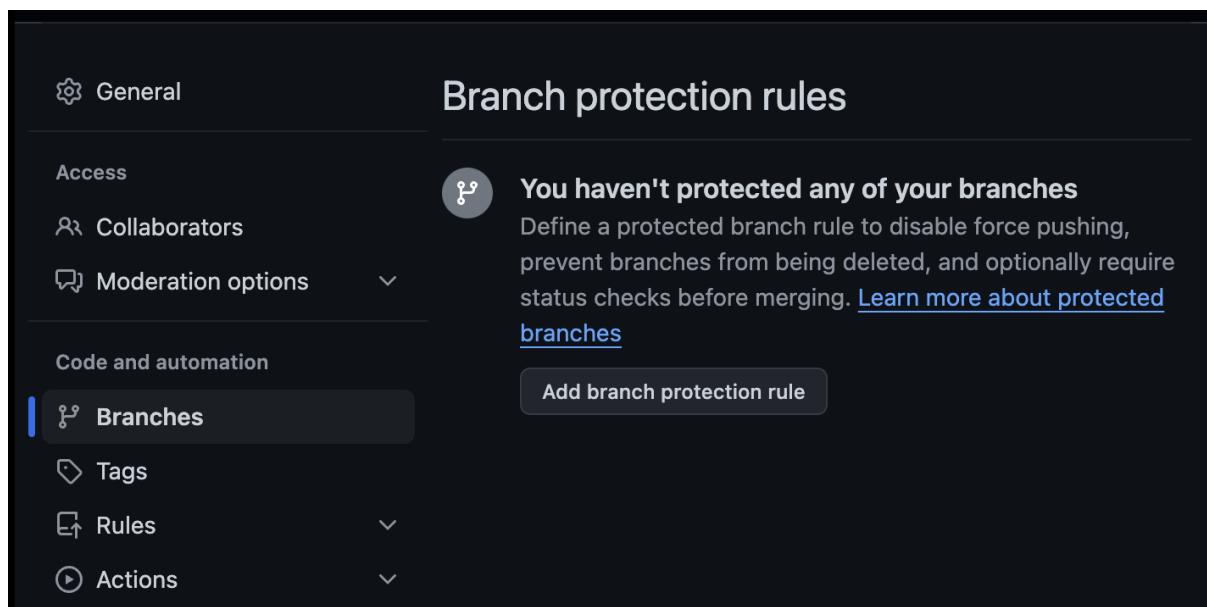
```
> git fetch origin  
> git switch my-new-feature  
> git merge master  
> fix conflicts!
```

Switch to master. Merge in the feature branch (now with no conflicts). Push changes up to Github.

```
> git switch master  
> git merge my-new-feature  
> git push origin master
```

Configuring Branch Protection Rules

In Repository Setting's select Branches option.



Click on Add branch protection rule and enter “main” as Branch name pattern option.

Branch protection rule



Protect your most important branches

Branch protection rules define whether collaborators can delete or force push to the branch and set requirements for any pushes to the branch, such as passing status checks or a linear commit history.

Your GitHub Free plan can only enforce rules on its public repositories, like this one.

Branch name pattern *

main

Protect matching branches

Require a pull request before merging

When enabled, all commits must be made to a non-protected branch and submitted via a pull request before they can be merged into a branch that matches this rule.

Require approvals

When enabled, pull requests targeting a matching branch require a number of approvals and no changes requested before they can be merged.

Required number of approvals before merging: 1 ▾

Dismiss stale pull request approvals when new commits are pushed

New reviewable commits pushed to a matching branch will dismiss pull request review approvals.

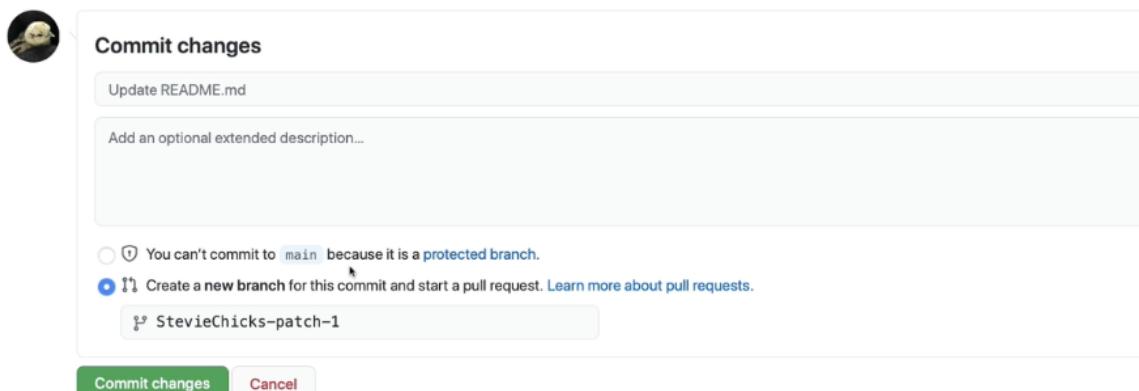
Require review from Code Owners

Require an approved review in pull requests including files with a designated code owner.

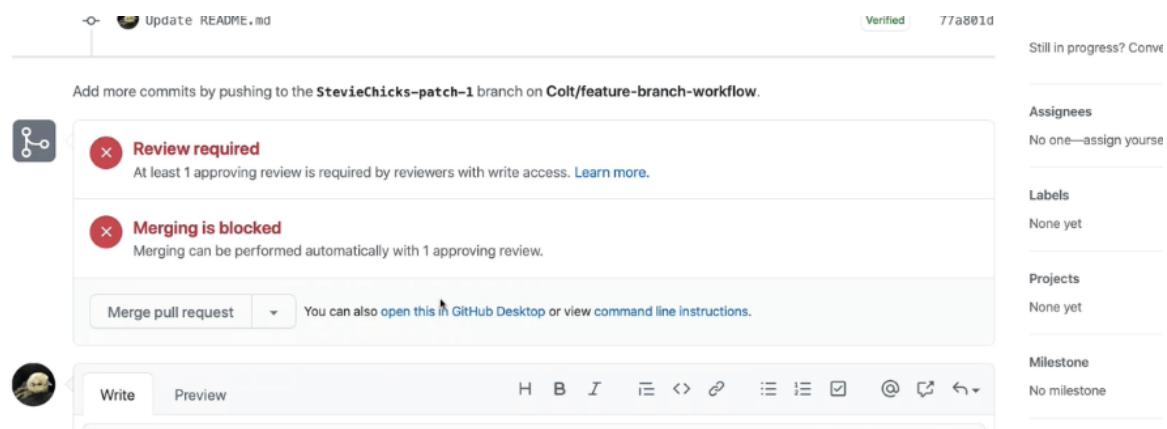
Require approval of the most recent reviewable push

Whether the most recent reviewable push is a merge or a commit, the protection rule applies to it.

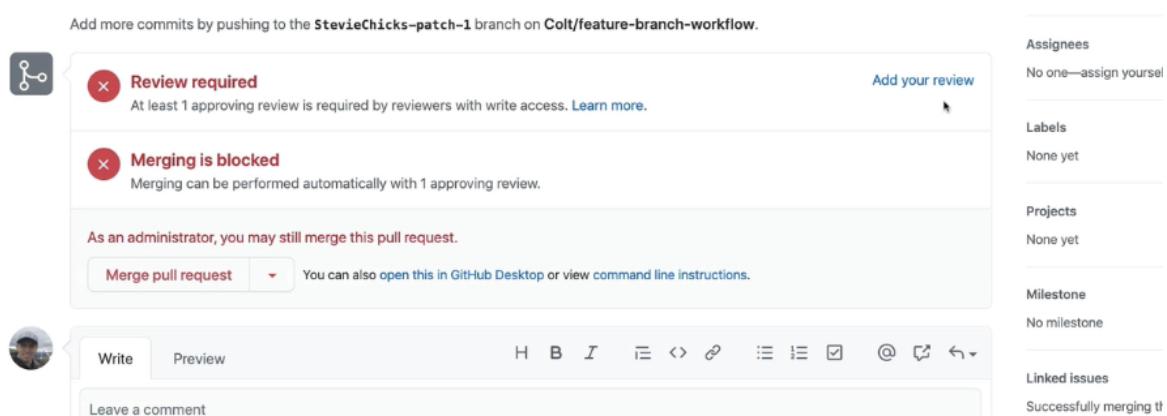
If someone try's to commit a change in main branch it will display a protection error.



The user should perform a Pull Request to the repository owner for the approval.



repository owner:



Fork & Clone: Another Workflow

The “fork & clone” workflow is different from anything we’ve seen so far. Instead of just one centralised Github repository, every developer has their own Github repository in addition to the “main” repo. Developers make changes and push to their own forks before making pull requests.

It’s very commonly used on large open-source projects where there may be thousands of contributors with only a couple maintainers.

Forking

Github allow us to create personal copies of other peoples repositories. We call those copies a “fork” of the original.

When we fork a repo, we’re basically asking Github “Make me my own copy of this repo please”

As with pull requests, forking is not a Git feature. The ability to fork is implemented by Github.

Note: It is not part of git, it's part of Github.

Example:

Fork your own copy of ggeop/Python-ai-assistant

MIT license

804 stars 256 forks 42 watching 7 Branches 3 Tags Activity

Public repository

develop

Go to file + <> Code

Commit	Message	Date
	ggeop Merge pull request #109 from ggeop/test_branch	2 years ago
	.github Create FUNDING.yml	4 years ago
	bin Remove merge feature branch to deve...	2 years ago
	config Add Github release deployment	2 years ago

Click on the fork icon.

The screenshot shows the GitHub interface for creating a fork of the repository 'ggeop / Python-ai-assistant'. The top navigation bar includes links for Code (selected), Issues (24), Pull requests (11), Discussions, Actions, and a three-dot menu. The main section is titled 'Create a new fork' and explains what a fork is: 'A fork is a copy of a repository. Forking a repository allows you to freely experiment with changes without affecting the original project.' It also notes that existing forks can be viewed. A note below states that required fields are marked with an asterisk (*). The form fields include 'Owner *' (set to 'Sakib-Dalal'), 'Repository name *' (set to 'Python-ai-assistant'), and a checked checkbox indicating 'Python-ai-assistant is available'. Below these, there's a 'Description (optional)' field containing 'Python AI assistant'. A checked checkbox labeled 'Copy the develop branch only' is present, with a note explaining that contributions can be made to the upstream repository. A informational message states that the user is creating a fork in their personal account. At the bottom right is a large blue 'Create fork' button.

Create a new fork

A *fork* is a copy of a repository. Forking a repository allows you to freely experiment with changes without affecting the original project. [View existing forks](#).

Required fields are marked with an asterisk ()*

Owner * **Repository name ***

Sakib-Dalal | Python-ai-assistant

Python-ai-assistant is available.

By default, forks are named the same as their upstream repository. You can customize the name to distinguish it further.

Description (optional)

Python AI assistant

Copy the develop branch only

Contribute back to ggeop/Python-ai-assistant by adding your own branch. [Learn more](#).

ⓘ You are creating a fork in your personal account.

Create fork

Click on Create Fork.

It will create a copy of a repo on your Github account.

The screenshot shows a GitHub repository page for 'Python-ai-assistant' by Sakib-Dalal. The page includes navigation links for Code, Pull requests, Actions, Projects, Wiki, and Security. Below the header are three icons: eye, brain, and star. The repository title is 'Python AI assistant 🧠'. It shows 0 stars, 257 forks, 0 watching, 1 Branch, 0 Tags, and Activity. It's a Public repository forked from [ggeop/Python-ai-assistant](#). A dropdown menu shows the current branch is 'develop'. Buttons for 'Go to file', '+', and 'Code' are visible. A message states 'This branch is up to date with ggeop/Python-ai-assistant:develop'. Below is a list of commits:

Commit	Message	Date
ggeop Merge pull request ggeop#109 from ggeop/test_branch	Create FUNDING.yml	2 years ago
ggeop Remove merge feature branch to deve...	Remove merge feature branch to deve...	2 years ago
ggeop Add Github release deployment	Add Github release deployment	2 years ago
ggeop Add files via upload	Add files via upload	2 years ago
ggeop Refactoring: Minor changes.	Refactoring: Minor changes.	3 years ago

The screenshot shows a GitHub repository page for a newly created fork. The title is 'The original repo...' and the URL is [aapatre / Automatic-Udemy-Course-Enroller-GET-PAID-UDEMY-COURSES-for-FREE](#). Below it is 'My newly-created fork...' and the URL is [Colt / Automatic-Udemy-Course-Enroller-GET-PAID-UDEMY-COURSES-for-FREE](#). It notes that the fork was created from the original repository.

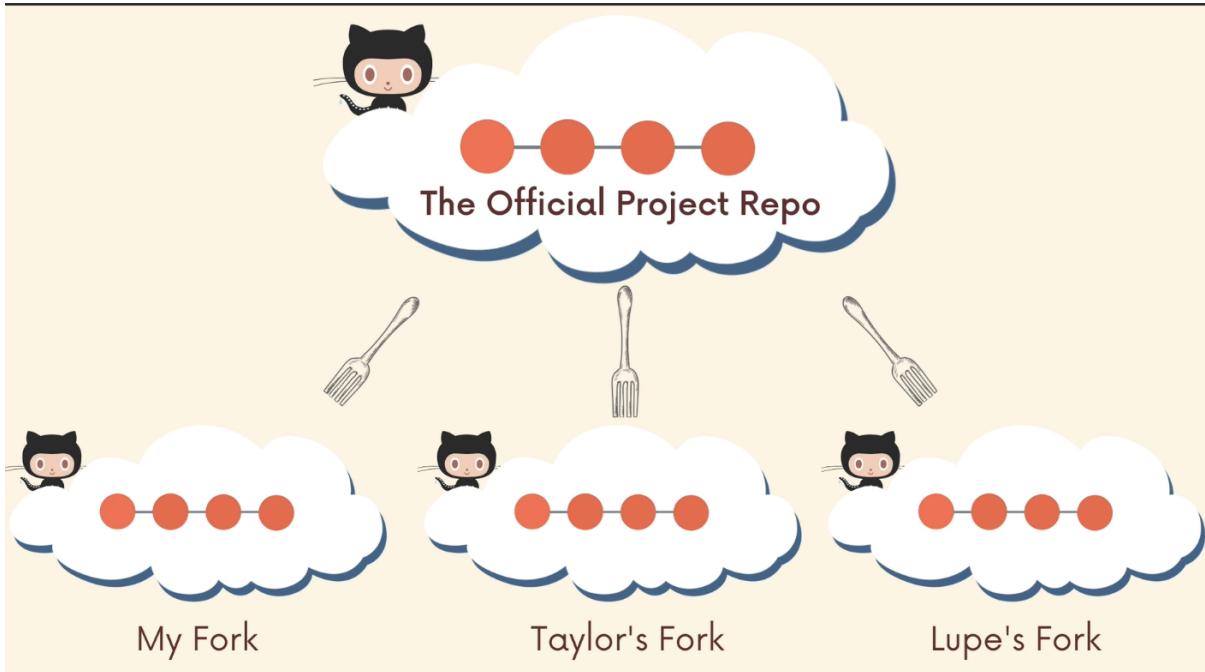
Now What?

Now that I've forked, I have my own copy of the repo where I can do whatever I want!

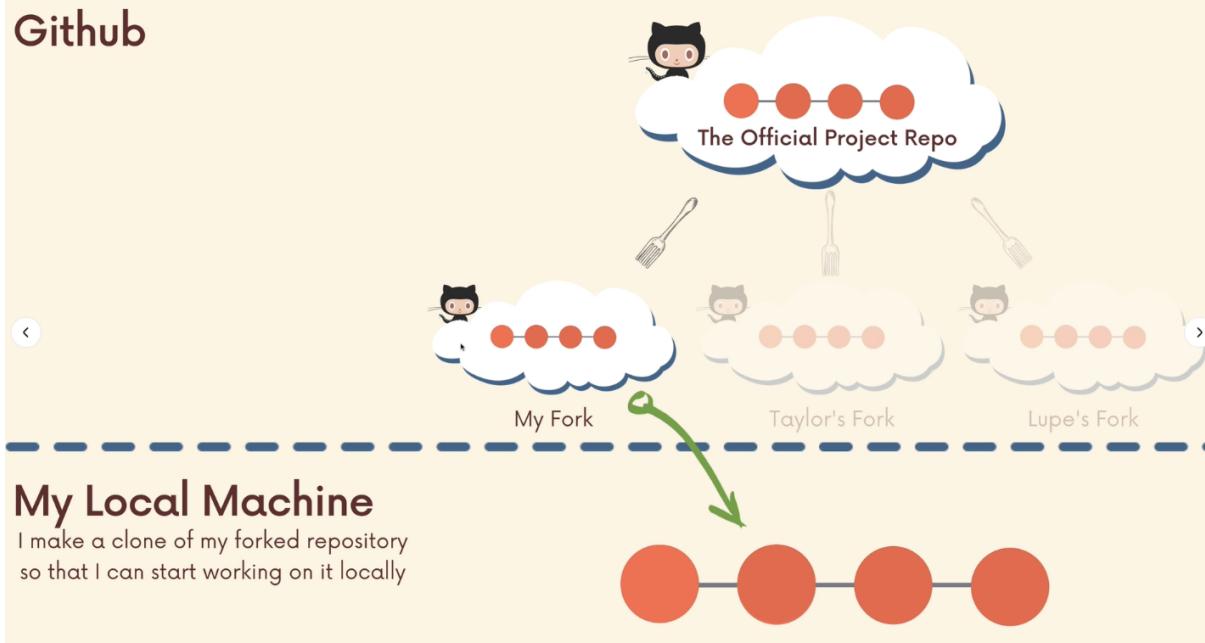
I can clone my fork and make changes, add features, and break things without fear of disturbing the original repository.

If I do want to share my work, I can make a pull request from my fork to the original repo.

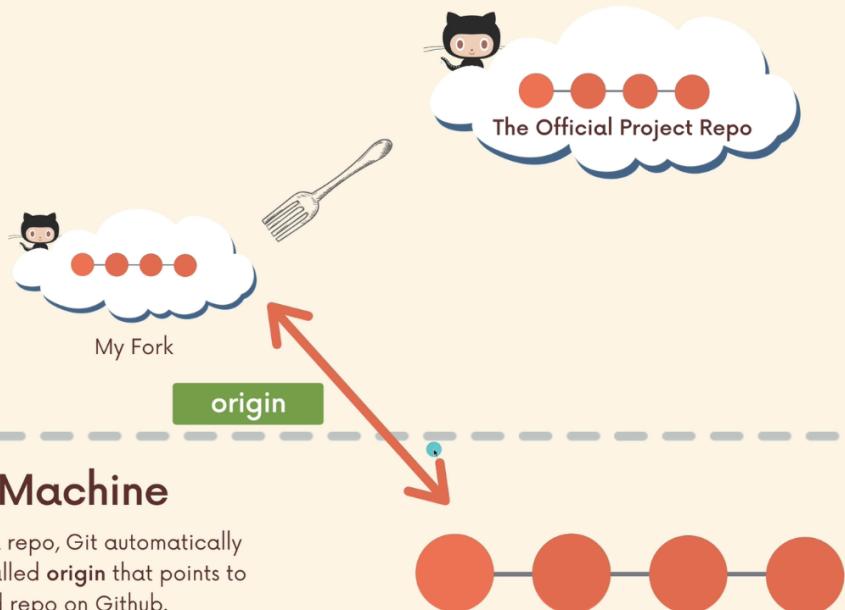
Example:



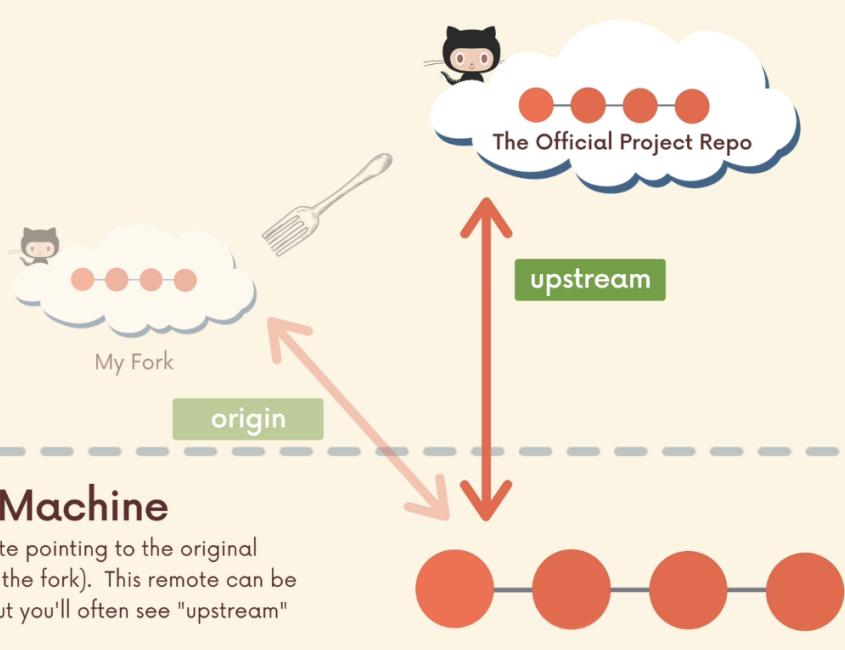
Github



Github

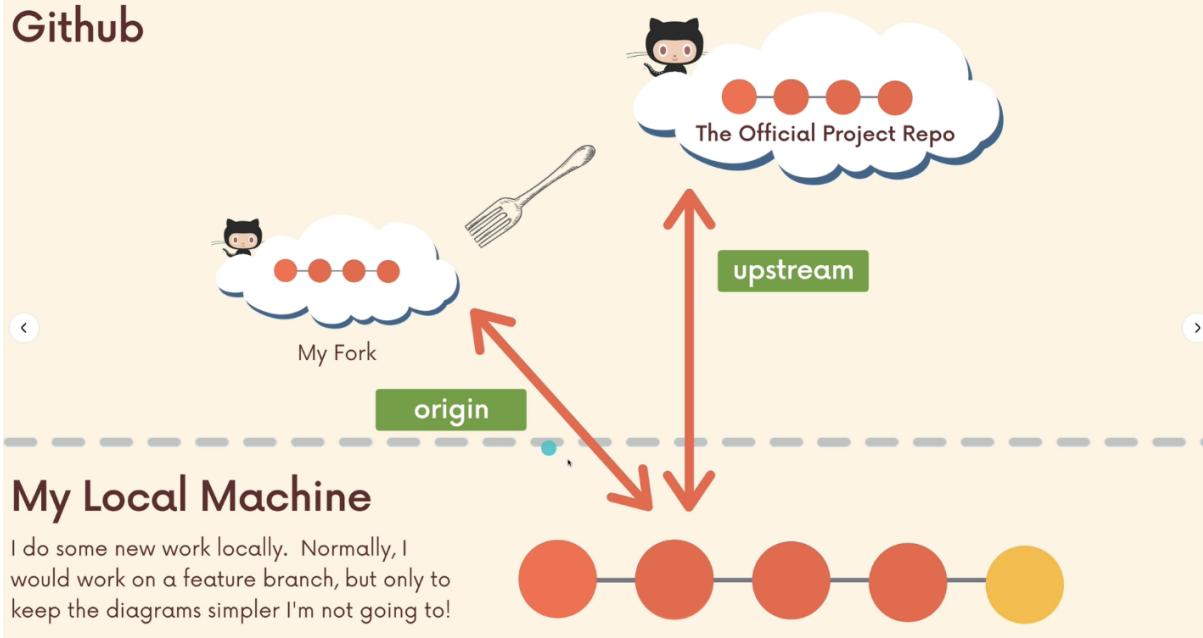


Github

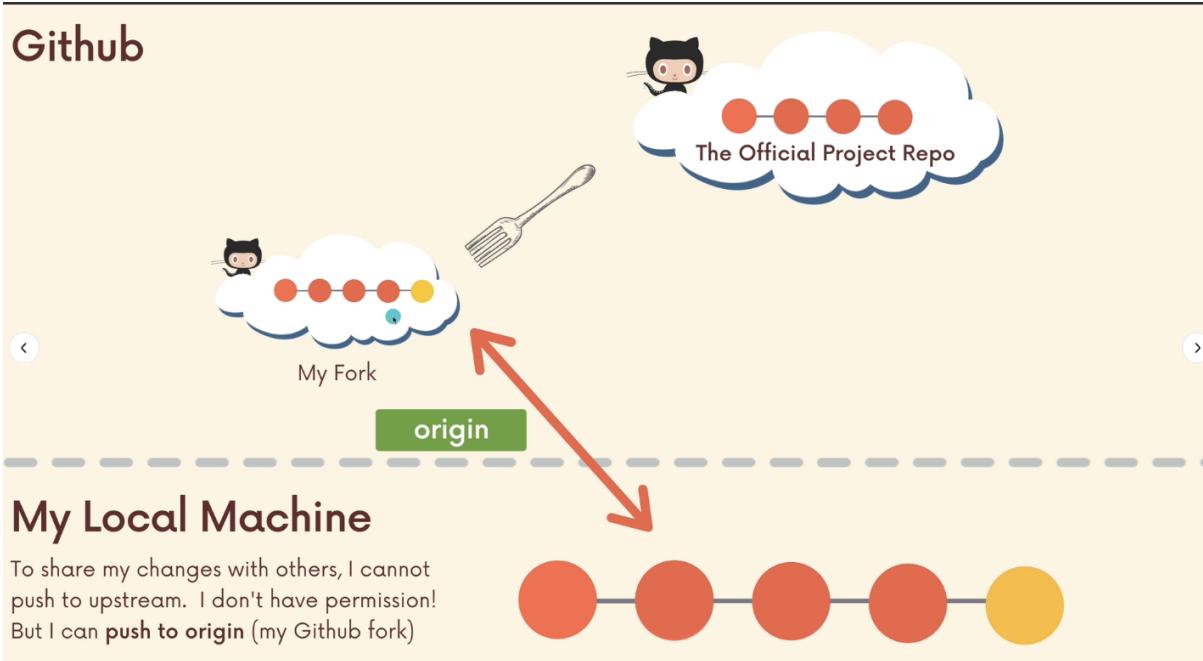


Now we have two remotes “origin” and “upstream”

Github

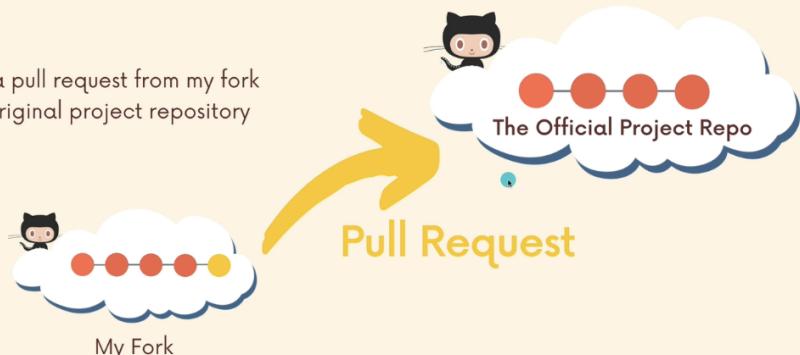


Github



Github

Next, I can make a pull request from my fork on Github to the original project repository



My Local Machine



Github

Now I wait to hear from the project maintainers! Do they want me to make further changes? It turns out they accept and merge my pull request! Woohoo!

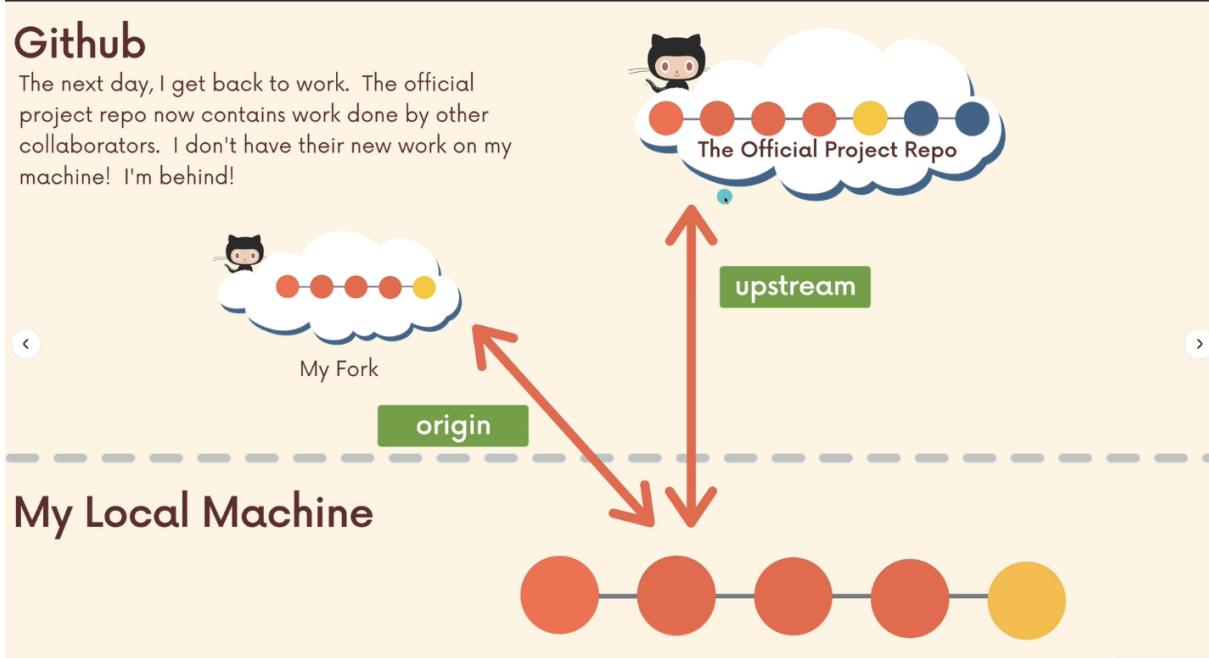


My Local Machine



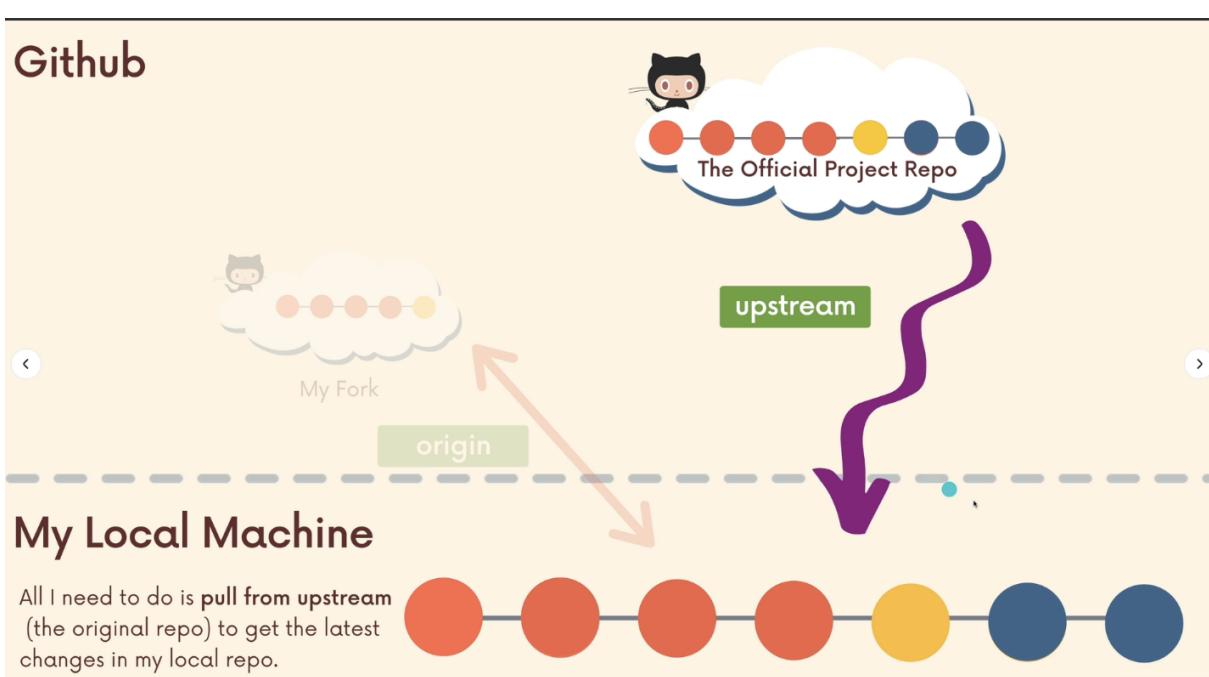
Github

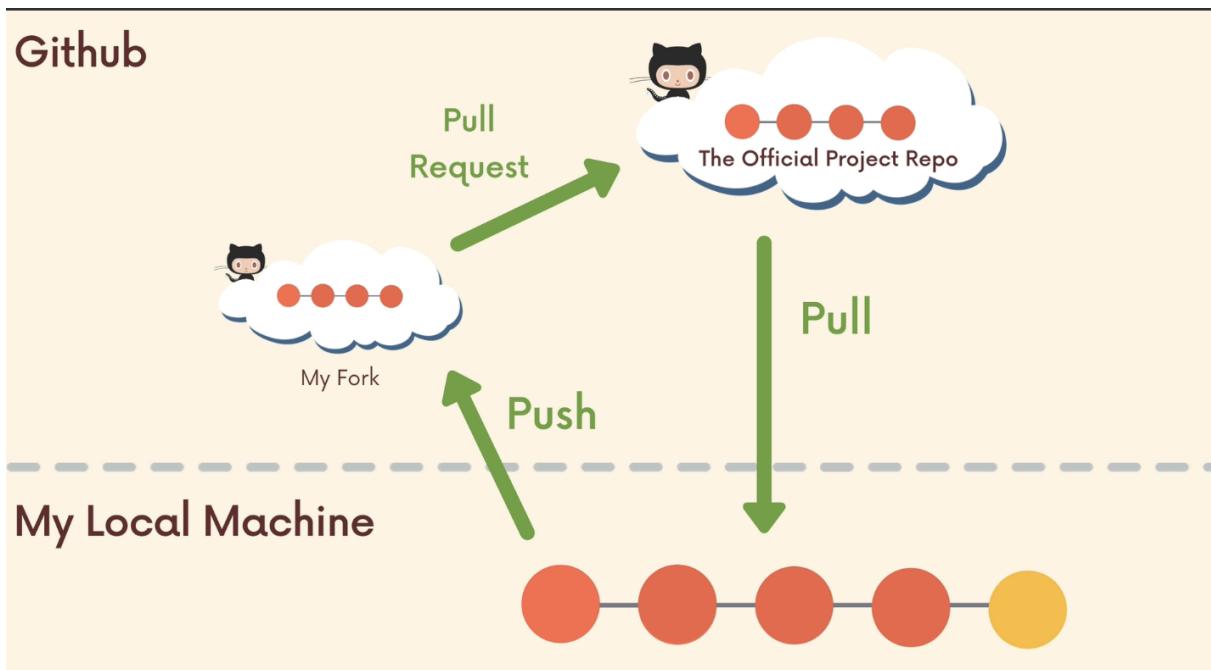
The next day, I get back to work. The official project repo now contains work done by other collaborators. I don't have their new work on my machine! I'm behind!



Github

All I need to do is **pull from upstream** (the original repo) to get the latest changes in my local repo.





Summary

1. Fork the Project
2. Clone the fork
3. Add upstream remote
4. Do some work
5. Push to origin
6. Open Pull Request