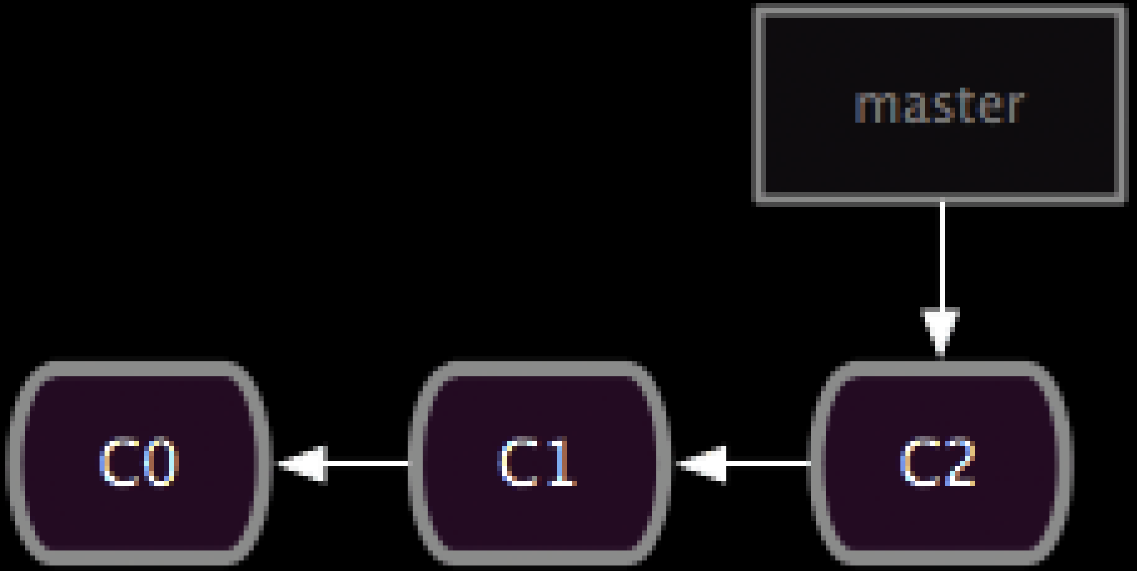
http://flic.kr/p/6oP7x7

Version Control with Git

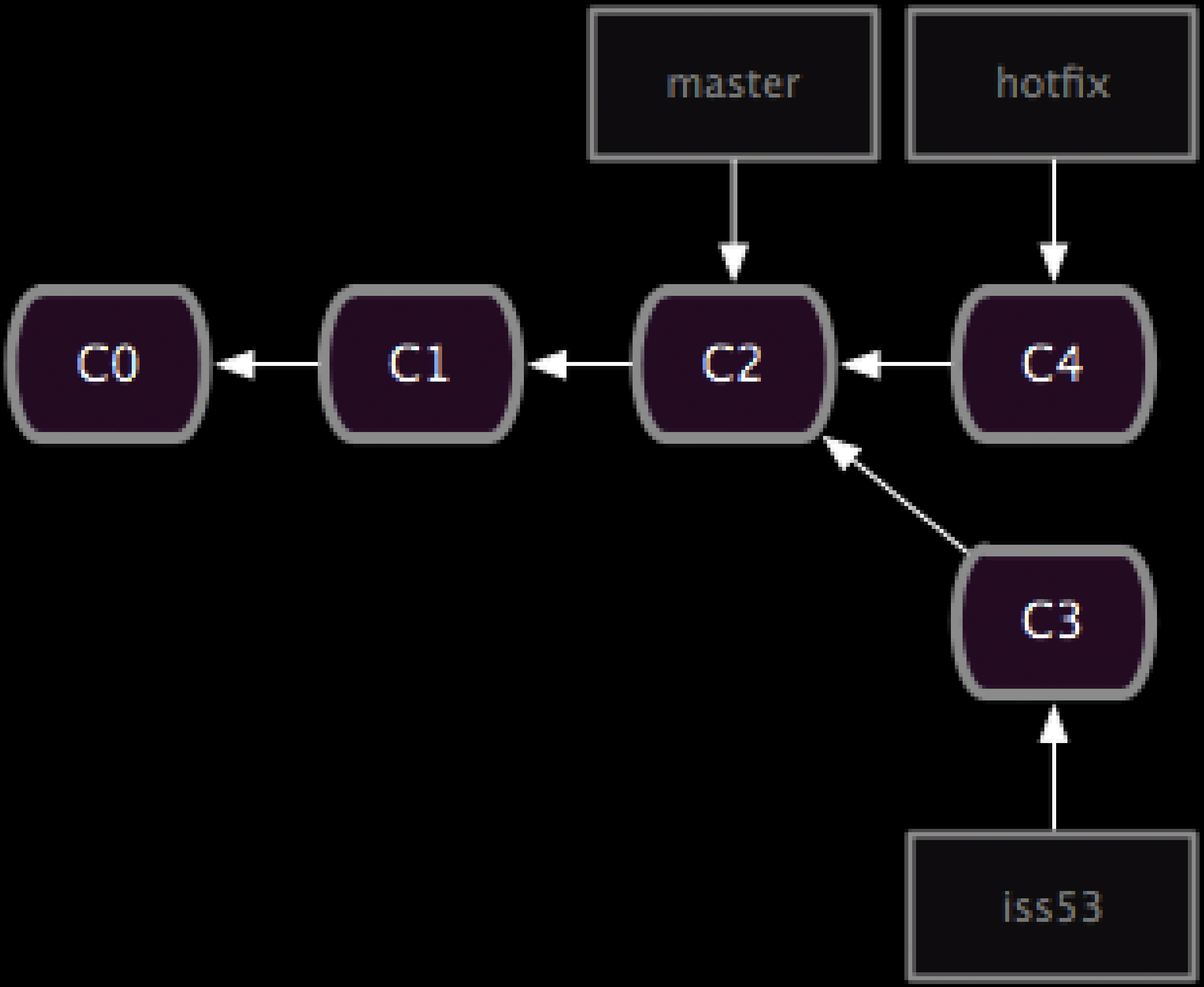
Why track/manage revisions?

Backup: Undo or refer to old stuff



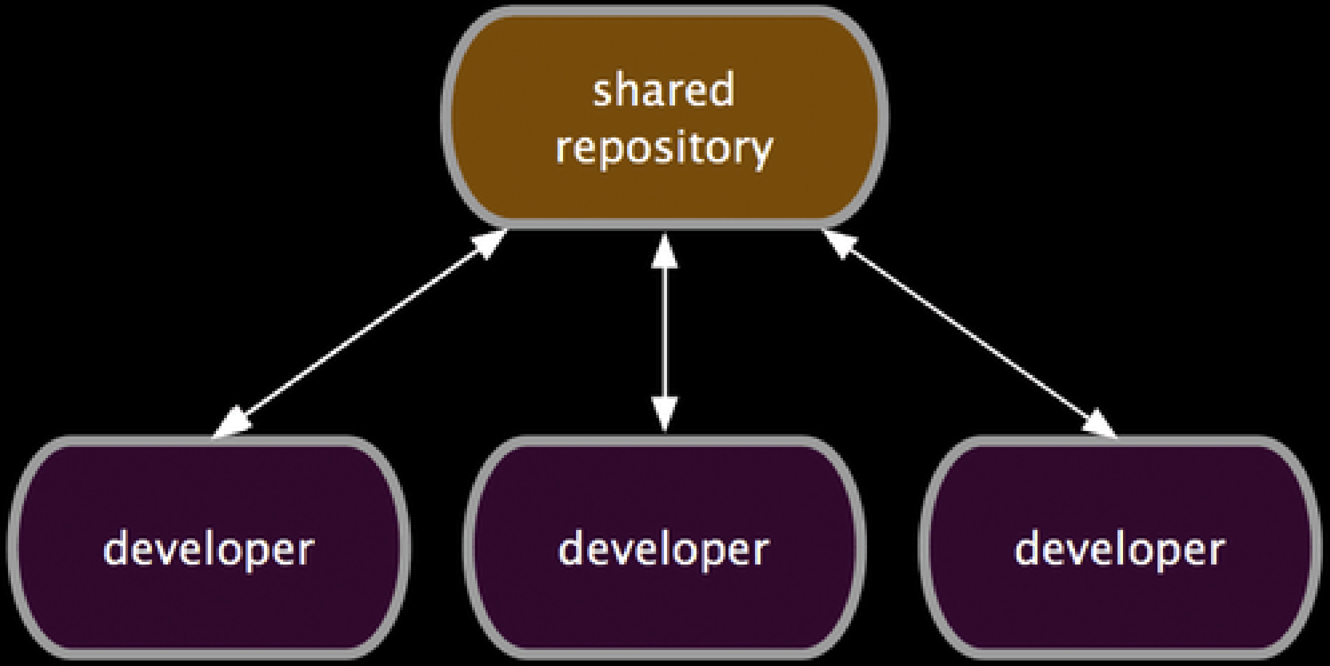
http://git-scm.com/book/en/Git-Branching-Basic-Branching-and-Merging

Branch: Maintain old release while working on new



http://git-scm.com/book/en/Git-Branching-Basic-Branching-and-Merging

Collaborate: Work in parallel with teammates



http://git-scm.com/book/en/Distributed-Git-Distributed-Workflows

Version Control Systems (VCSs)

- Help you track/manage/distribute revisions
- Standard in modern development
- Examples:

older

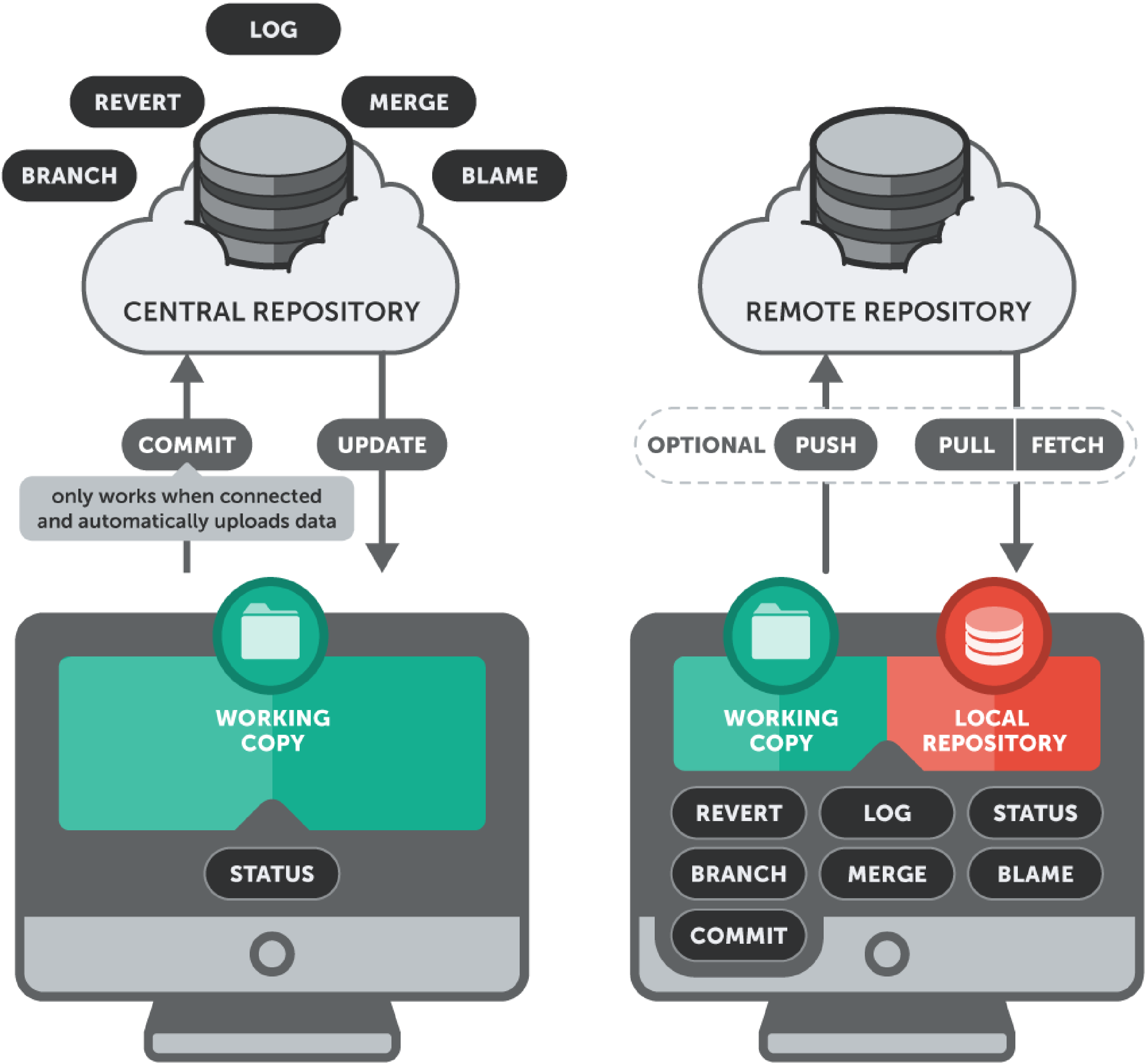
  - Revision Control System (RCS)
  - Concurrent Versions System (CVS)
  - Subversion (SVN)
  - Git

newer

Our focus

SUBVERSION

GIT



LOG

REVERT

MERGE

BRANCH

BLAME

CENTRAL REPOSITORY

COMMIT

UPDATE

only works when connected
and automatically uploads data

WORKING COPY

STATUS

REMOTE REPOSITORY

OPTIONAL

PUSH

PULL

FETCH

WORKING COPY

LOCAL REPOSITORY

REVERT

LOG

STATUS

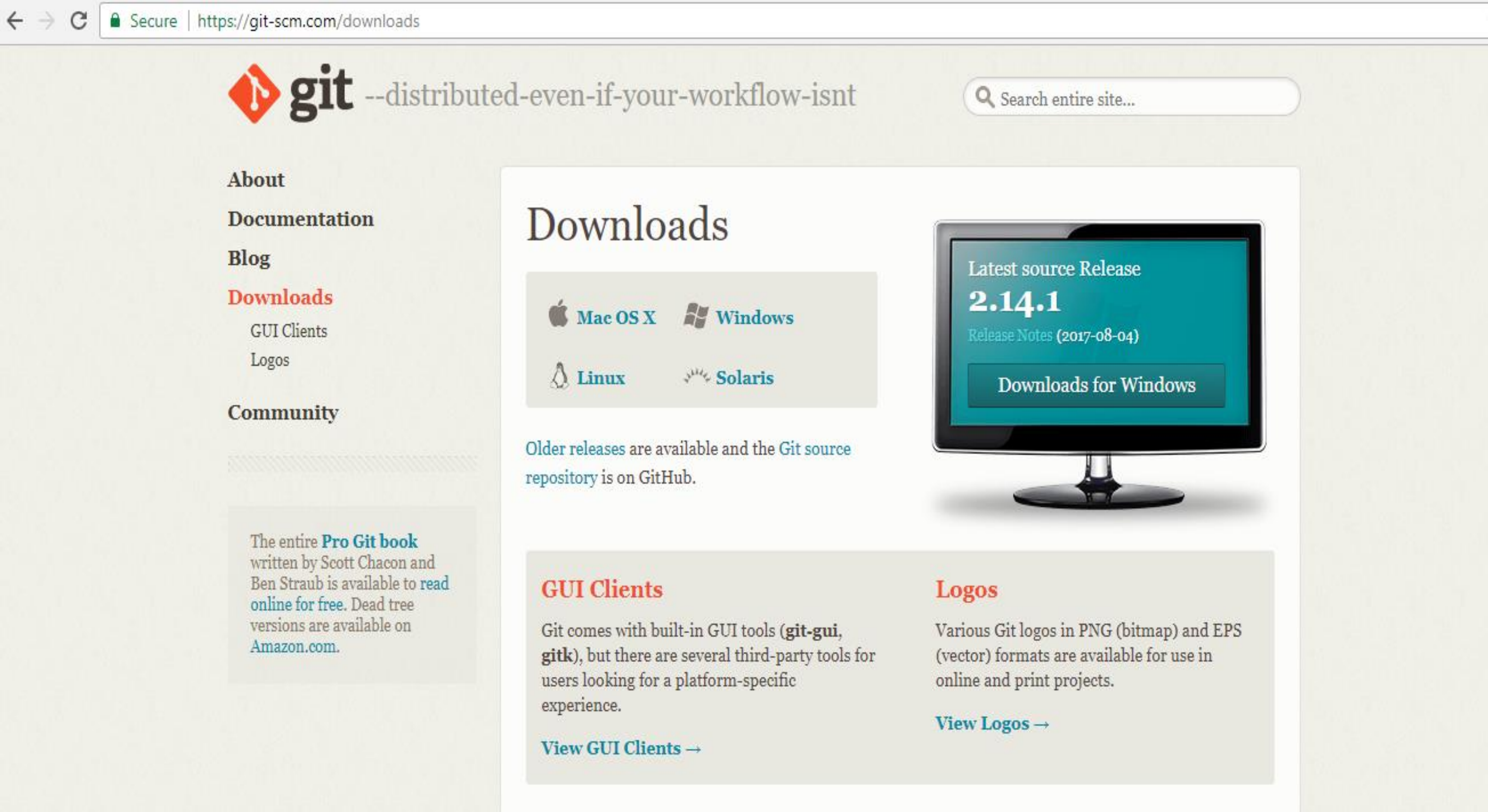
BRANCH

MERGE

BLAME

COMMIT

https://git-scm.com



The entire **Pro Git book** written by Scott Chacon and Ben Straub is available to read online for free. Dead tree versions are available on Amazon.com.

Downloads

Older releases are available and the Git source repository is on GitHub.

Latest source Release
2.14.1
Release Notes (2017-08-04)

GUI Clients

Git comes with built-in GUI tools (**git-gui**, **gitk**), but there are several third-party tools for users looking for a platform-specific experience.

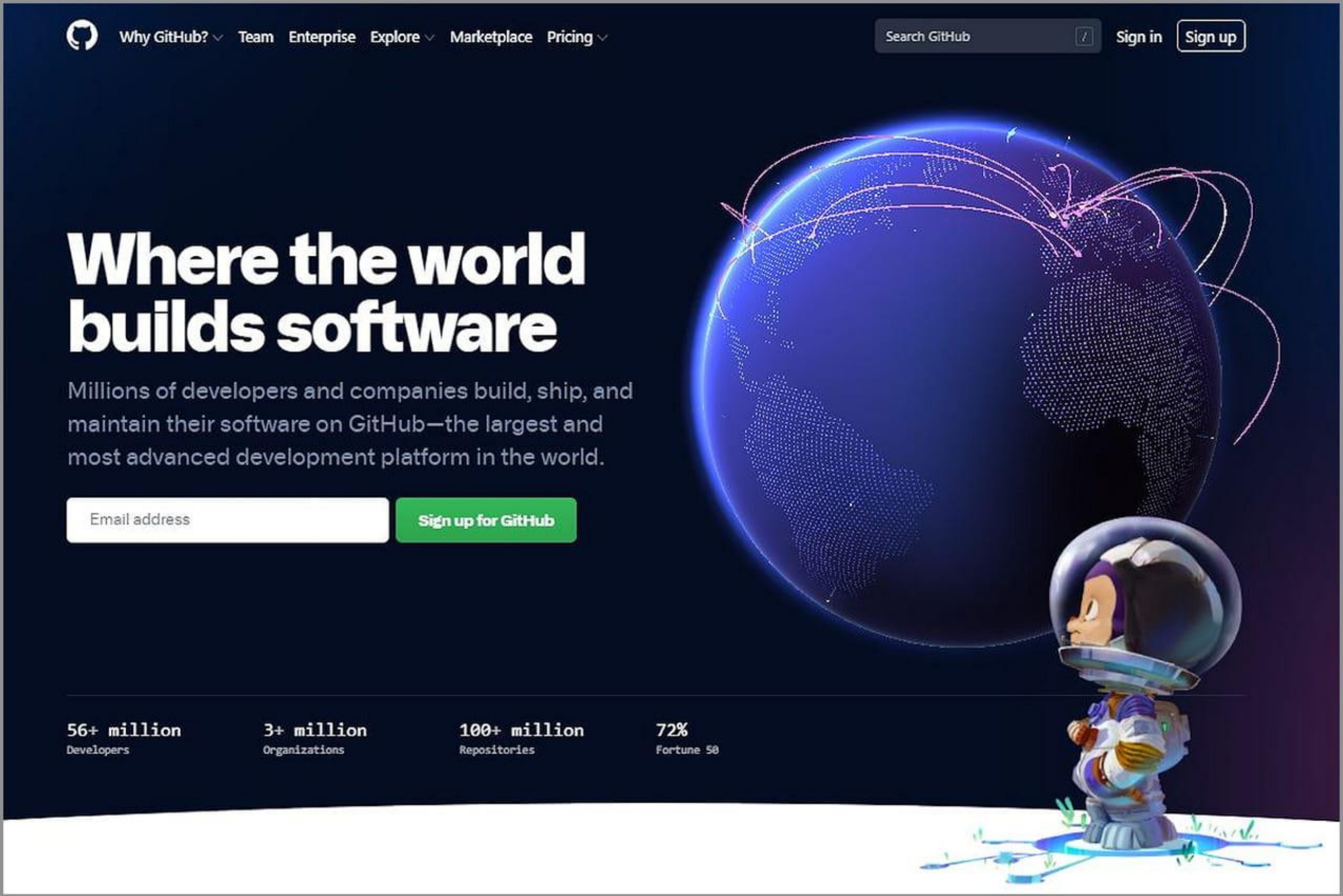
View GUI Clients →

Logos

Various Git logos in PNG (bitmap) and EPS (vector) formats are available for use in online and print projects.

View Logos →

https://github.com



Where the world builds software

Millions of developers and companies build, ship, and maintain their software on GitHub—the largest and most advanced development platform in the world.

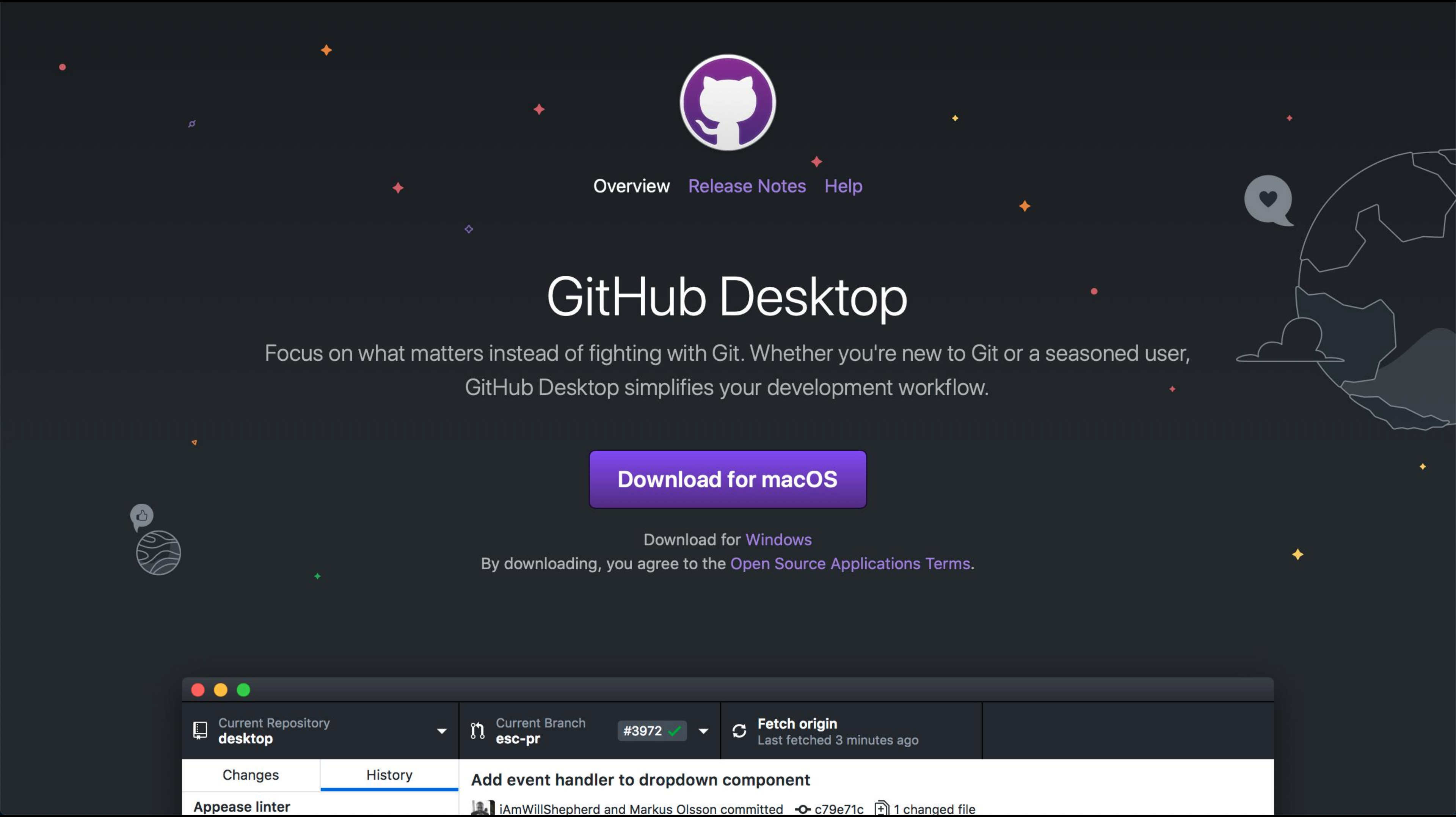
56+ million Developers

3+ million Organizations

100+ million Repositories

72% Fortune 50

https://desktop.github.com



GitHub Desktop

Focus on what matters instead of fighting with Git. Whether you're new to Git or a seasoned user, GitHub Desktop simplifies your development workflow.

Download for Windows

By downloading, you agree to the Open Source Applications Terms.

Appease linter

Add event handler to dropdown component

iAmWillShepherd and Markus Olsson committed c79e71c 1 changed file

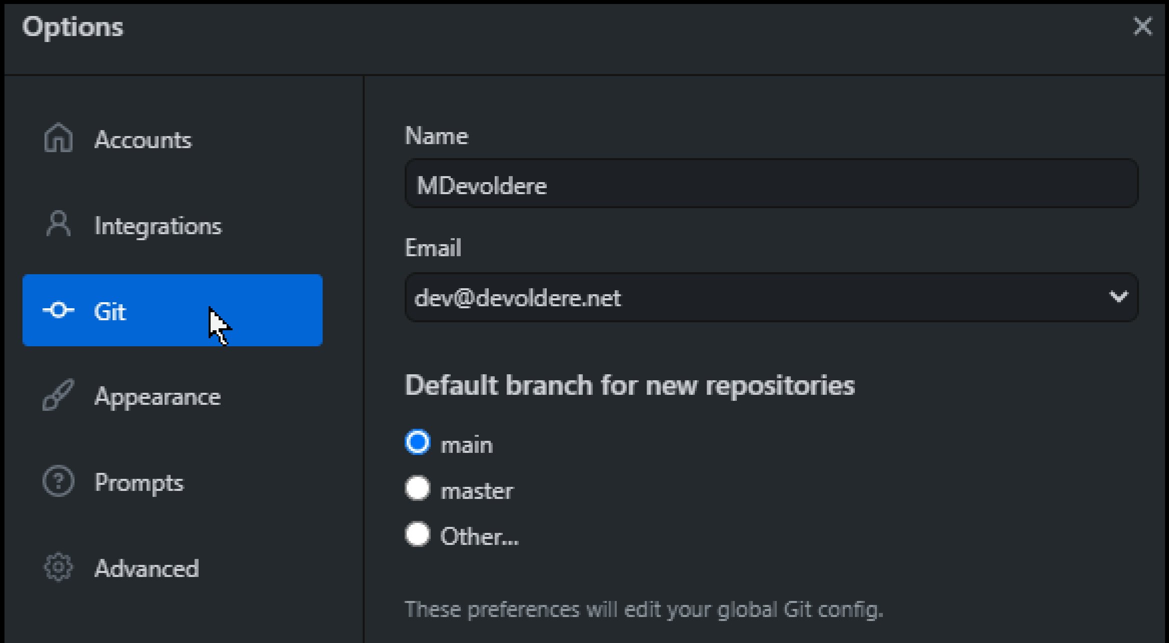
Configure your Git client

- Check config info:

```
$ git config --list
user.name=MDevoldere
user.email=mdevoldere@arfp.asso.fr
```

- Fix if necessary:

```
$ git config --global user.name "John Doe"
$ git config --global user.email jdoe@example.com
```



Name

MDevoldere

Email

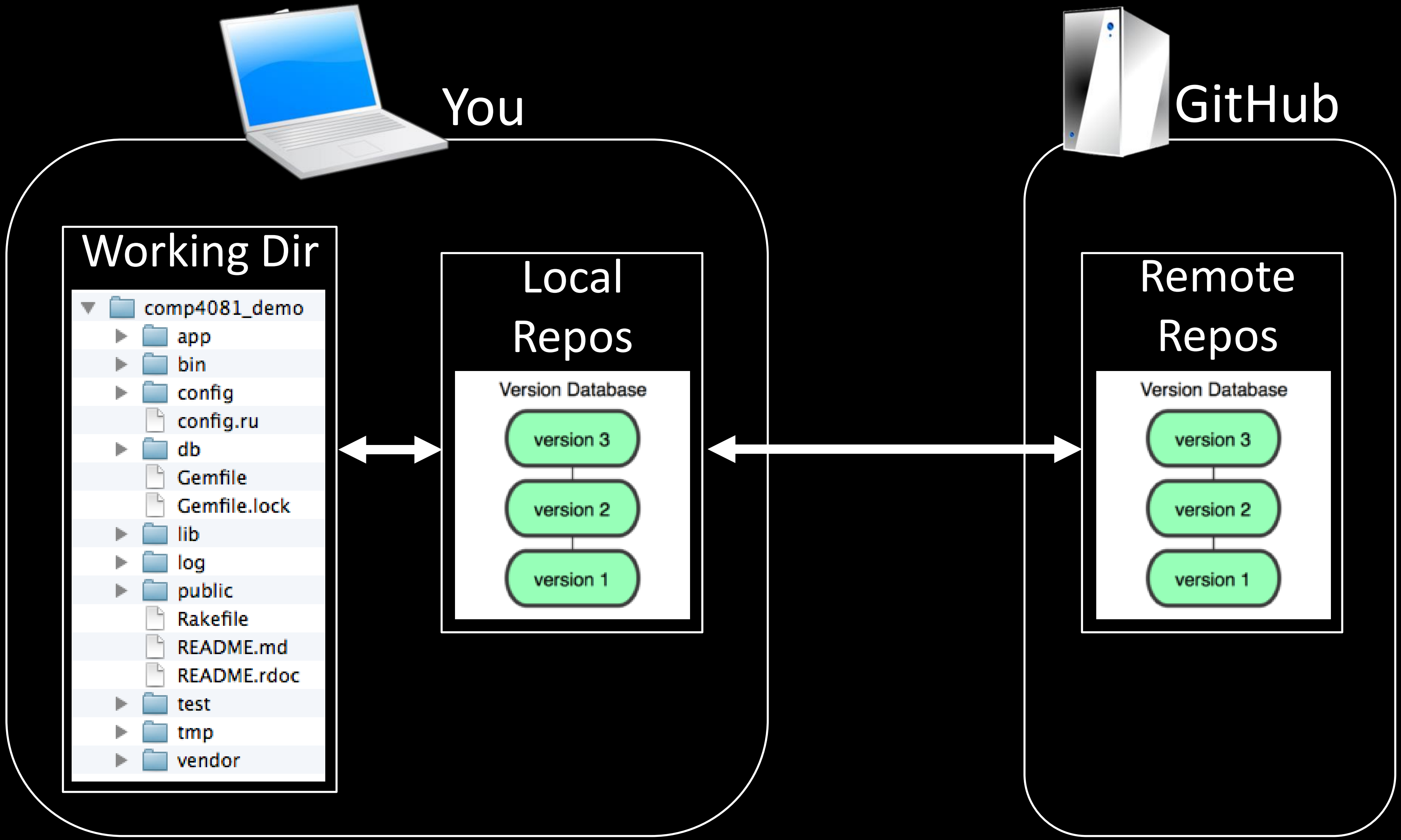
dev@devoldere.net

Default branch for new repositories

● main
○ master
○ Other...

These preferences will edit your global Git config.

GitHub-User Perspective



You

Working Dir

- comp4081_demo
  - app
  - bin
  - config
  - config.ru
  - db
  - Gemfile
  - Gemfile.lock
  - lib
  - log
  - public
  - Rakefile
  - README.md
  - README.rdoc
  - test
  - tmp
  - vendor

Local Repos

Version Database

version 3

version 2

version 1

GitHub

Remote Repos

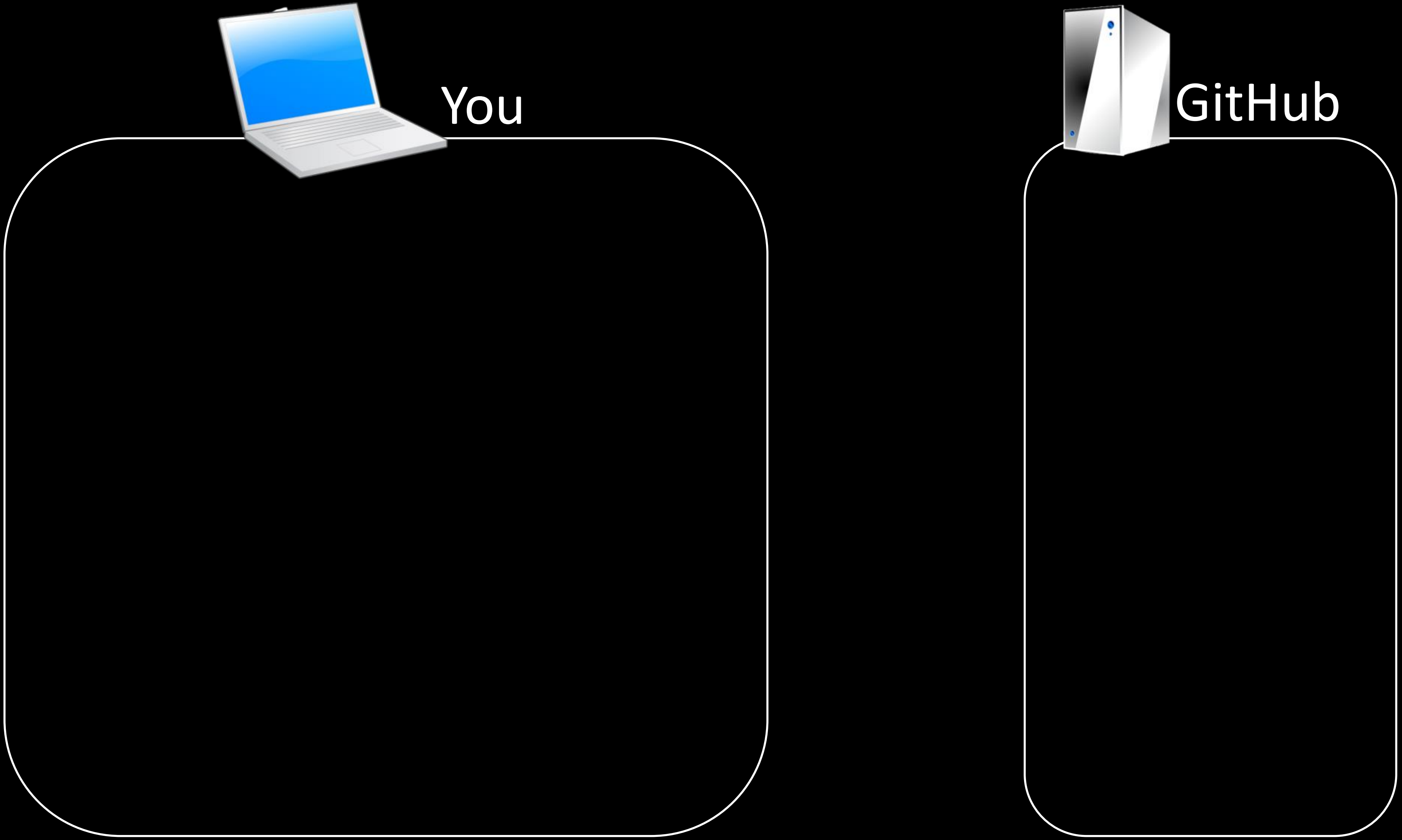
Version Database

version 3

version 2

version 1

Let’s begin with an example…

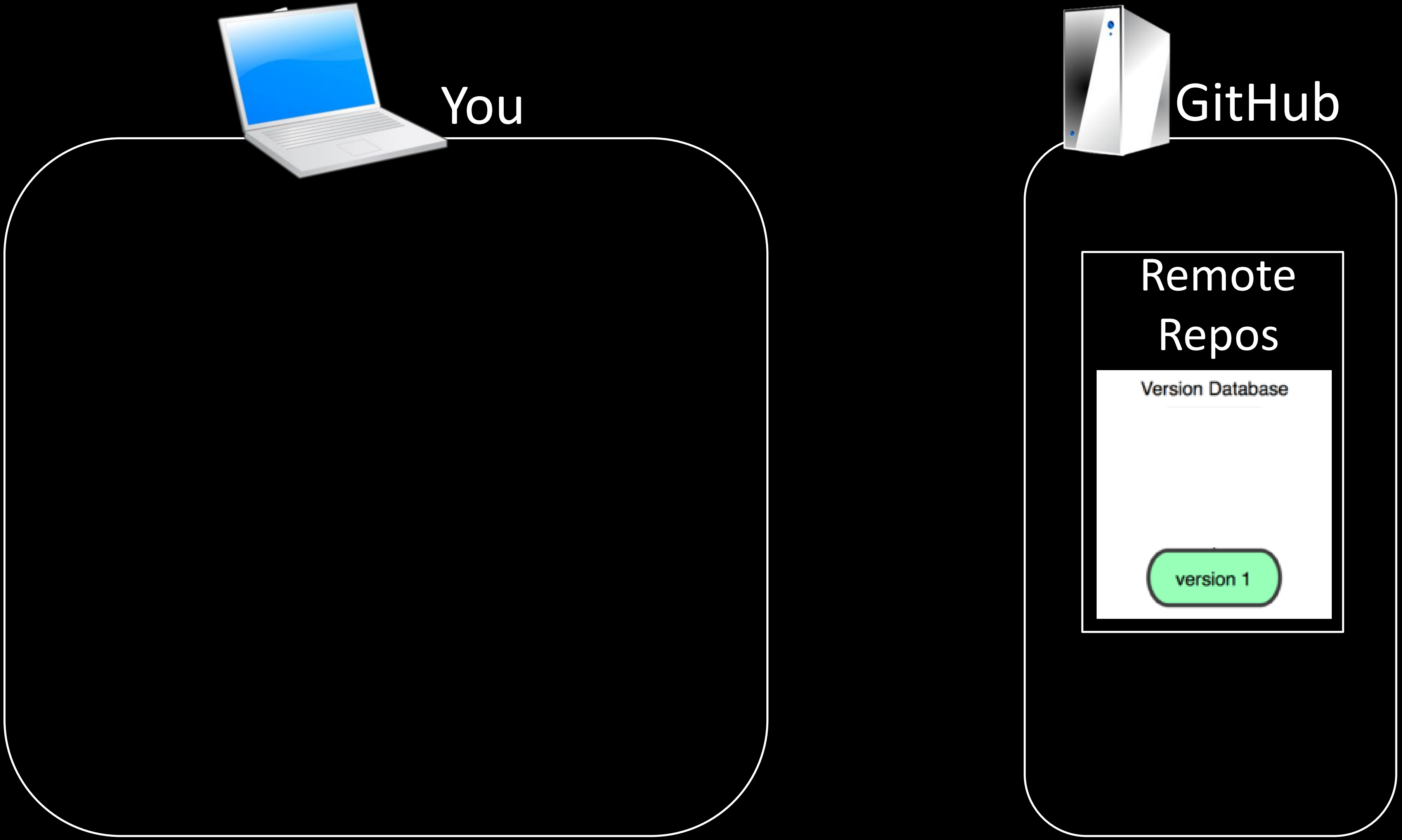


You

GitHub

Log into GitHub and create a repos

(with add README option)



You

GitHub

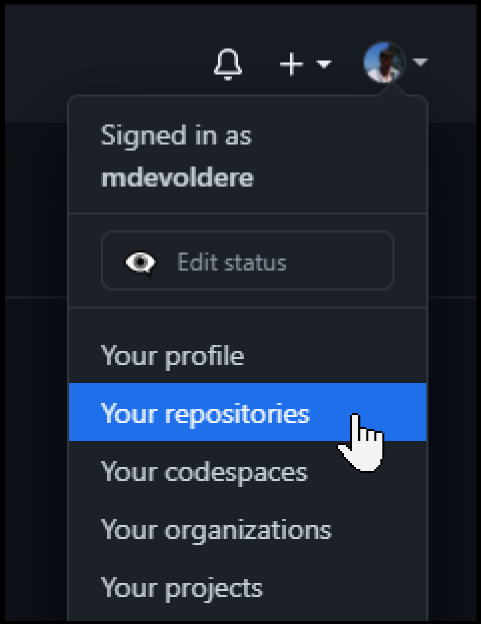
Remote Repos

Version Database

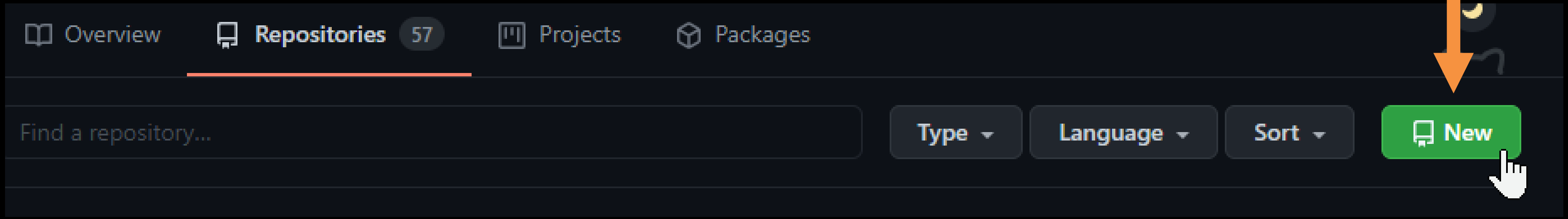
version 1

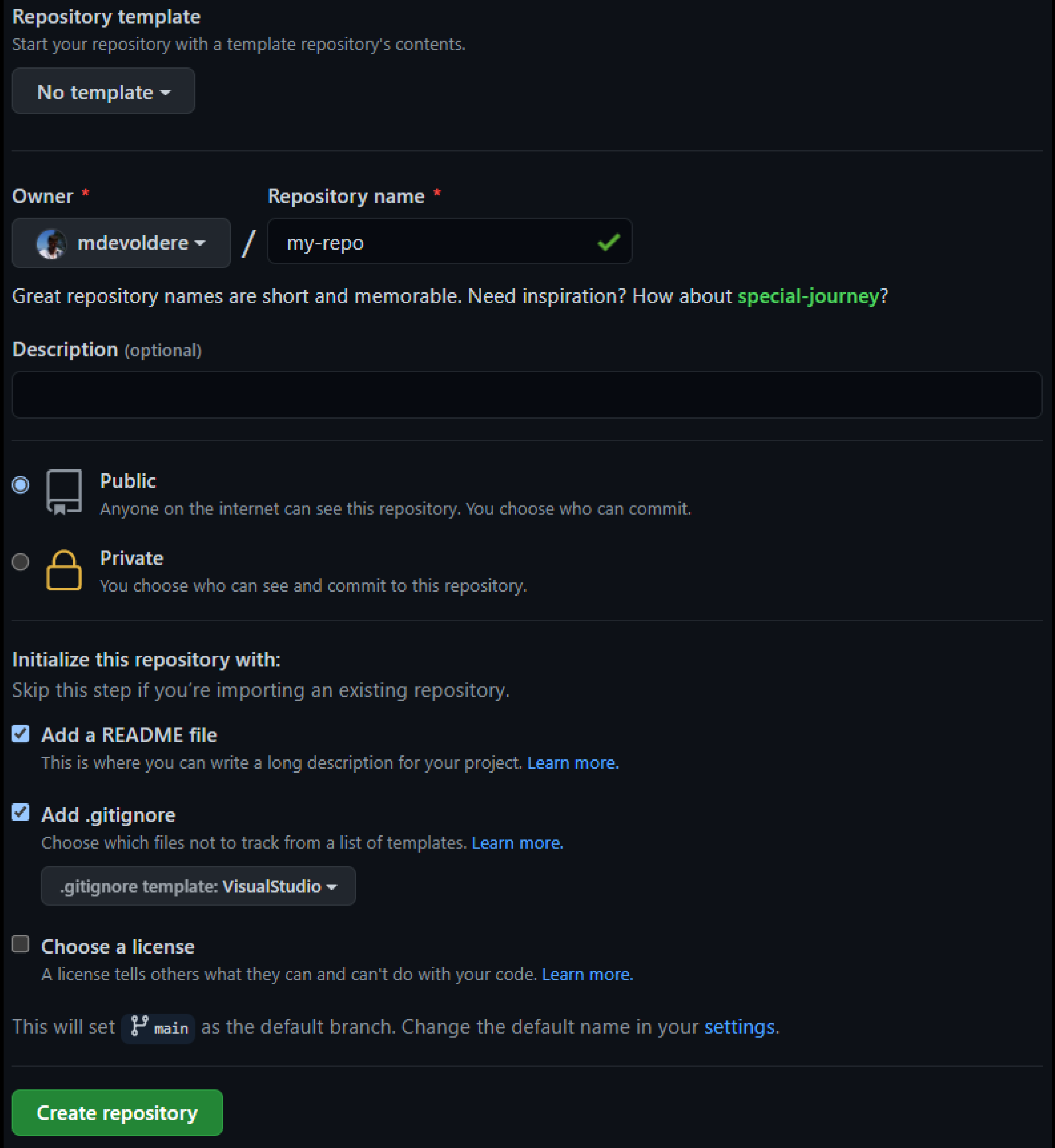
https://github.com

1. Go to your Repos page



2. On Repos page, click « New »





Repository template

Start your repository with a template repository's contents.

No template ▾

Owner * **Repository name** *

mdevoldere ▾ / my-repo ✓

Great repository names are short and memorable. Need inspiration? How about special-journey?

Description (optional)

● **Public**
Anyone on the internet can see this repository. You choose who can commit.

○ **Private**
You choose who can see and commit to this repository.

Initialize this repository with:

Skip this step if you're importing an existing repository.

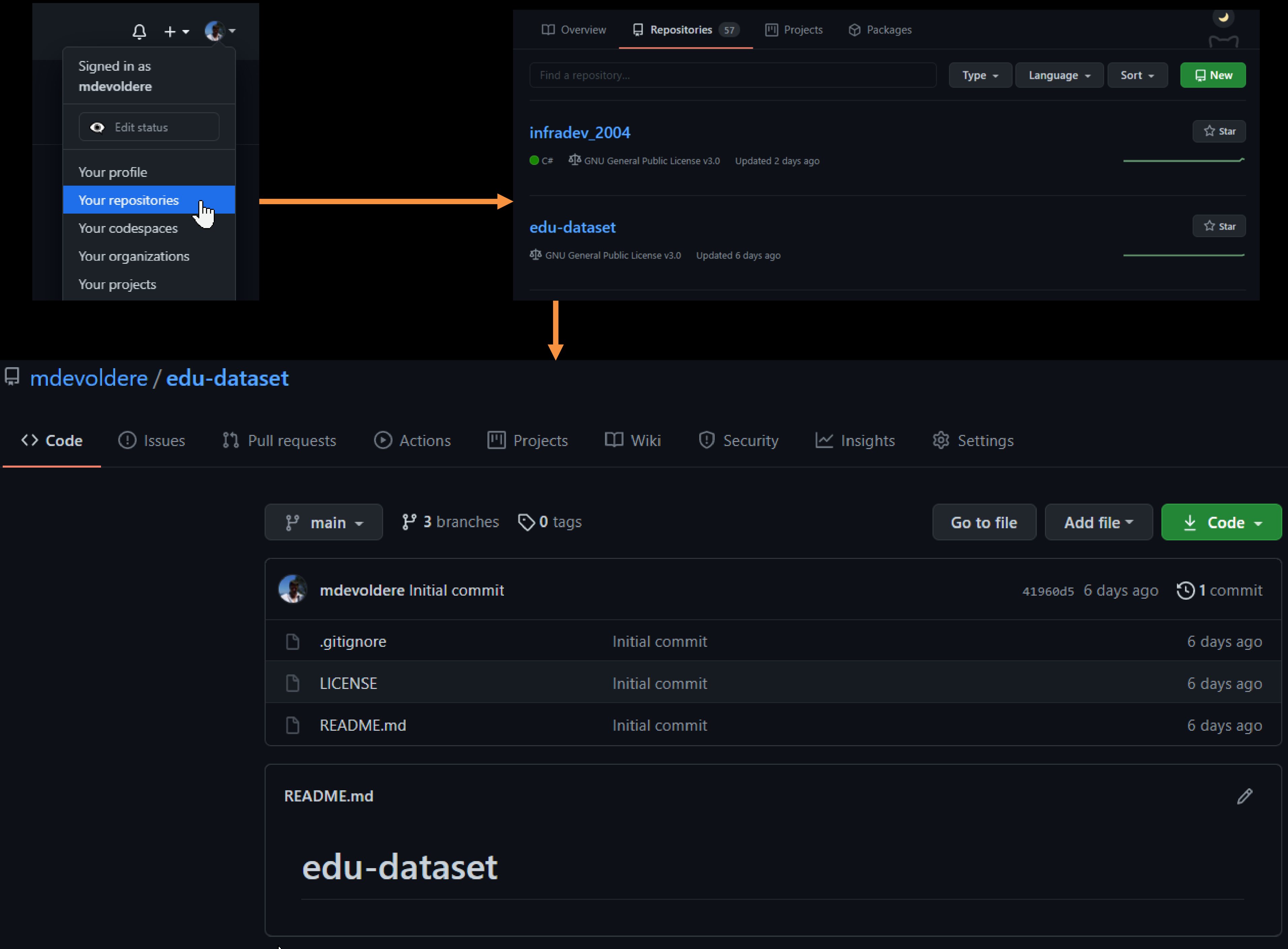
☑ **Add a README file**
This is where you can write a long description for your project. Learn more.

☑ **Add .gitignore**
Choose which files not to track from a list of templates. Learn more.

.gitignore template: **VisualStudio** ▾

□ **Choose a license**
A license tells others what they can and can't do with your code. Learn more.

This will set `main` as the default branch. Change the default name in your settings.



Signed in as **mdevoldere**

infradev_2004

C# GNU General Public License v3.0 Updated 2 days ago

edu-dataset

GNU General Public License v3.0 Updated 6 days ago

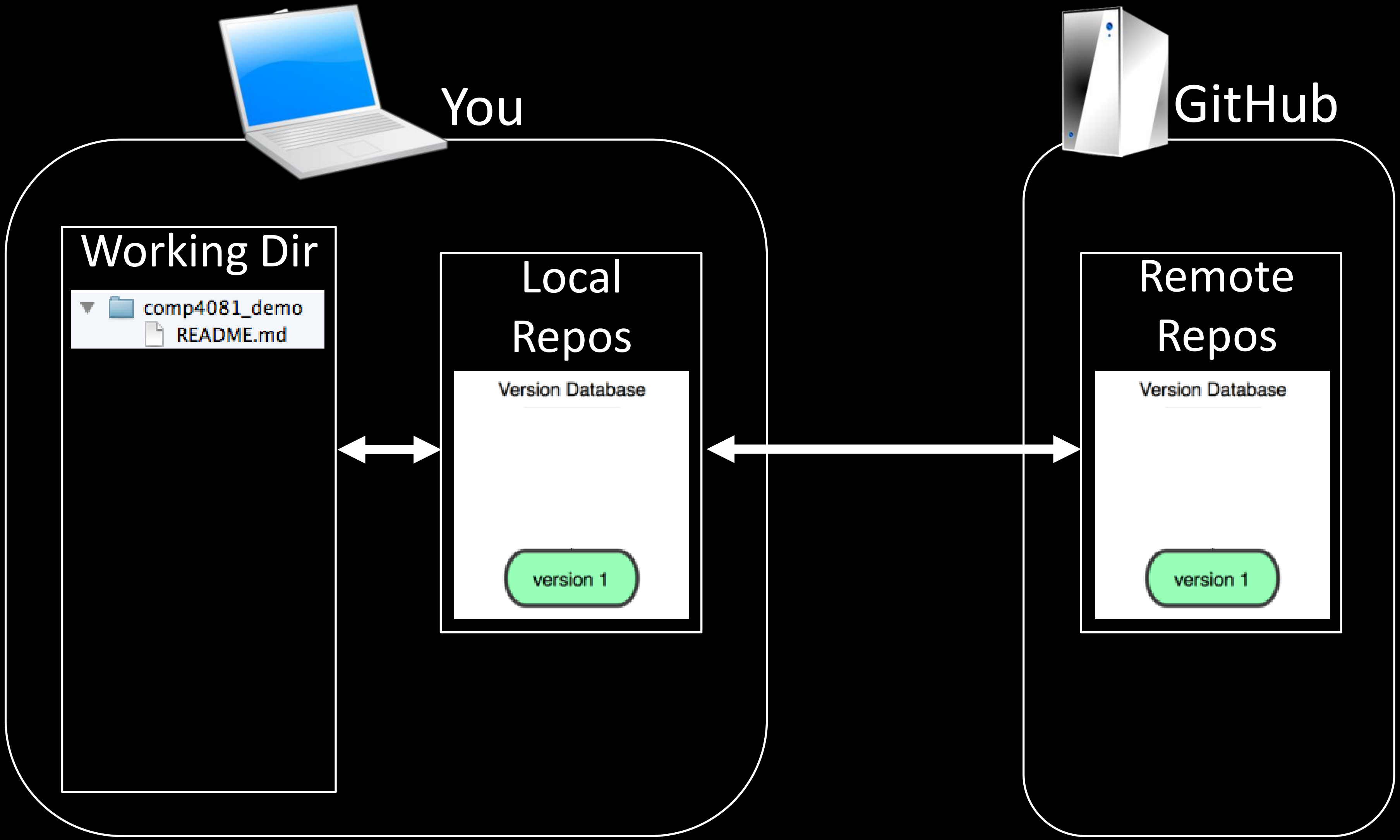
mdevoldere / edu-dataset

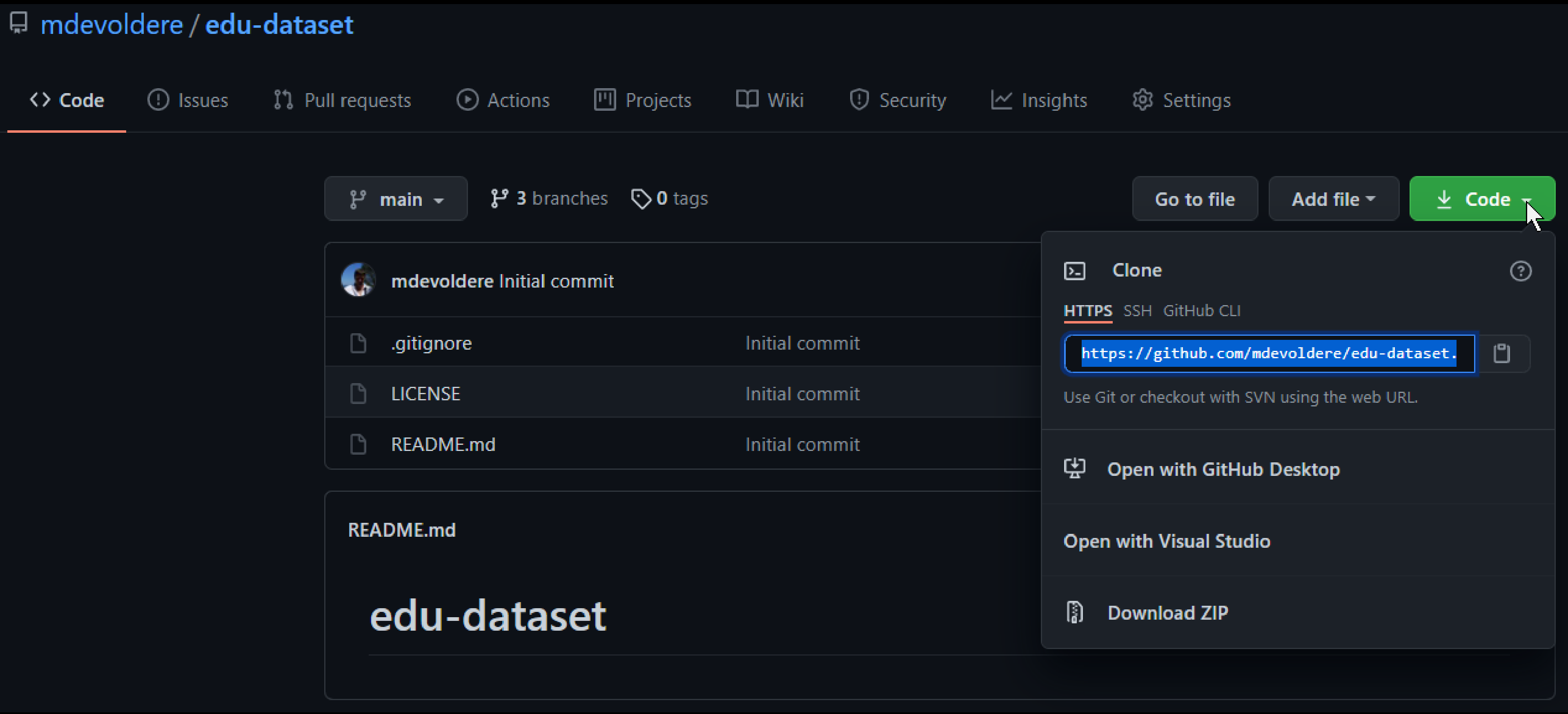
mdevoldere Initial commit	41960d5 6 days ago	1 commit
.gitignore	Initial commit	6 days ago
LICENSE	Initial commit	6 days ago
README.md	Initial commit	6 days ago

README.md

edu-dataset

```
$ git clone https://github.com/arfp/comp4081_demo.git
```





mdevoldere Initial commit

.gitignore	Initial commit
LICENSE	Initial commit
README.md	Initial commit

README.md

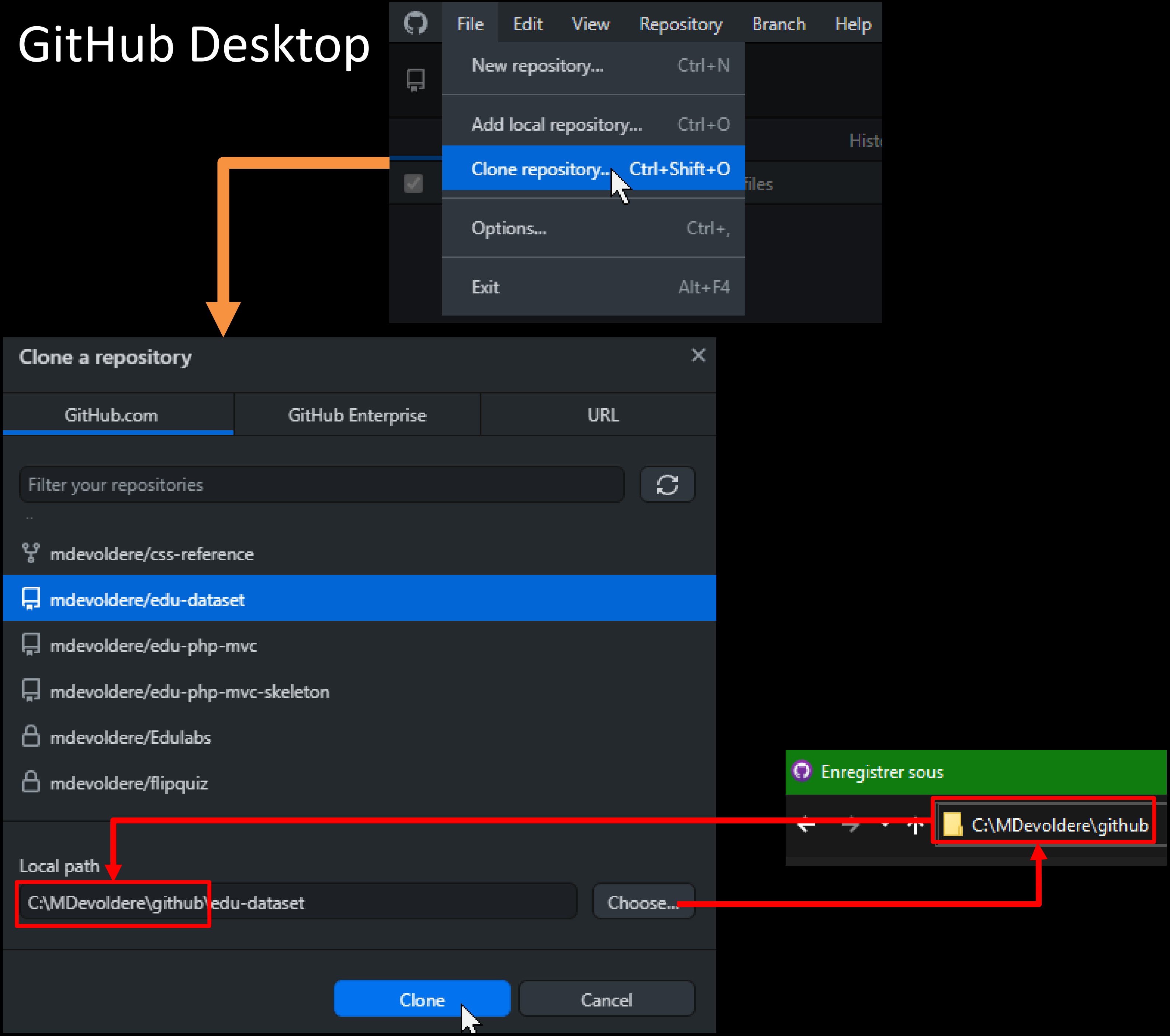
edu-dataset

https://github.com/mdevoldere/edu-dataset.

Use Git or checkout with SVN using the web URL.

```
git clone https://github.com/mdevoldere/edu-dataset.git
```

GitHub Desktop



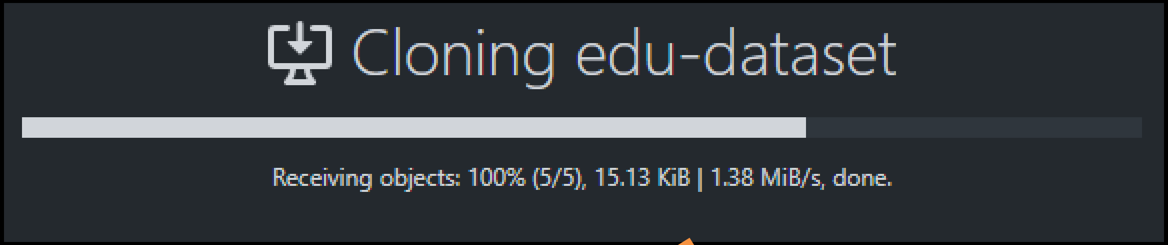
Clone a repository

- mdevoldere/css-reference
- mdevoldere/edu-dataset
- mdevoldere/edu-php-mvc
- mdevoldere/edu-php-mvc-skeleton
- mdevoldere/Edulabs
- mdevoldere/flipquiz

Local path: C:\MDevoldere\github\edu-dataset

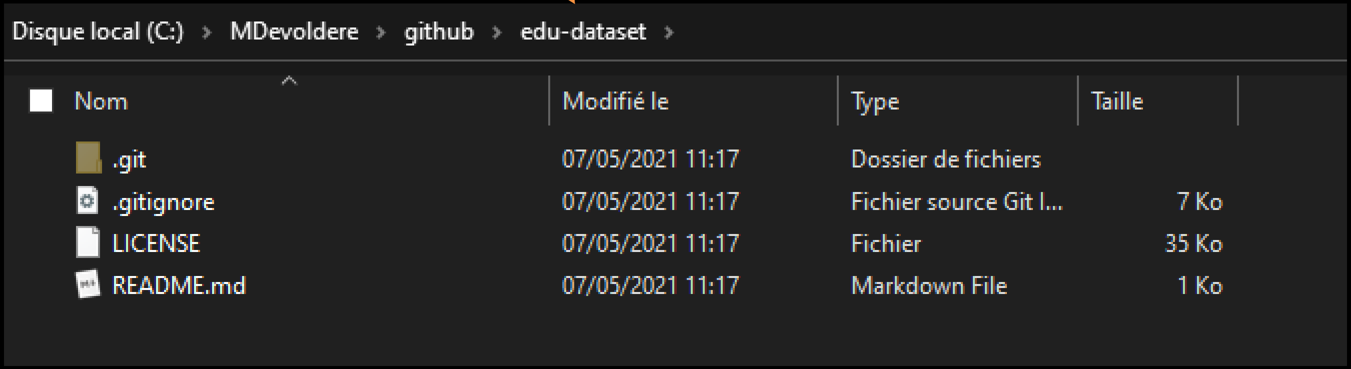
Enregistrer sous

C:\MDevoldere\github



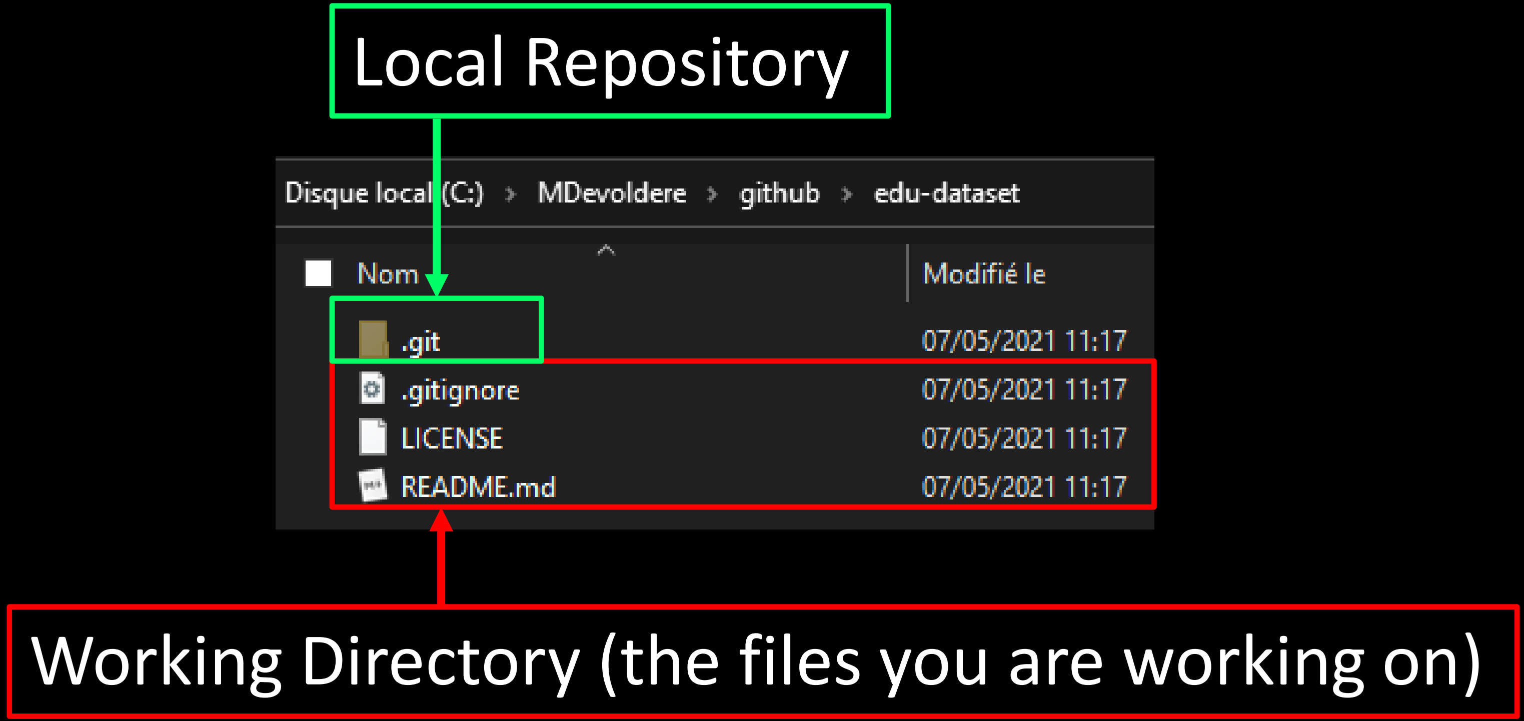
Cloning edu-dataset

```
Receiving objects: 100% (5/5), 15.13 KiB | 1.38 MiB/s, done.
```



Disque local (C:) › MDevoldere › github › edu-dataset ›

□ Nom	Modifié le	Type	Taille
.git	07/05/2021 11:17	Dossier de fichiers	
.gitignore	07/05/2021 11:17	Fichier source Git I...	7 Ko
LICENSE	07/05/2021 11:17	Fichier	35 Ko
README.md	07/05/2021 11:17	Markdown File	1 Ko

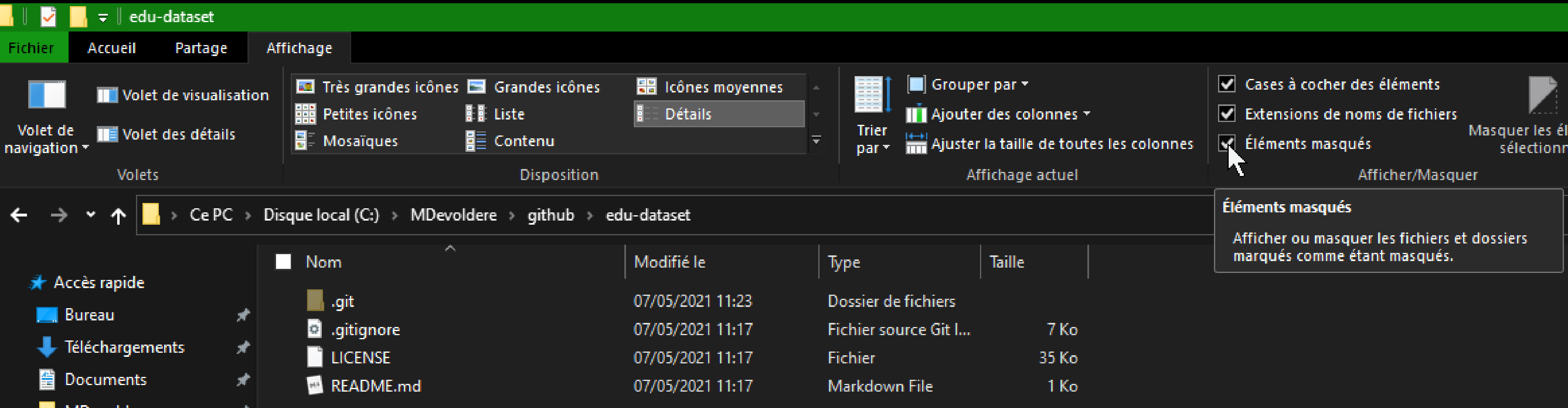


Local Repository

Working Directory (the files you are working on)

Disque local (C:) › MDevoldere › github › edu-dataset

Nom	Modifié le
.git	07/05/2021 11:17
.gitignore	07/05/2021 11:17
LICENSE	07/05/2021 11:17
README.md	07/05/2021 11:17



☑ Cases à cocher des éléments
☑ Extensions de noms de fichiers
☑ Éléments masqués

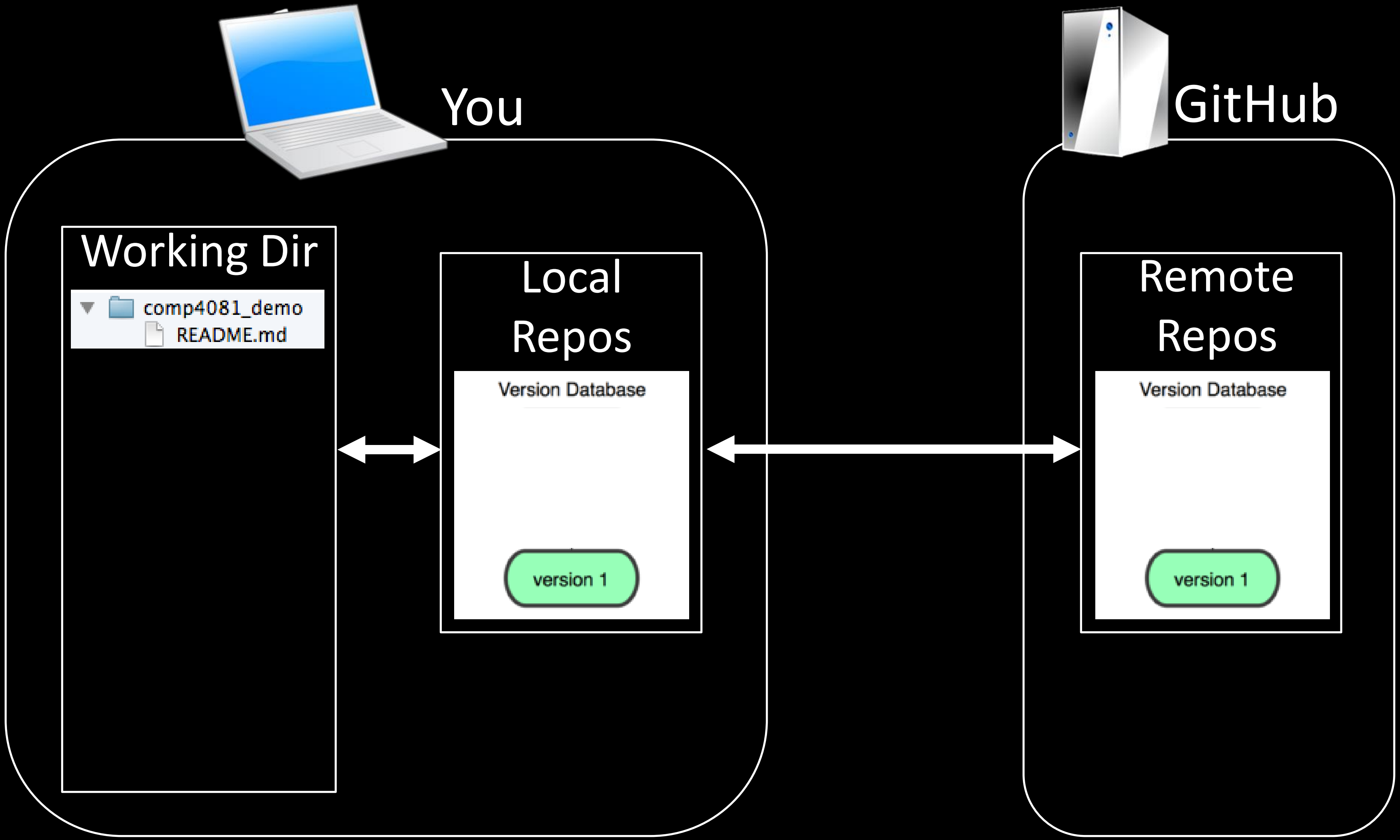
Éléments masqués

Afficher ou masquer les fichiers et dossiers marqués comme étant masqués.

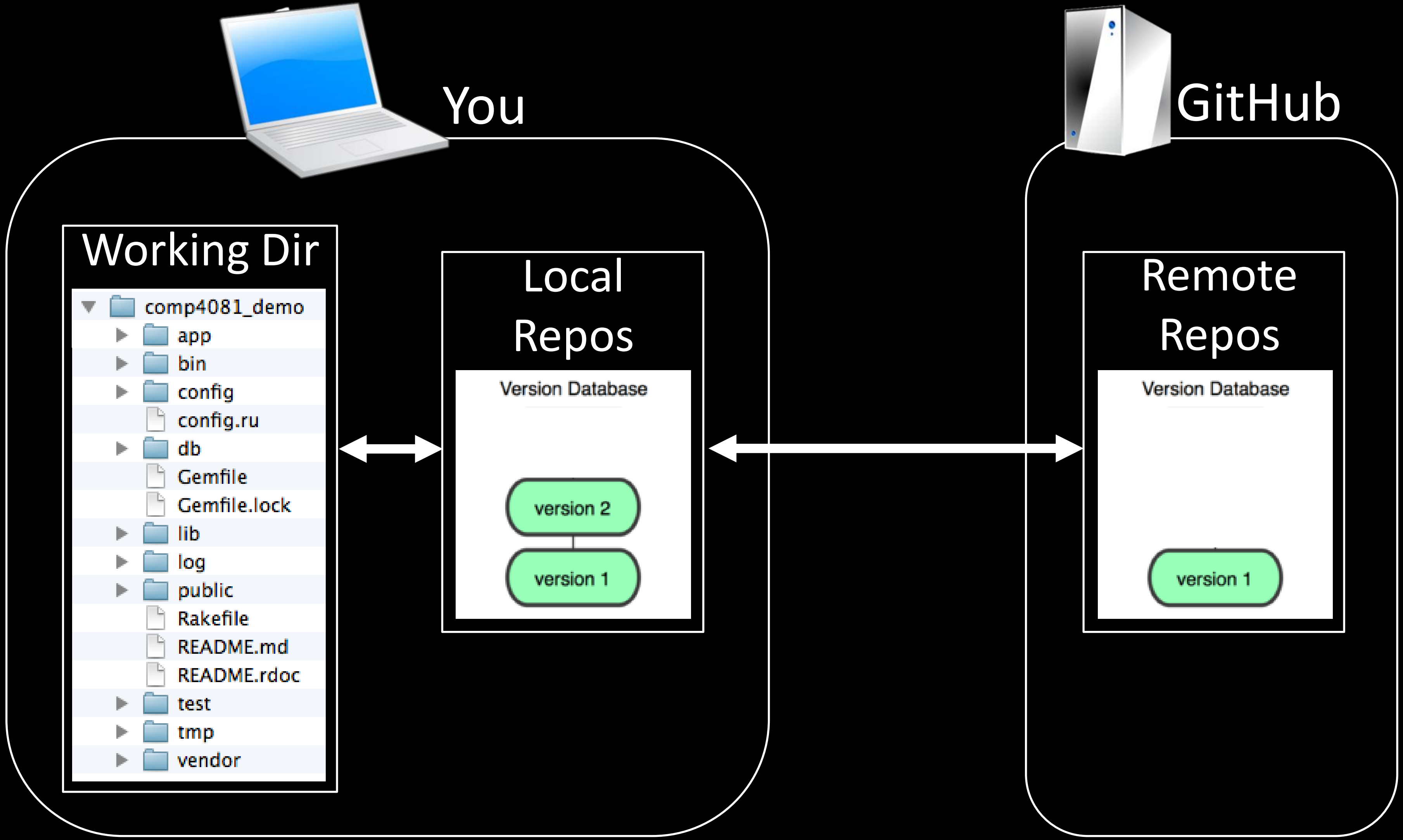
Ce PC › Disque local (C:) › MDevoldere › github › edu-dataset

Nom	Modifié le	Type	Taille
.git	07/05/2021 11:23	Dossier de fichiers	
.gitignore	07/05/2021 11:17	Fichier source Git I...	7 Ko
LICENSE	07/05/2021 11:17	Fichier	35 Ko
README.md	07/05/2021 11:17	Markdown File	1 Ko

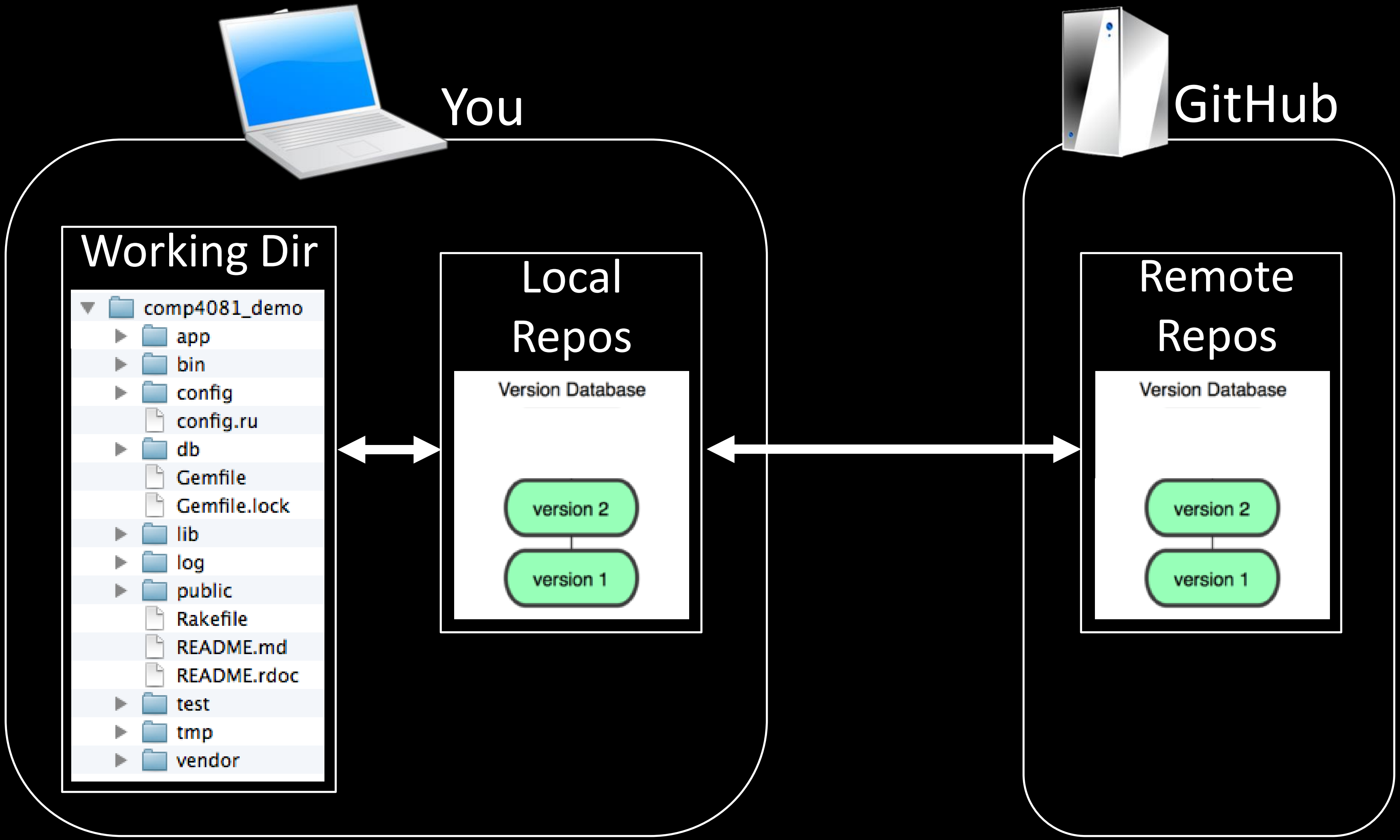
```
$ git clone https://github.com/arfp/comp4081_demo.git
```



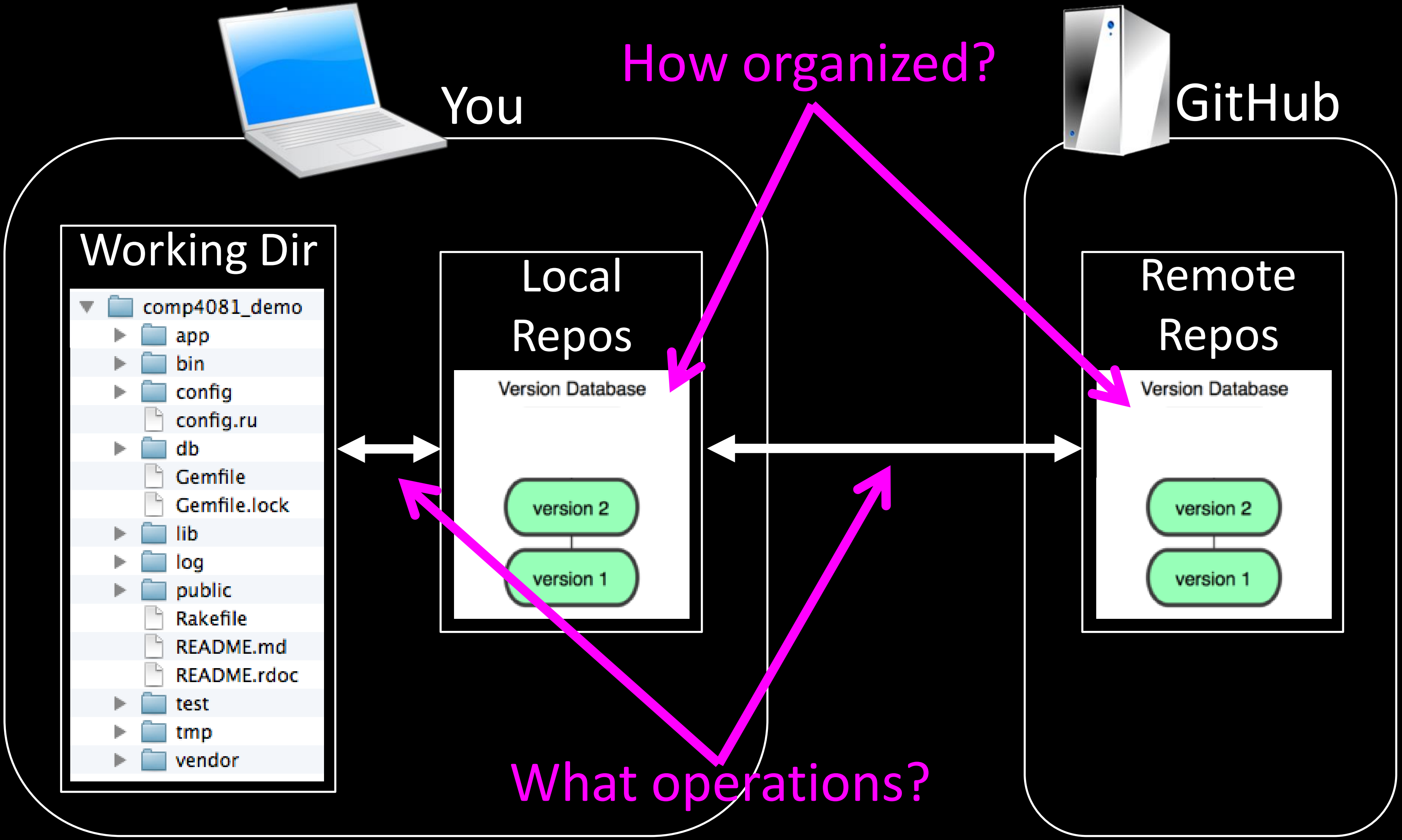
```
$ cd comp4081_demo
// Add/edit files
$ git add -A
$ git commit -m "Created project skeleton"
```



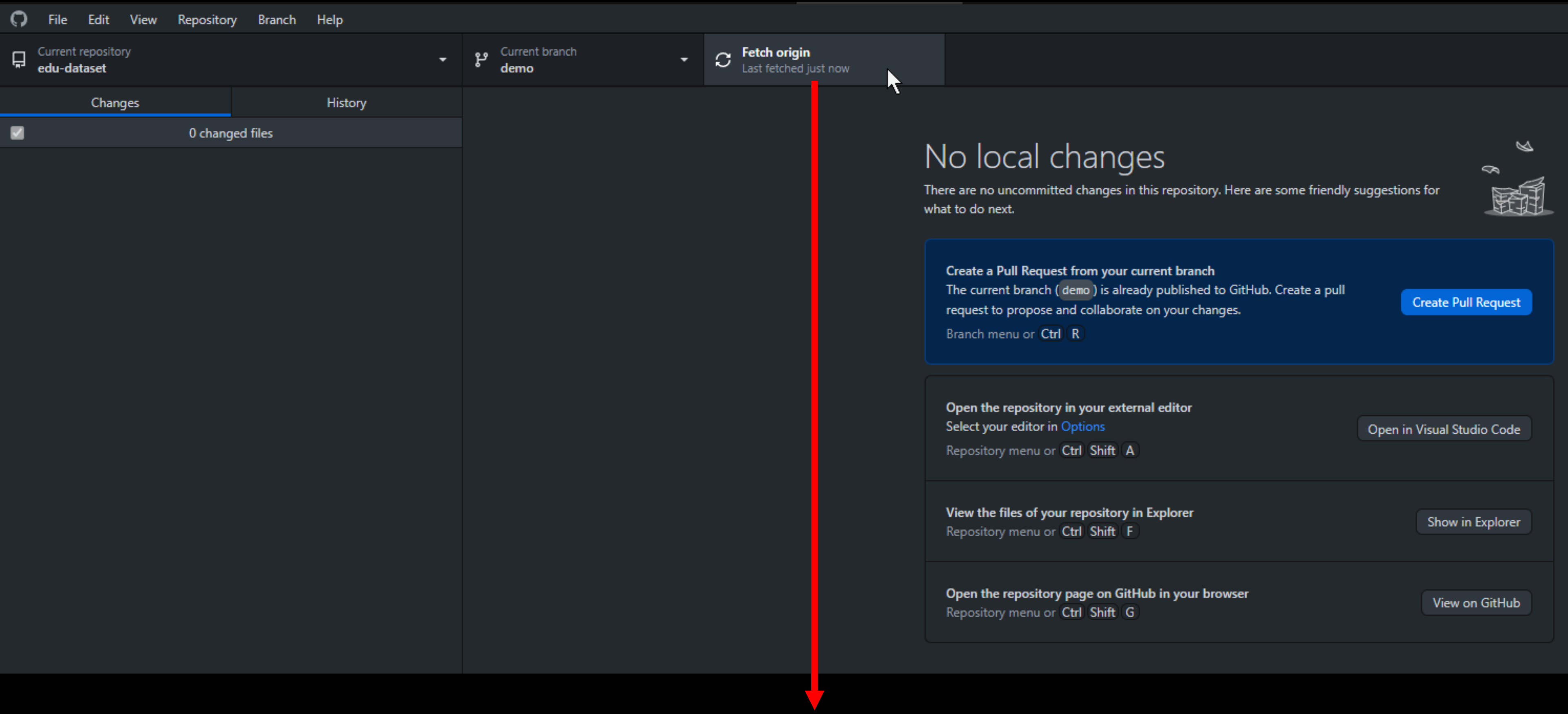
```
$ git push
```


You
GitHub
Working Dir
comp4081_demo
app
bin
config
config.ru
db
Gemfile
Gemfile.lock
lib
log
public
Rakefile
README.md
README.rdoc
test
tmp
vendor
Local Repos
Version Database
version 2
version 1
Remote Repos
Version Database
version 2
version 1

Questions to answer



Important: before starting to work



☑ 0 changed files

No local changes

There are no uncommitted changes in this repository. Here are some friendly suggestions for what to do next.

Create a Pull Request from your current branch
The current branch (demo) is already published to GitHub. Create a pull request to propose and collaborate on your changes.
Branch menu or Ctrl R

Open the repository in your external editor
Select your editor in Options
Repository menu or Ctrl Shift A

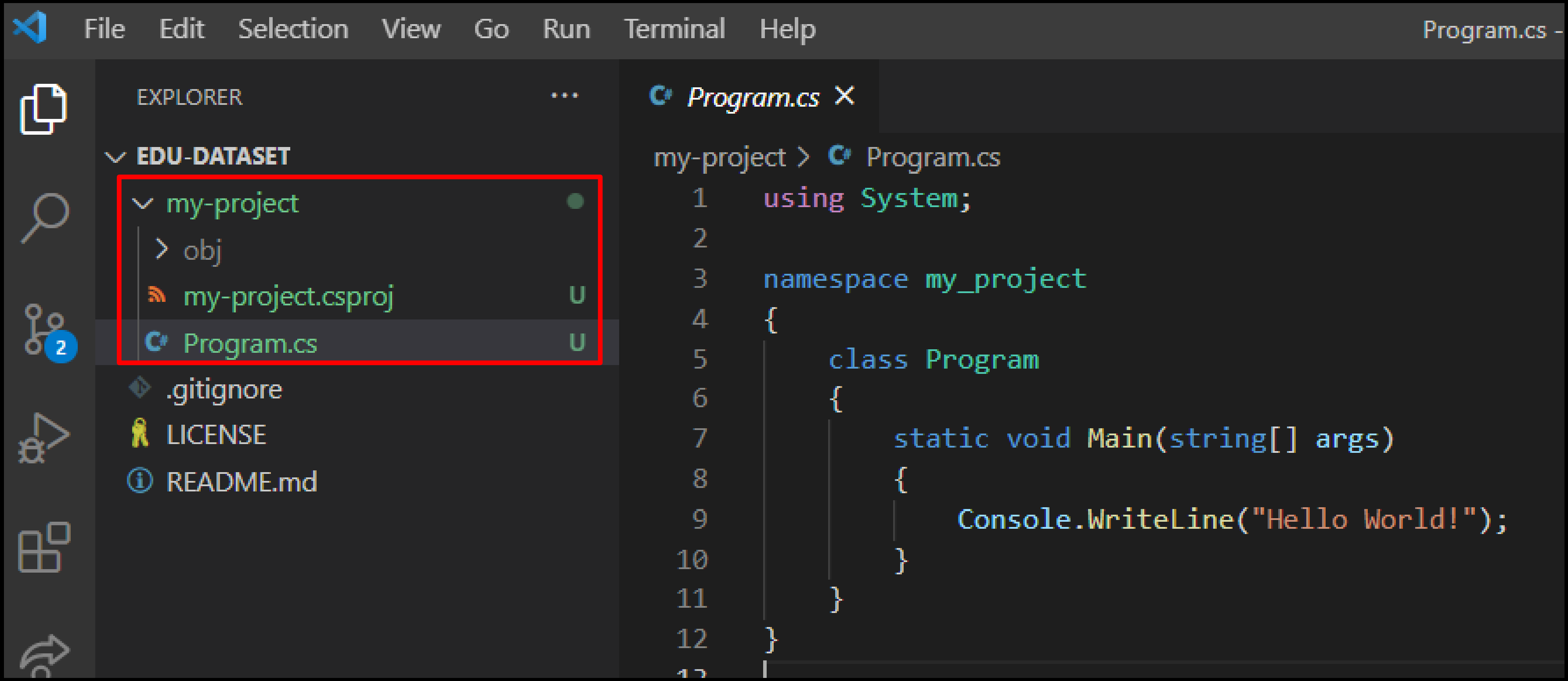
View the files of your repository in Explorer
Repository menu or Ctrl Shift F

Open the repository page on GitHub in your browser
Repository menu or Ctrl Shift G

Update your local repository to make sure you're in sync with the remote repository

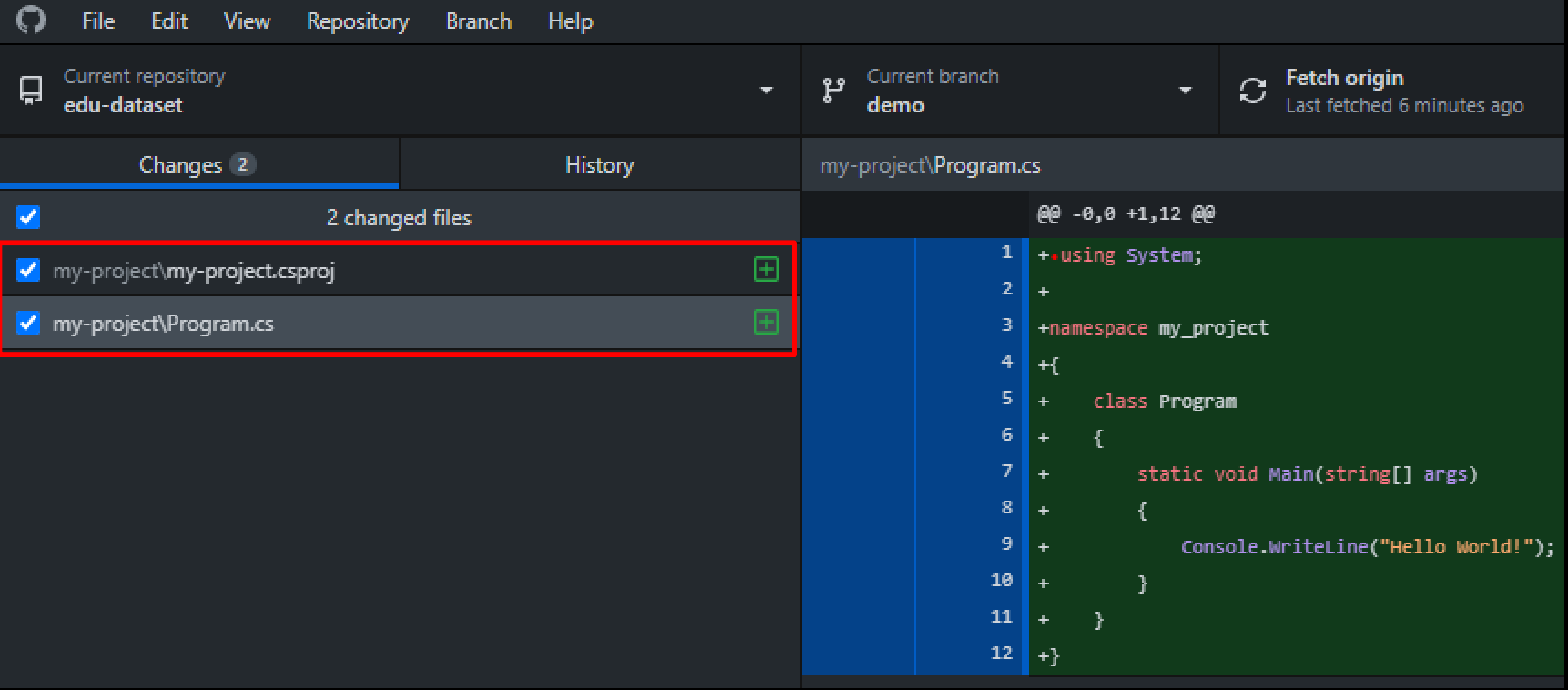
```
git fetch origin
```

Add / Edit files



```
using System;

namespace my_project
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Hello World!");
        }
    }
}
```

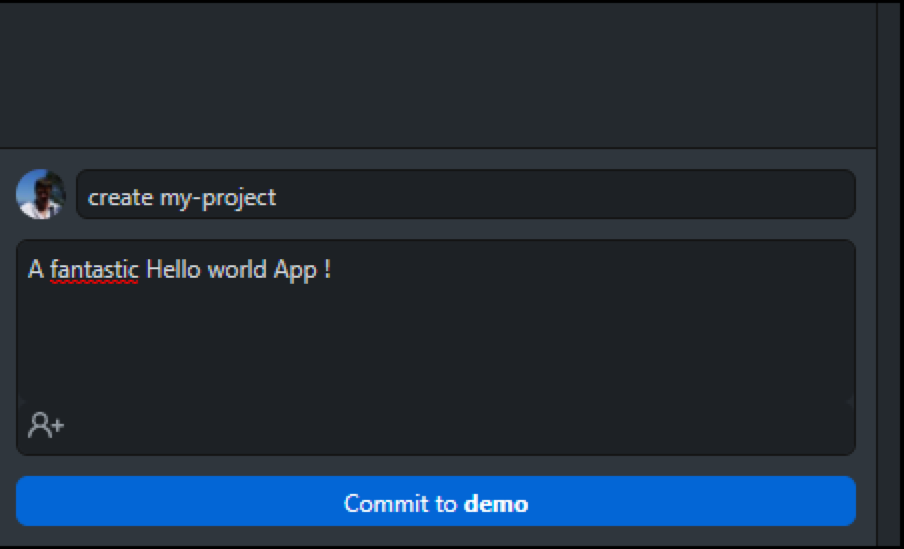


☑ my-project\my-project.csproj

☑ my-project\Program.cs

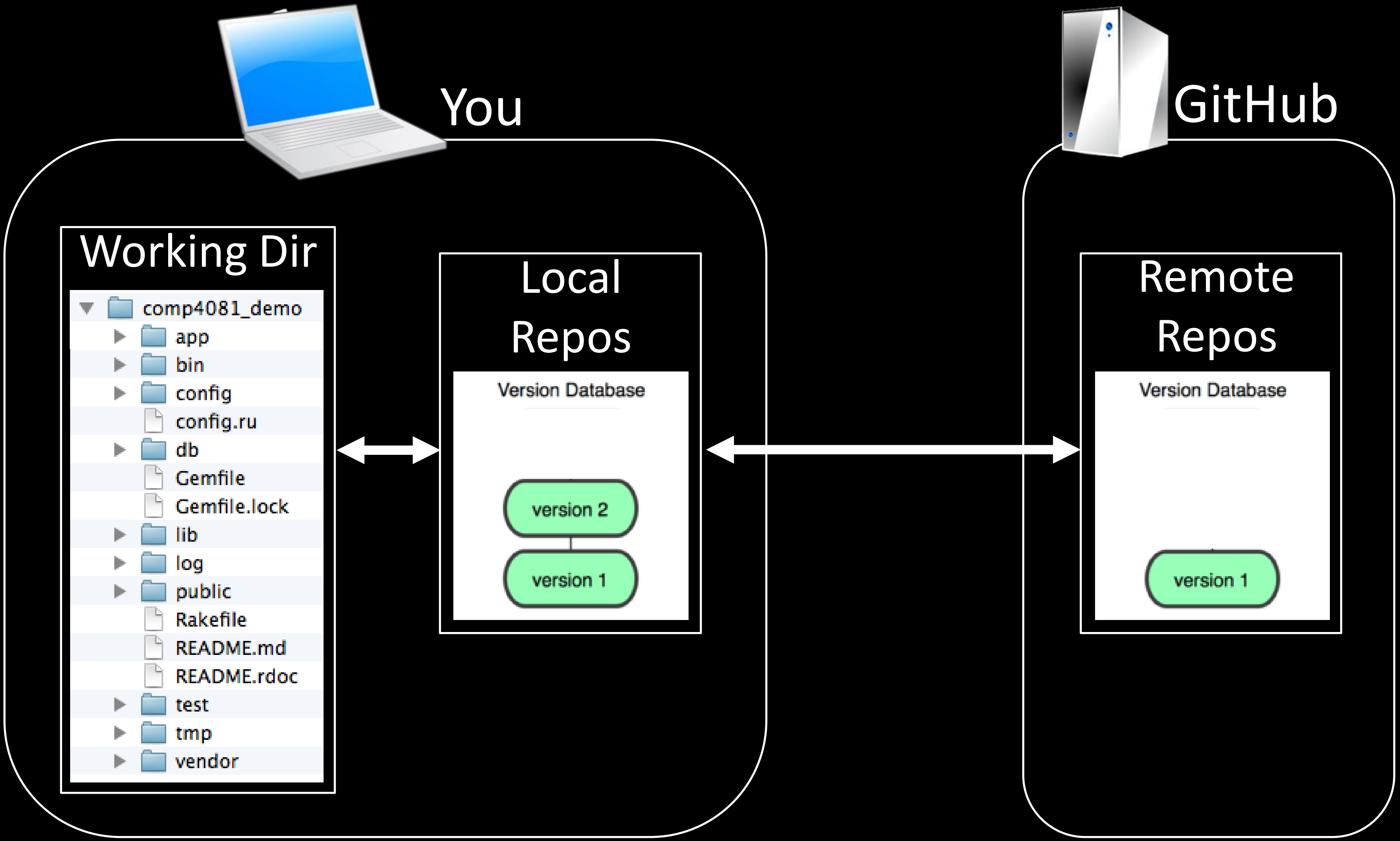
my-project\Program.cs

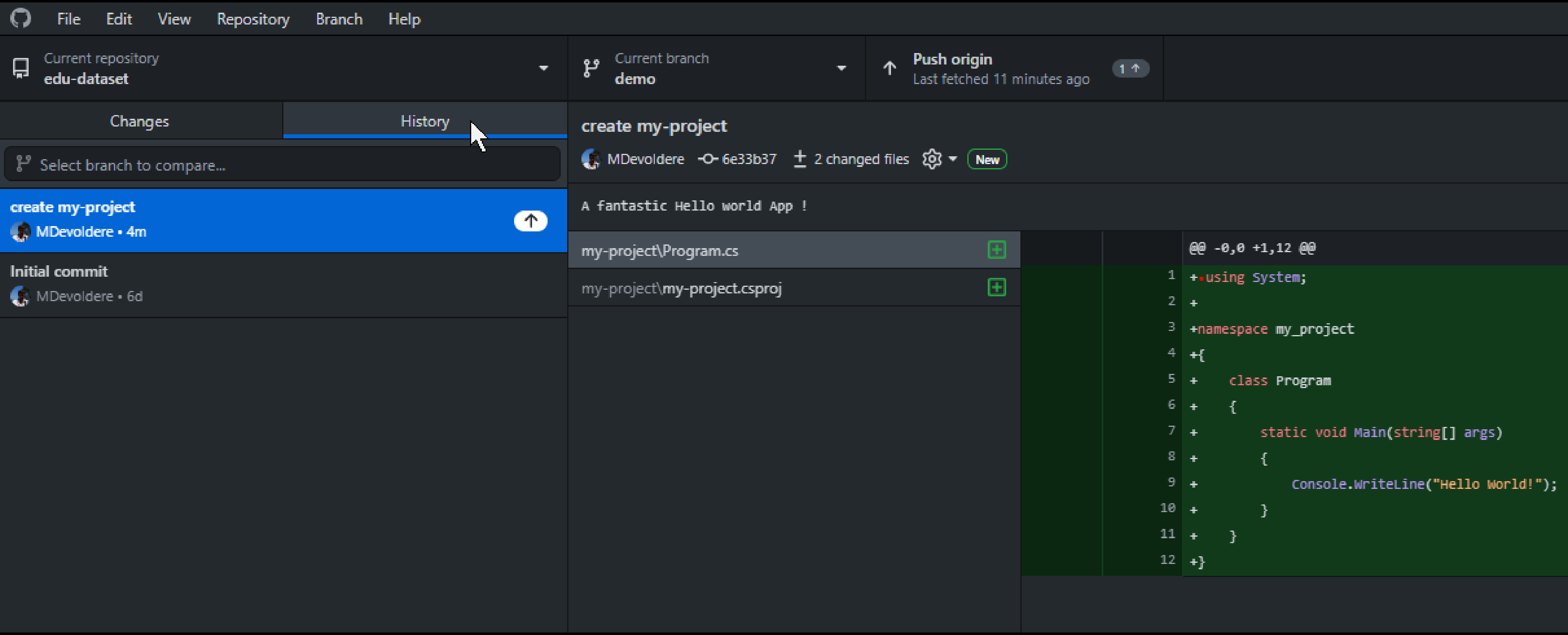
```
@@ -0,0 +1,12 @@
+using System;
+
+namespace my_project
+{
+    class Program
+    {
+        static void Main(string[] args)
+        {
+            Console.WriteLine("Hello World!");
+        }
+    }
+}
```


create my-project

A fantastic Hello world App !

```
$ cd comp4081_demo
// Add/edit files
$ git add -A
$ git commit -m "Created project skeleton"
```





create my-project
MDevoldere • 4m

Initial commit
MDevoldere • 6d

create my-project

MDevoldere 6e33b37 2 changed files

A fantastic Hello world App !

my-project\Program.cs

my-project\my-project.csproj

```
@@ -0,0 +1,12 @@
+using System;
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+        }
+    }
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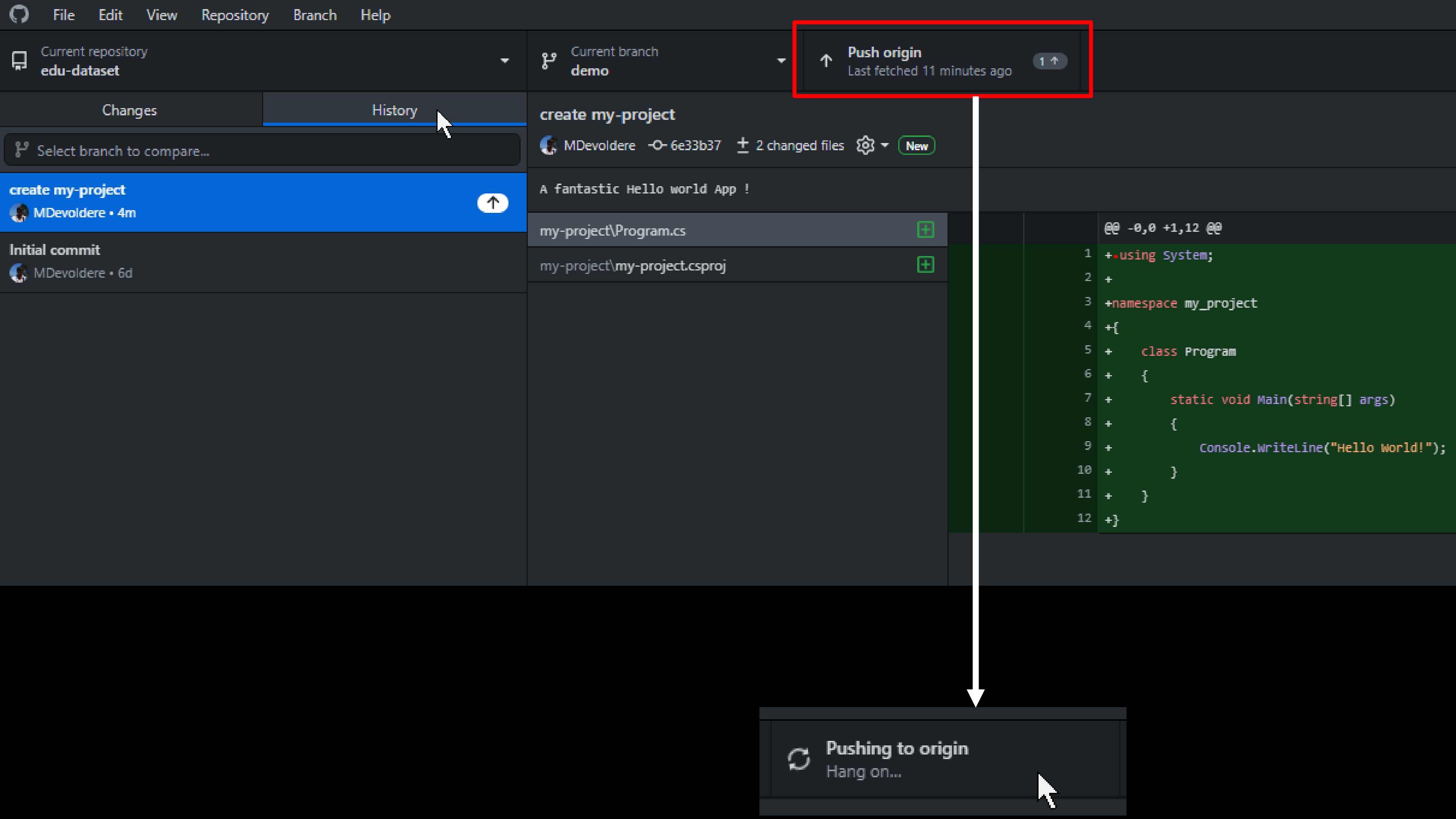
```



A fantastic Hello world App !

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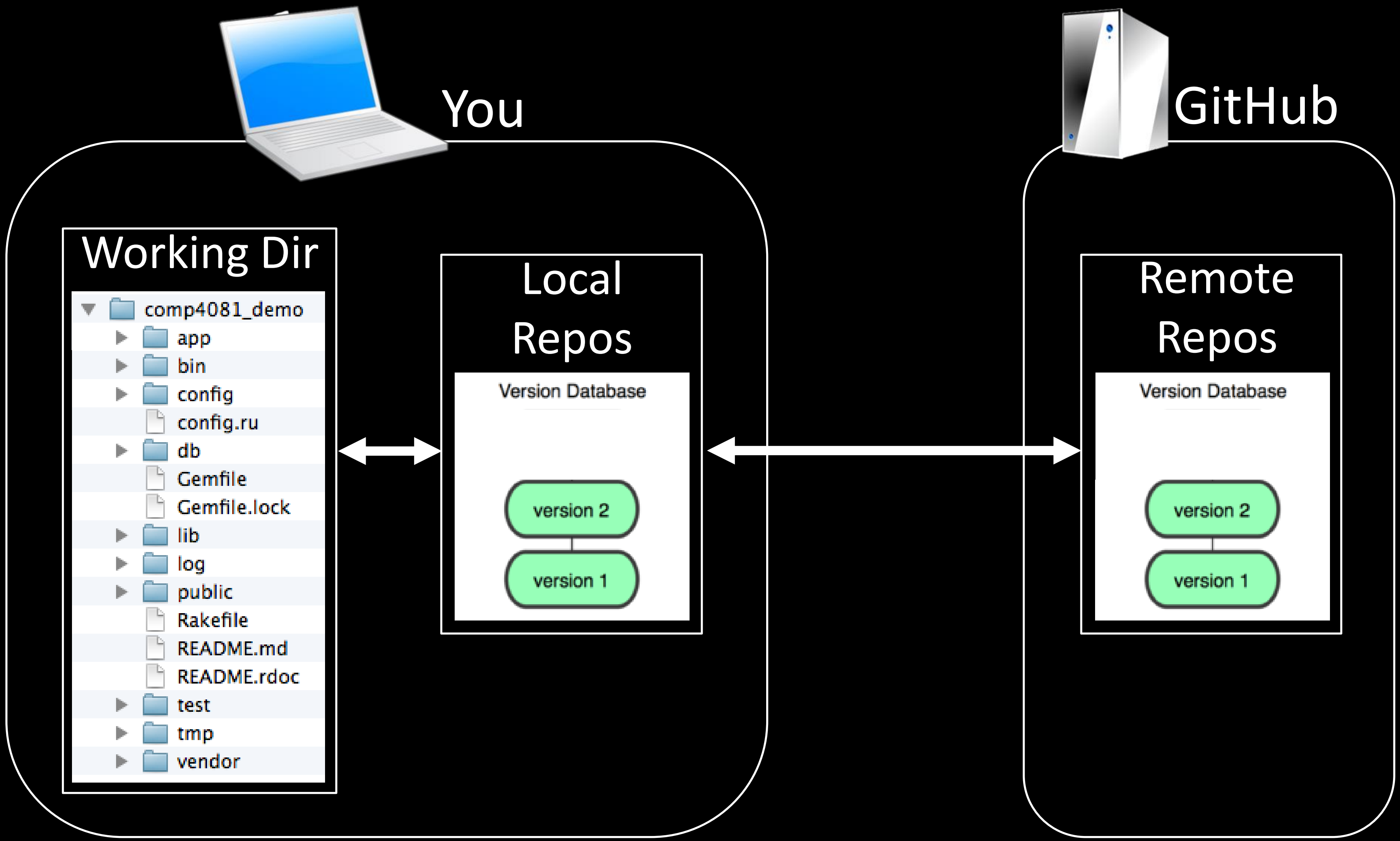
+    {
+        static void Main(string[] args)
+        {
+            Console.WriteLine("Hello World!");
+        }
+    }
+}
```

```
$ git push
```



You

GitHub

Working Dir

comp4081_demo
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Version Database

version 2

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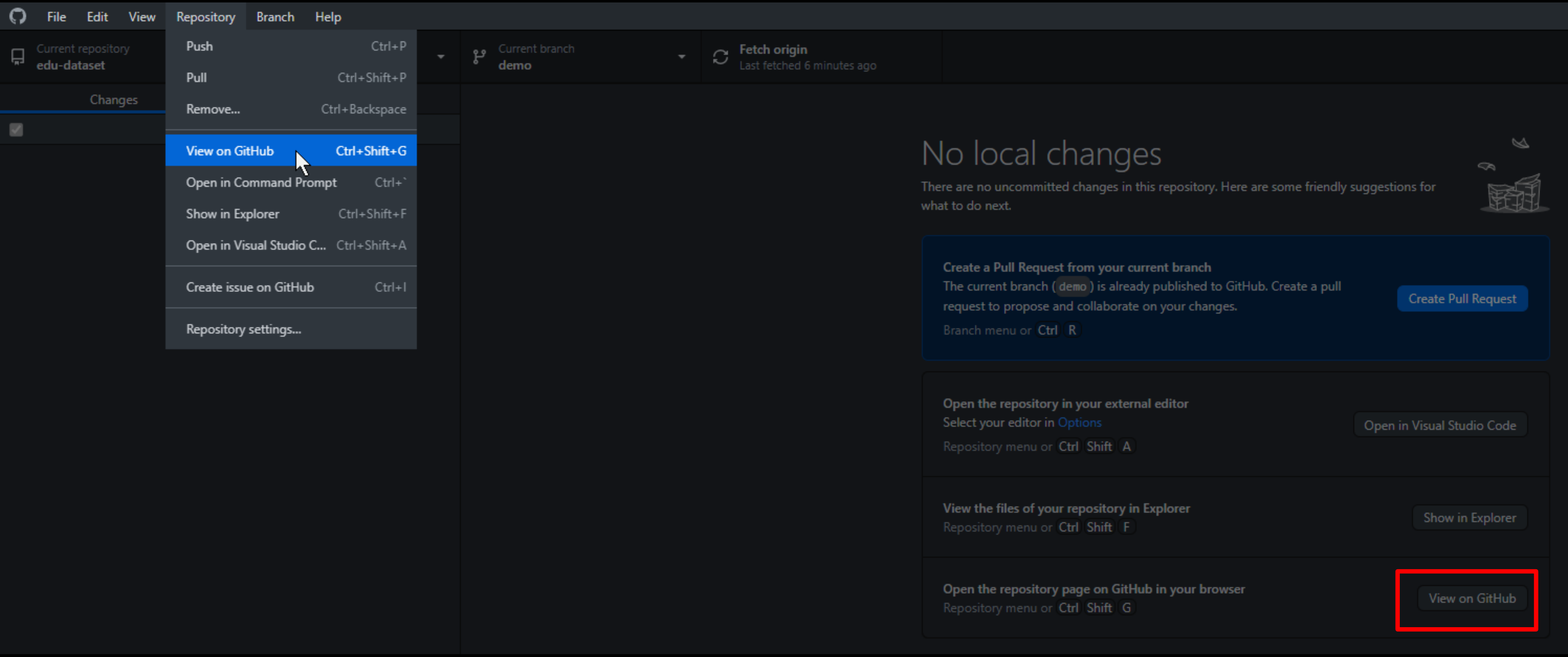

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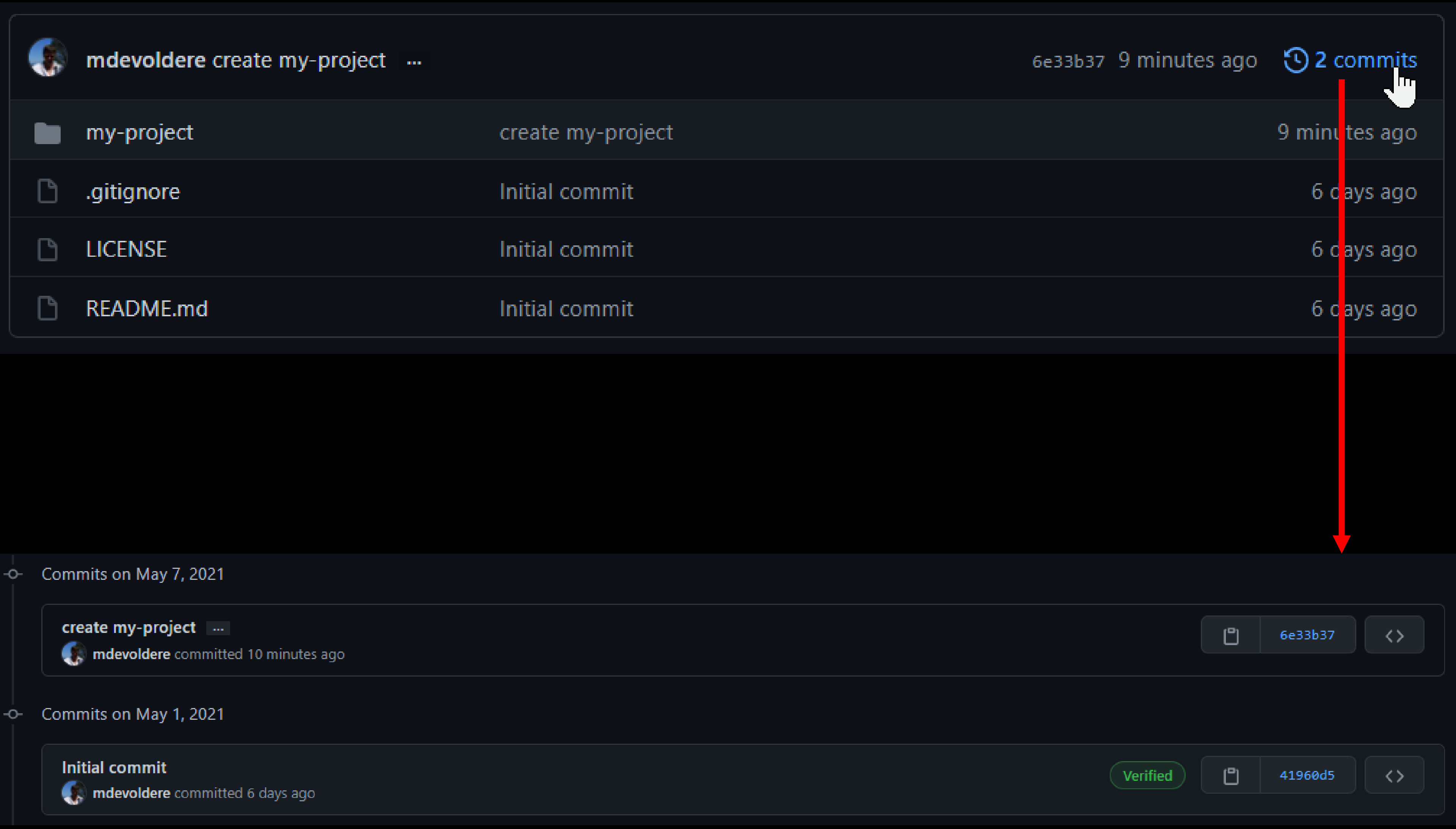
https://github.com/mdevoldere/edu-dataset



mdevoldere create my-project ... 6e33b37 9 minutes ago 2 commits

my-project	create my-project	9 minutes ago
.gitignore	Initial commit	6 days ago
LICENSE	Initial commit	6 days ago
README.md	Initial commit	6 days ago

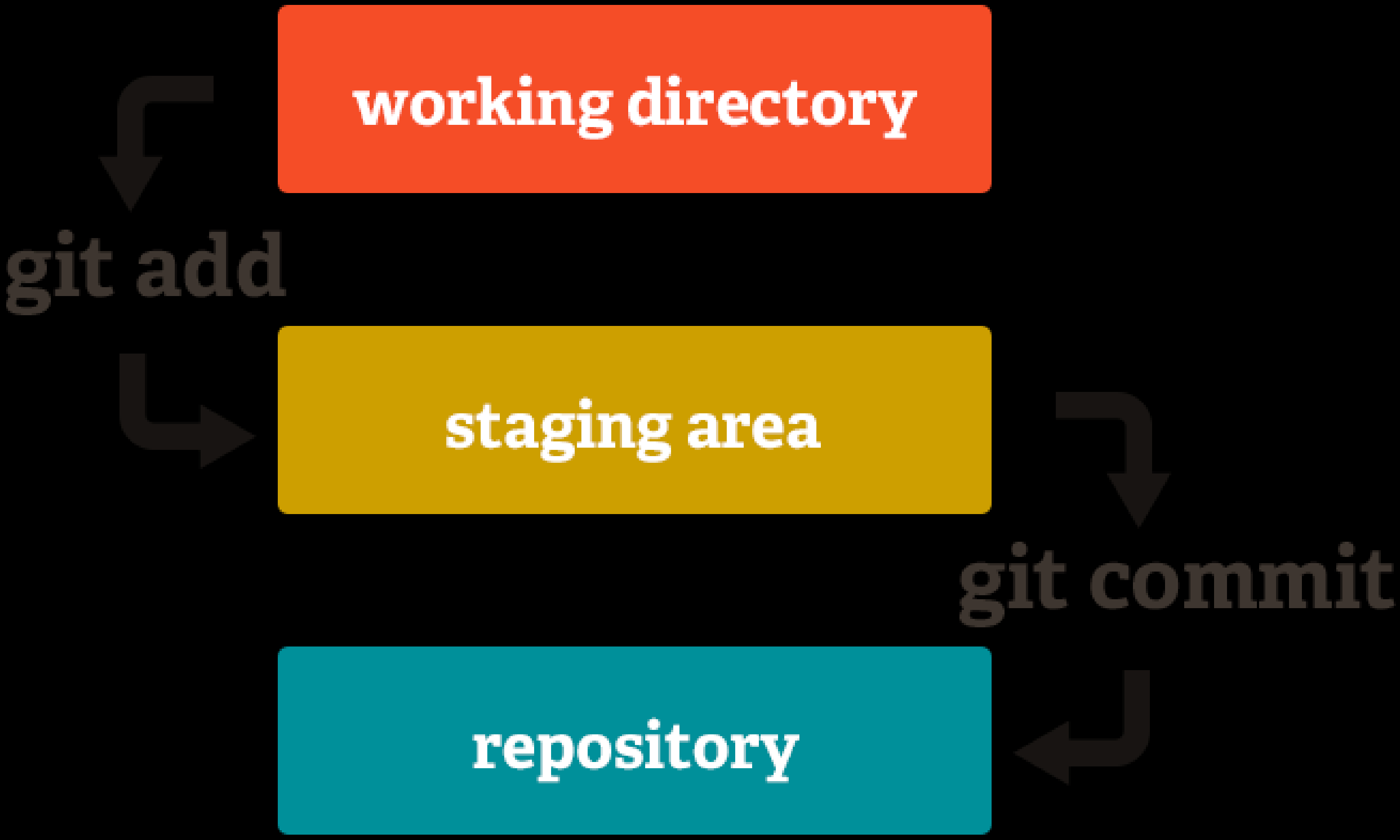
Commits on May 7, 2021

create my-project ...
mdevoldere committed 10 minutes ago
6e33b37

Commits on May 1, 2021

Initial commit
mdevoldere committed 6 days ago
Verified
41960d5

How the repos is organized



working directory

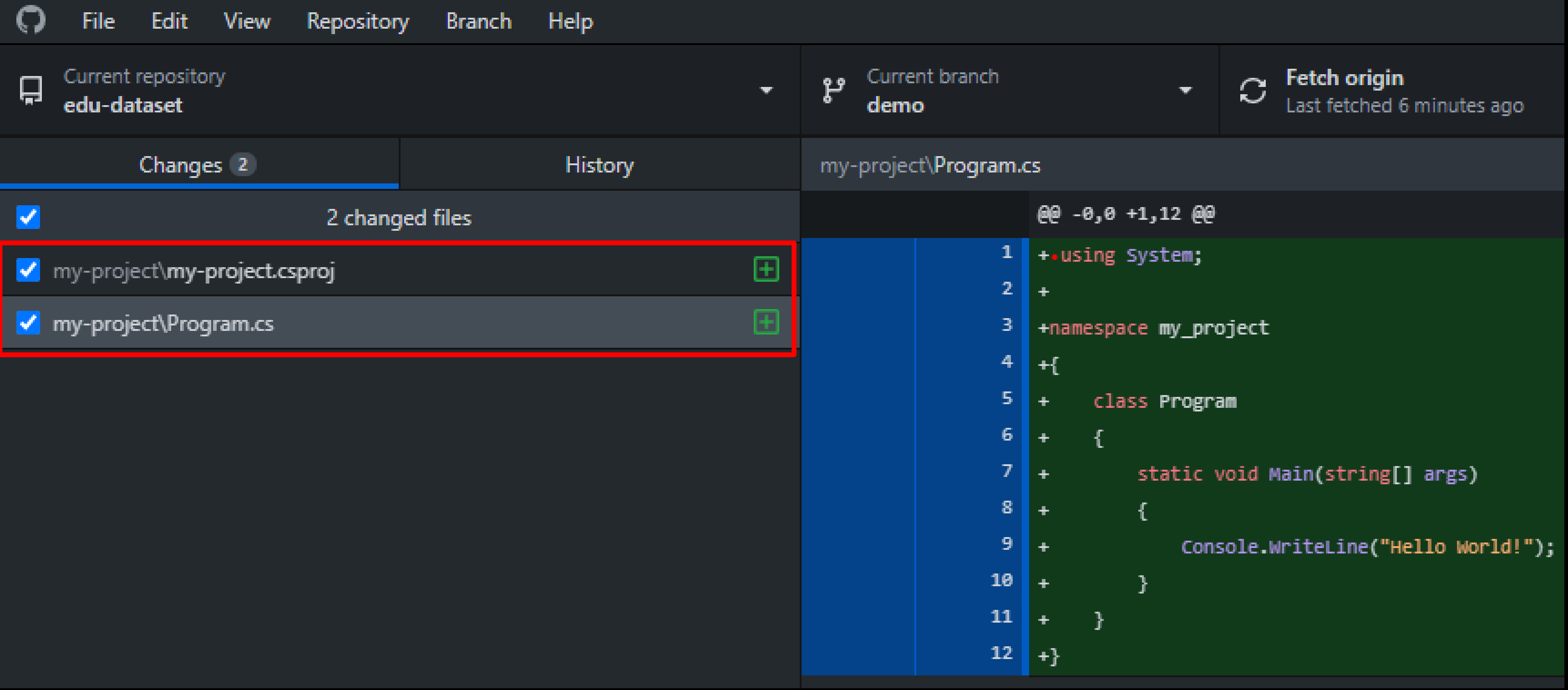
git add

staging area

git commit

repository

http://git-scm.com/book/



☑ 2 changed files

☑ my-project\my-project.csproj

☑ my-project\Program.cs

my-project\Program.cs

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@@ -0,0 +1,12 @@
+using System;
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+{
+    class Program
+    {
+        static void Main(string[] args)
+        {
+            Console.WriteLine("Hello World!");
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+    }
+}
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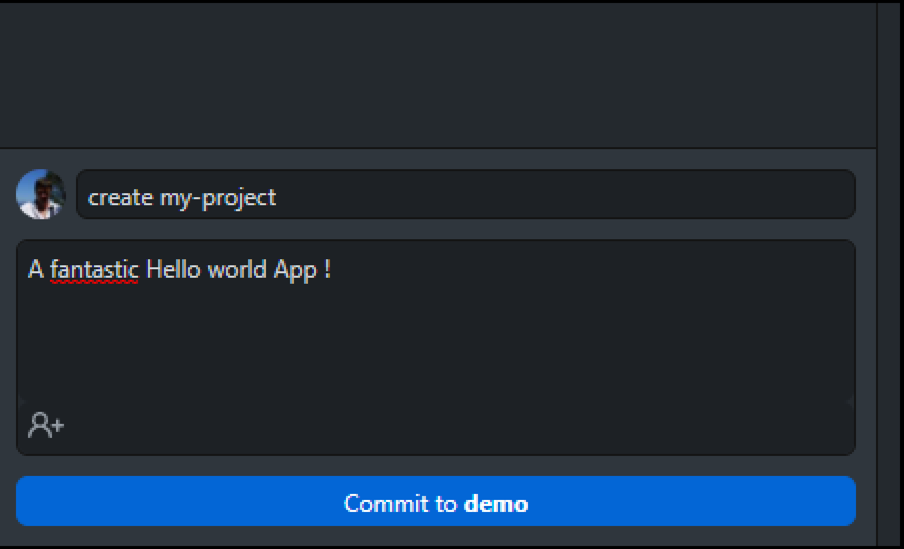
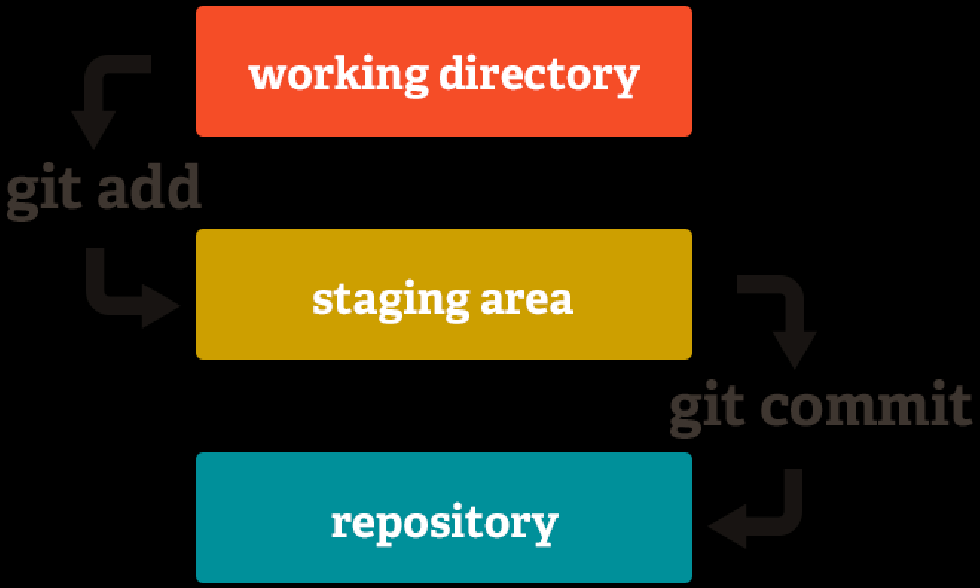


create my-project

A fantastic Hello world App !


working directory

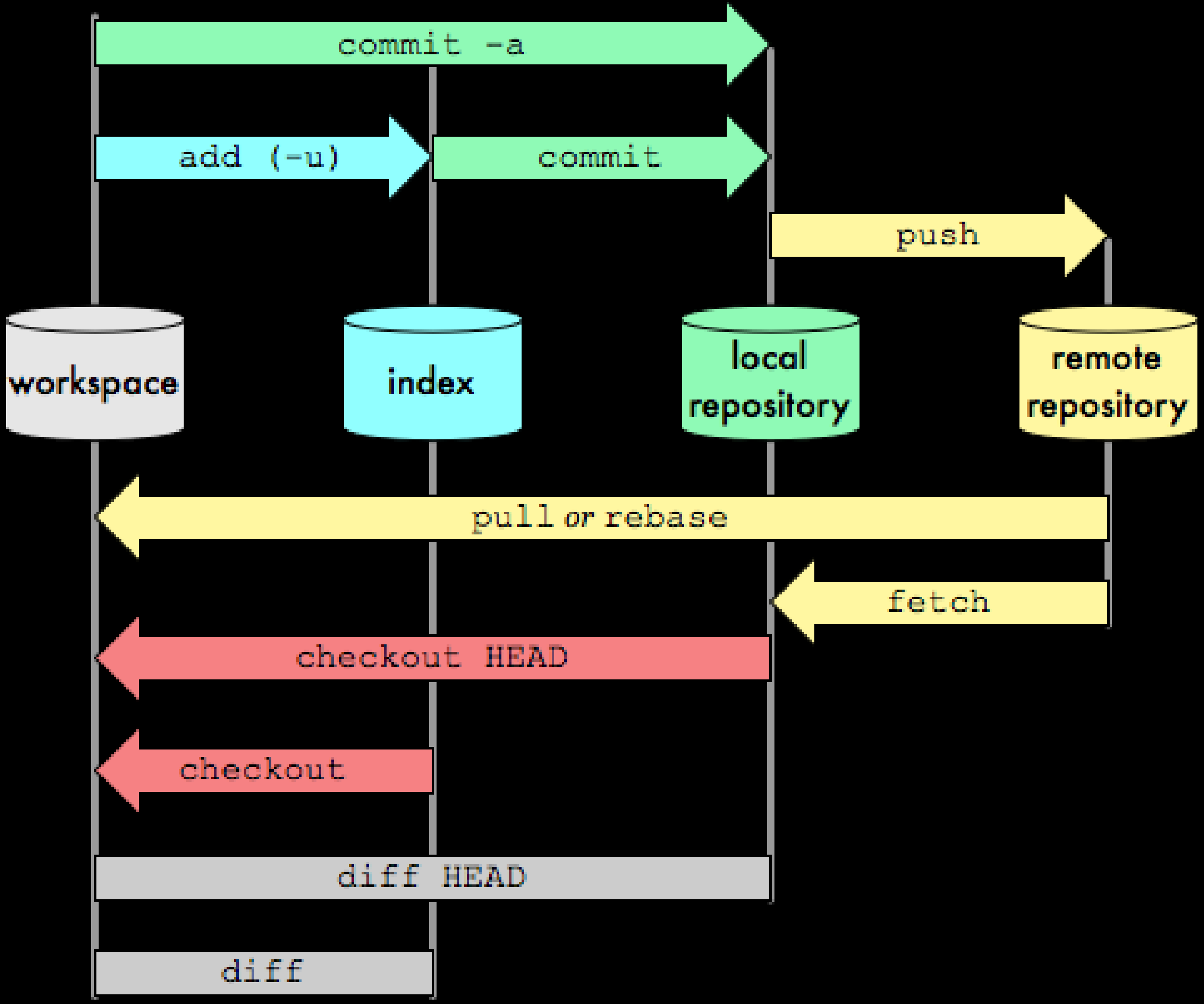
git add

staging area

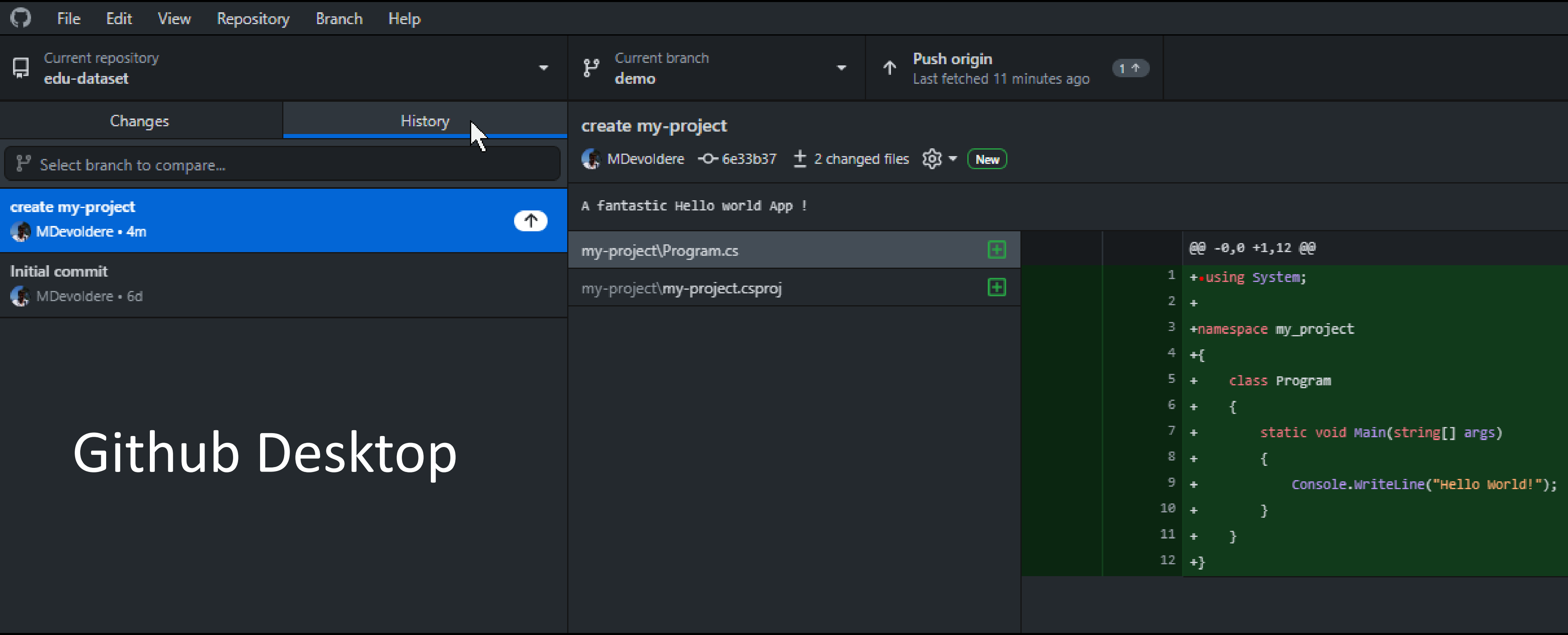
git commit

repository

How the repos is organized



http://git-scm.com/book/



create my-project
MDevoldere • 4m

Initial commit
MDevoldere • 6d

create my-project
MDevoldere 6e33b37 2 changed files New

A fantastic Hello world App !

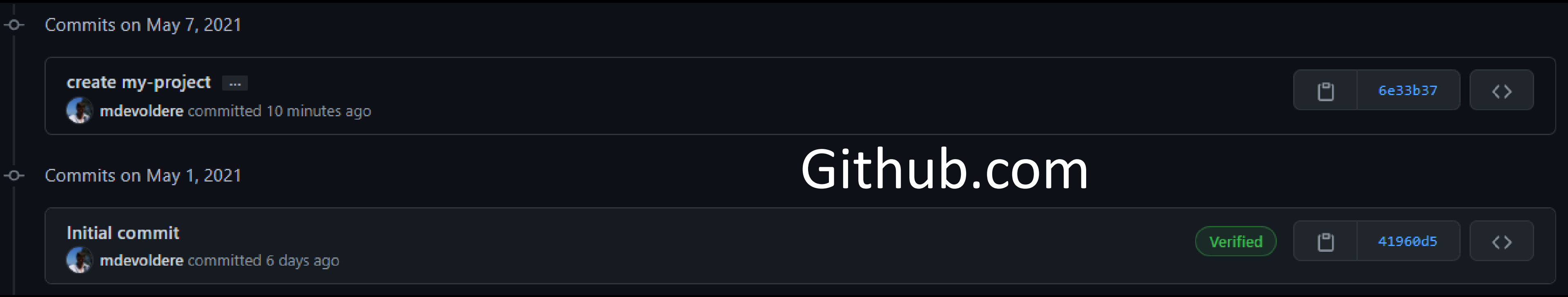
my-project\Program.cs

my-project\my-project.csproj

```
@@ -0,0 +1,12 @@
+using System;
+
+namespace my_project
+{
+    class Program
+    {
+        static void Main(string[] args)
+        {
+            Console.WriteLine("Hello World!");
+        }
+    }
+}
```

Github Desktop

How are commits organized?



Commits on May 7, 2021

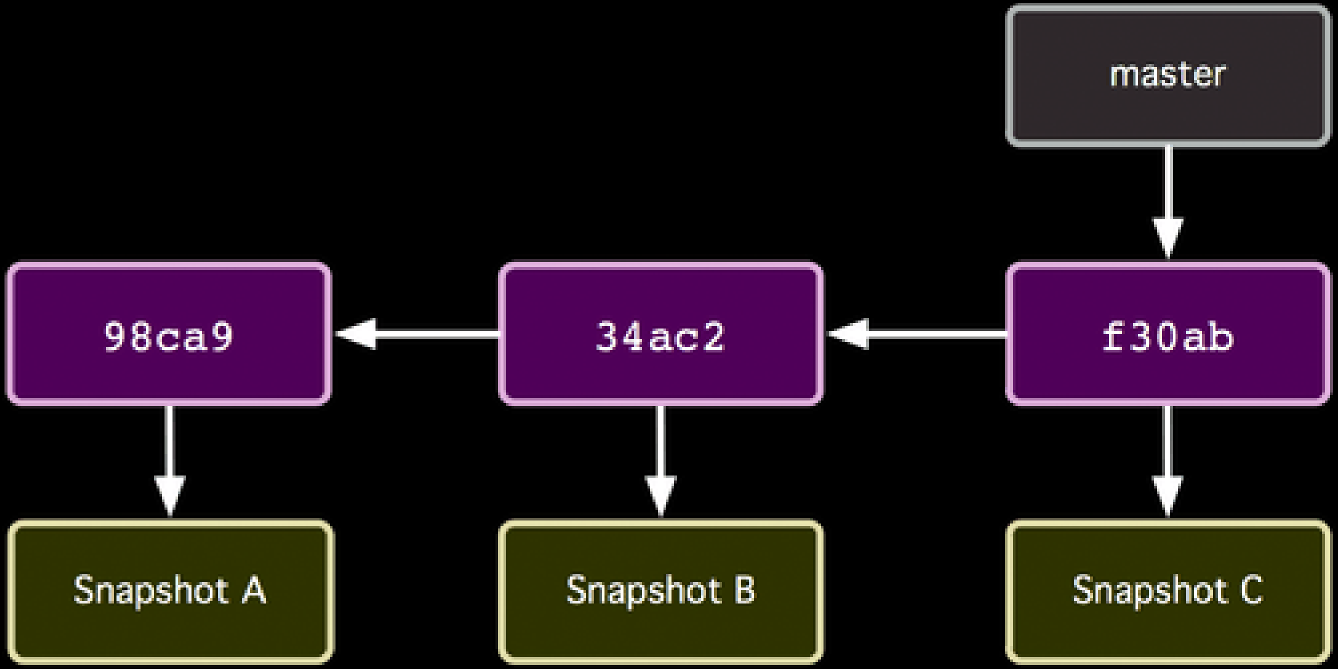
create my-project ...
mdevoldere committed 10 minutes ago
6e33b37

Commits on May 1, 2021

Initial commit
mdevoldere committed 6 days ago
Verified
41960d5

Github.com

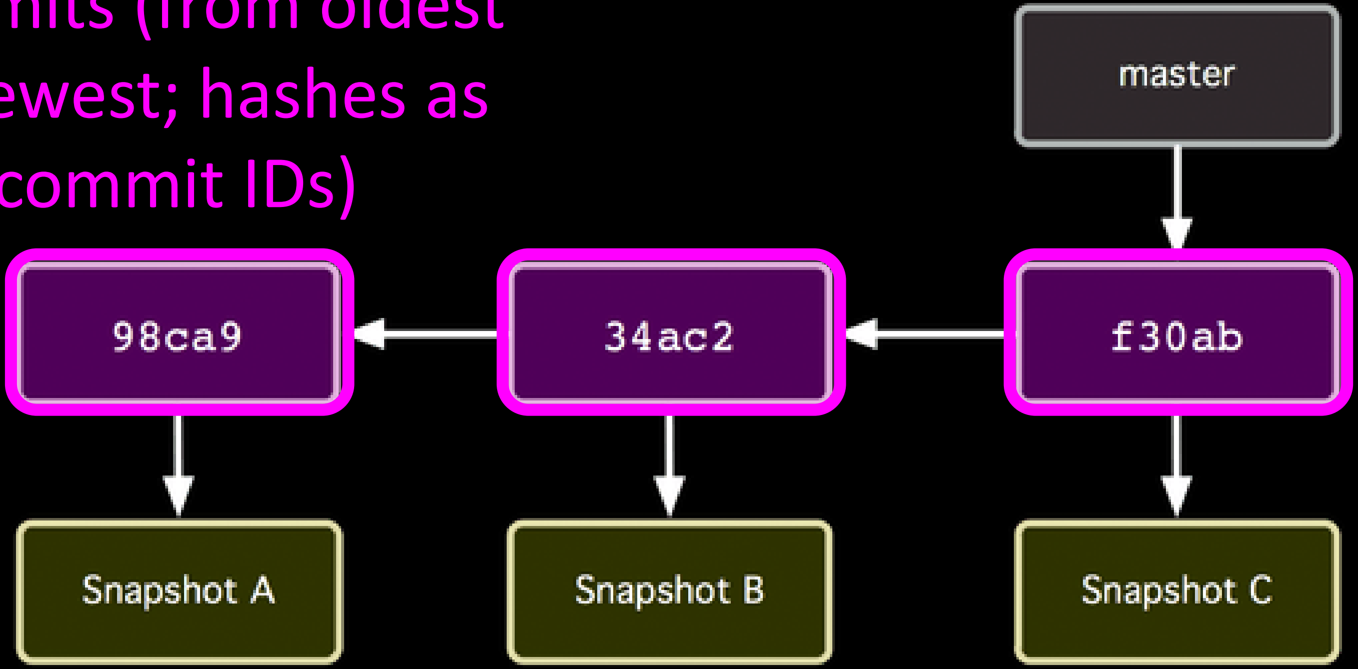
How the repos is organized



http://git-scm.com/book/

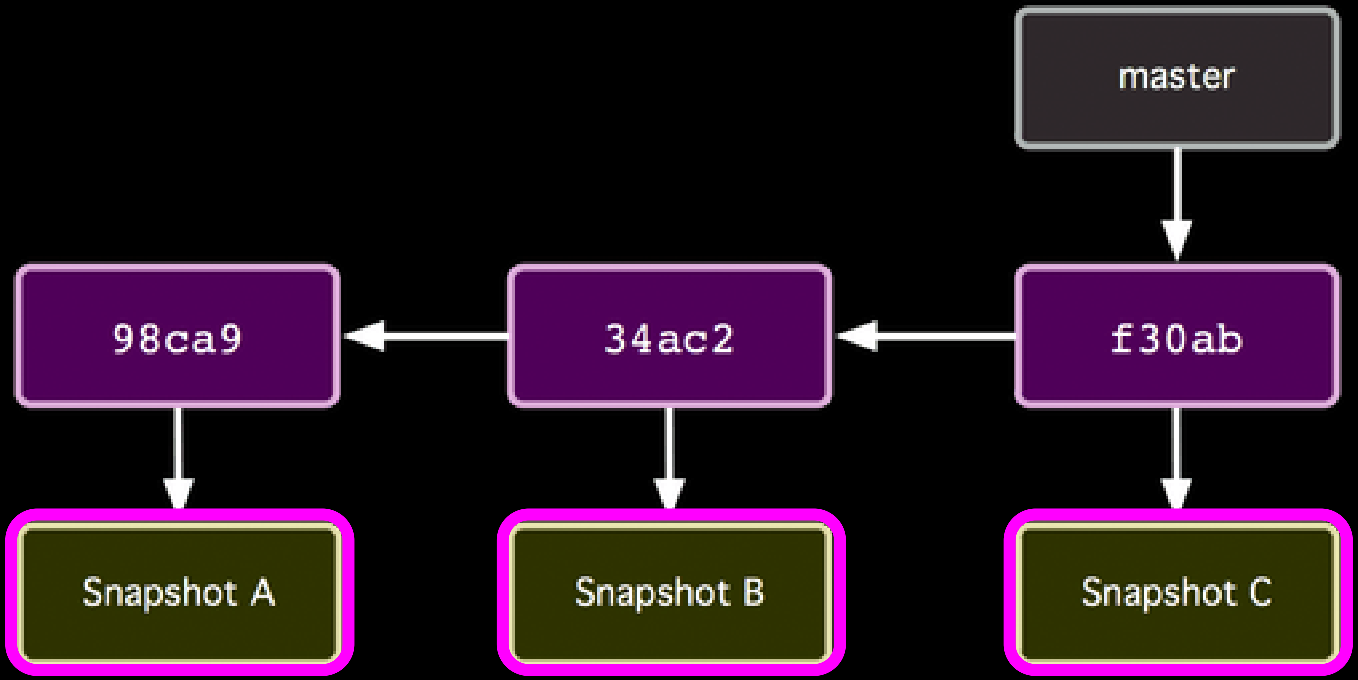
How the repos is organized

Commits (from oldest to newest; hashes as commit IDs)



http://git-scm.com/book/

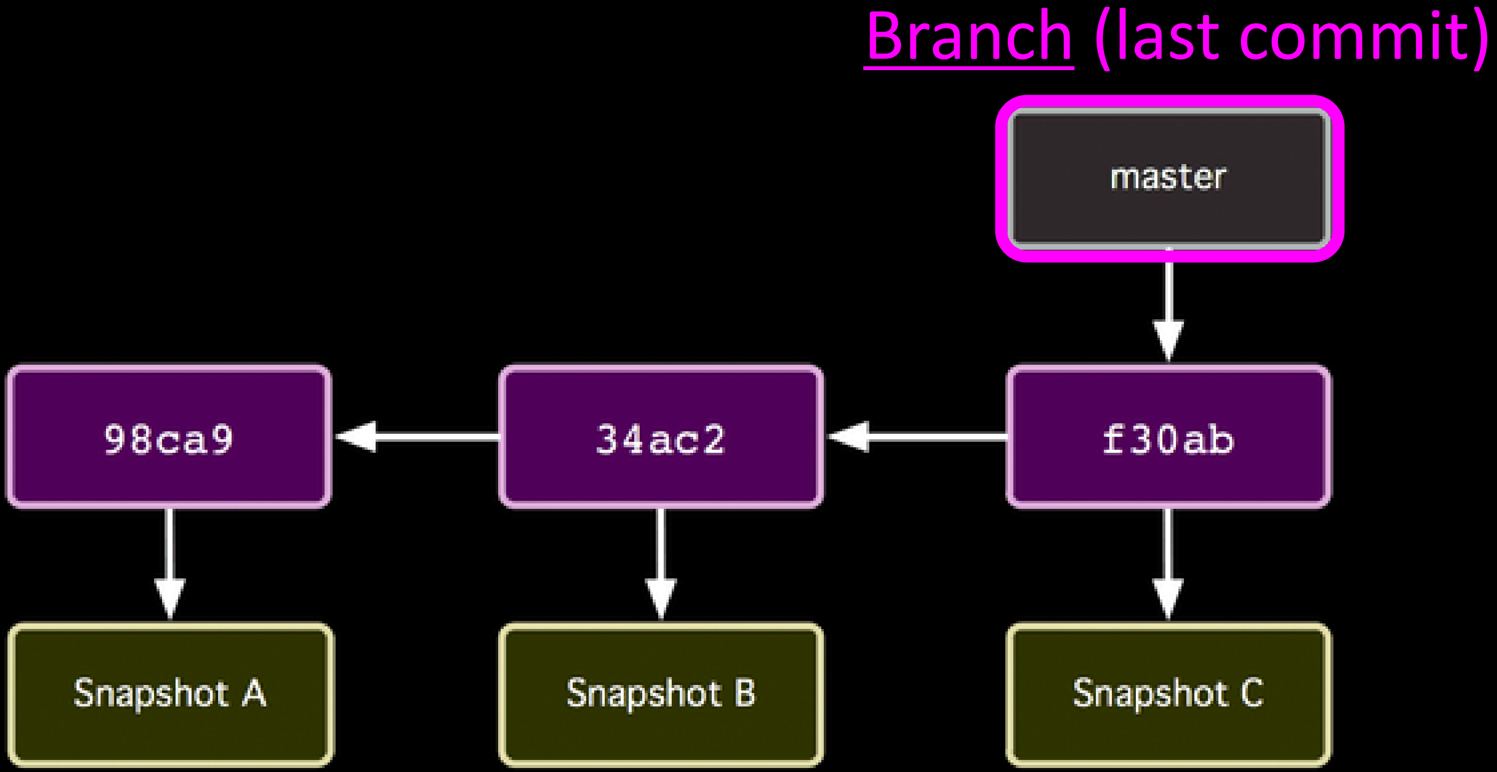
How the repos is organized



Snapshot of all files
at each commit

http://git-scm.com/book/

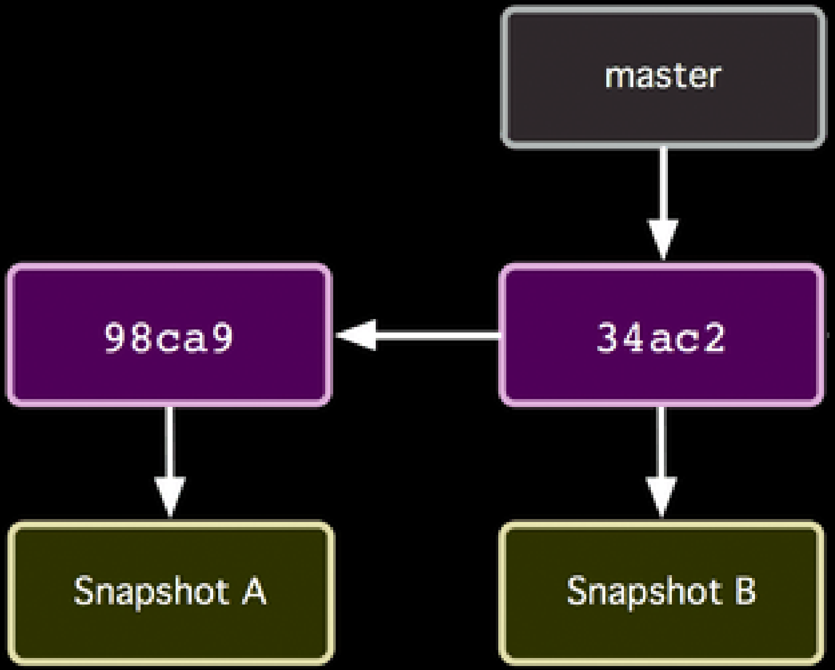
How the repos is organized



http://git-scm.com/book/

How commit works

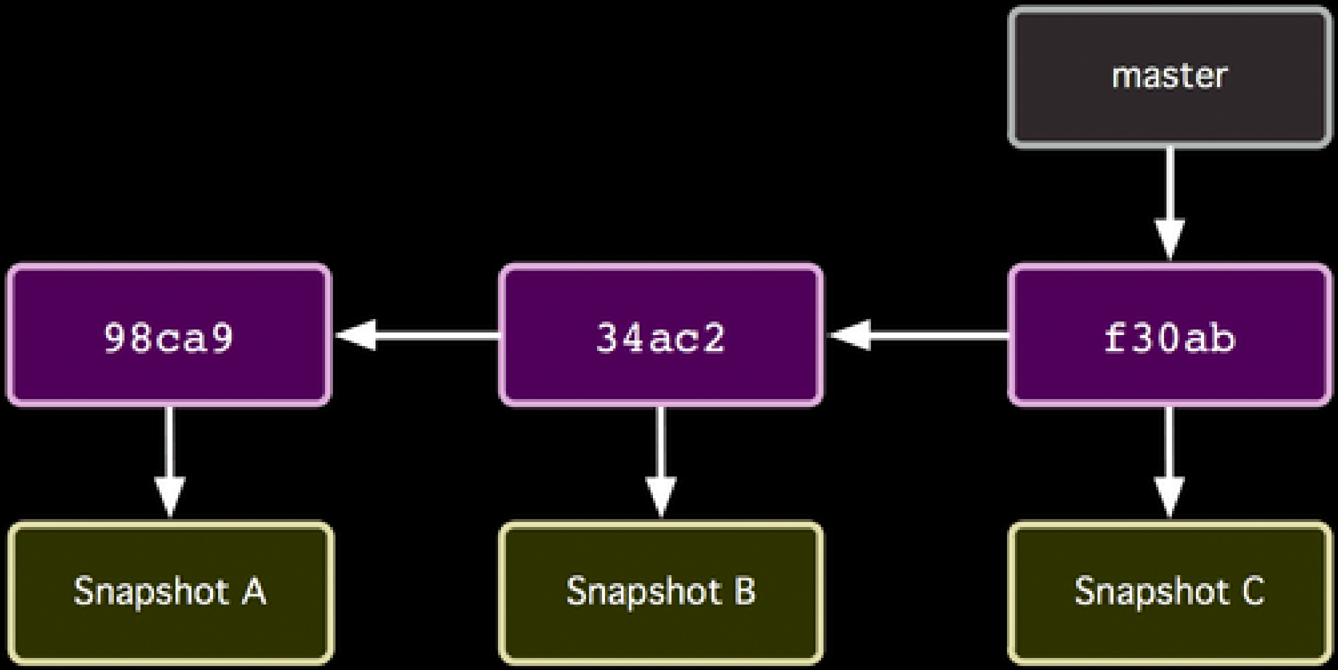
Before



http://git-scm.com/book/

How commit works

After



http://git-scm.com/book/

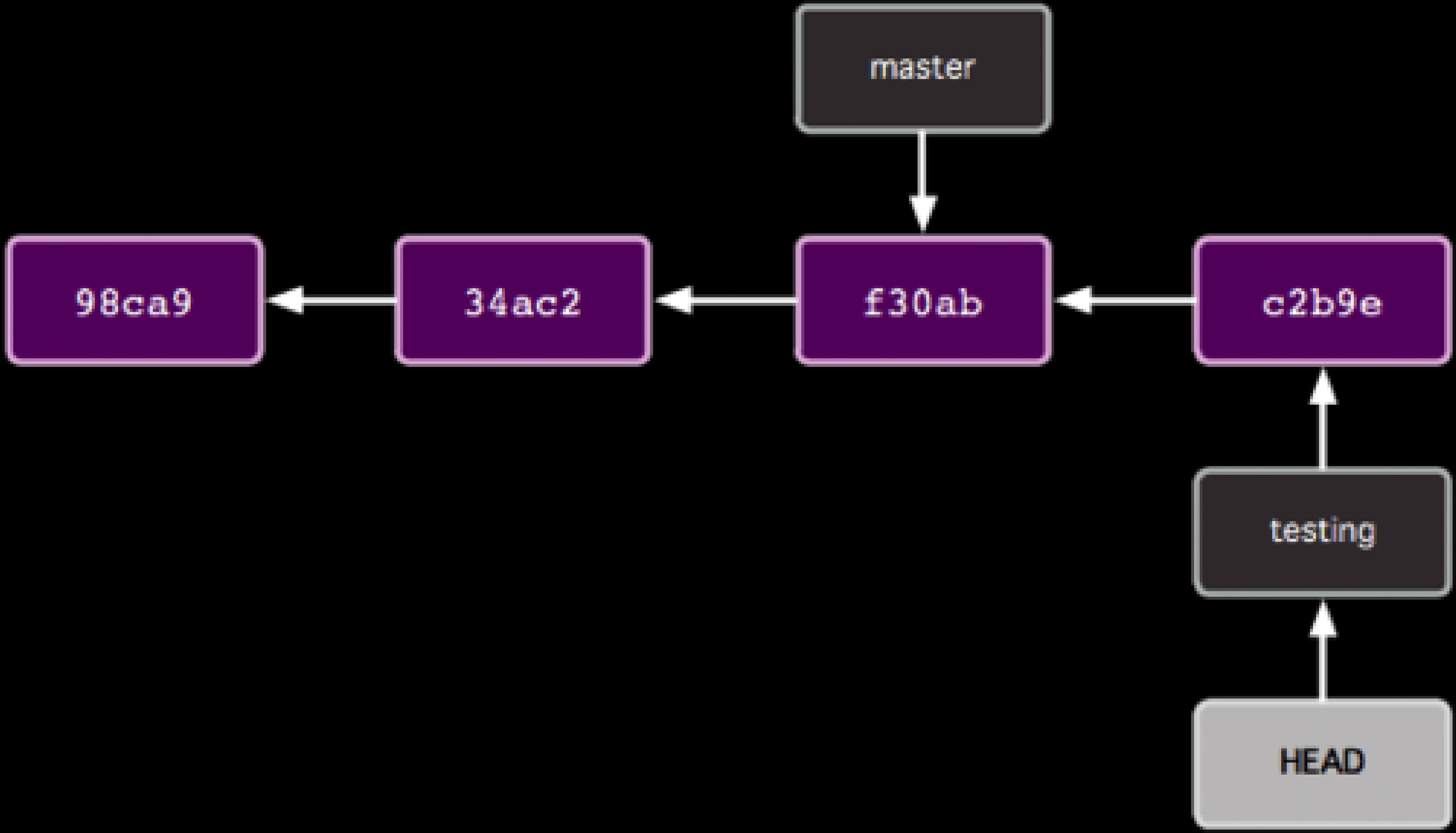
Common Workflow

1. Create temp local branch
2. Checkout temp branch
3. Edit/Add/Commit on temp branch
4. Checkout master branch
5. Pull to update master branch
6. Merge temp branch with updated master
7. Delete temp branch
8. Push to update server repos

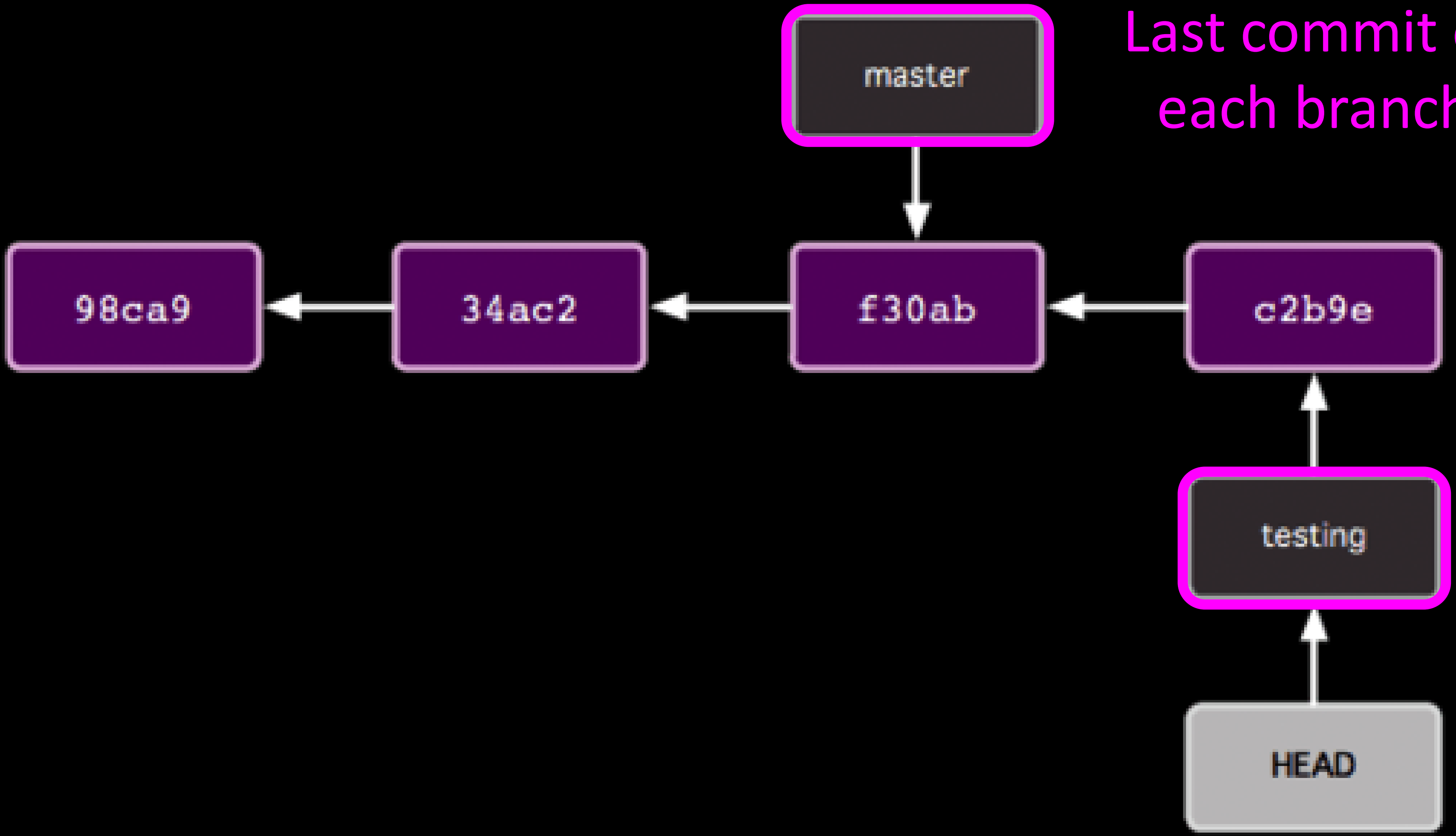
Make changes in local branch

Merge with GitHub repos

Organization with two branches

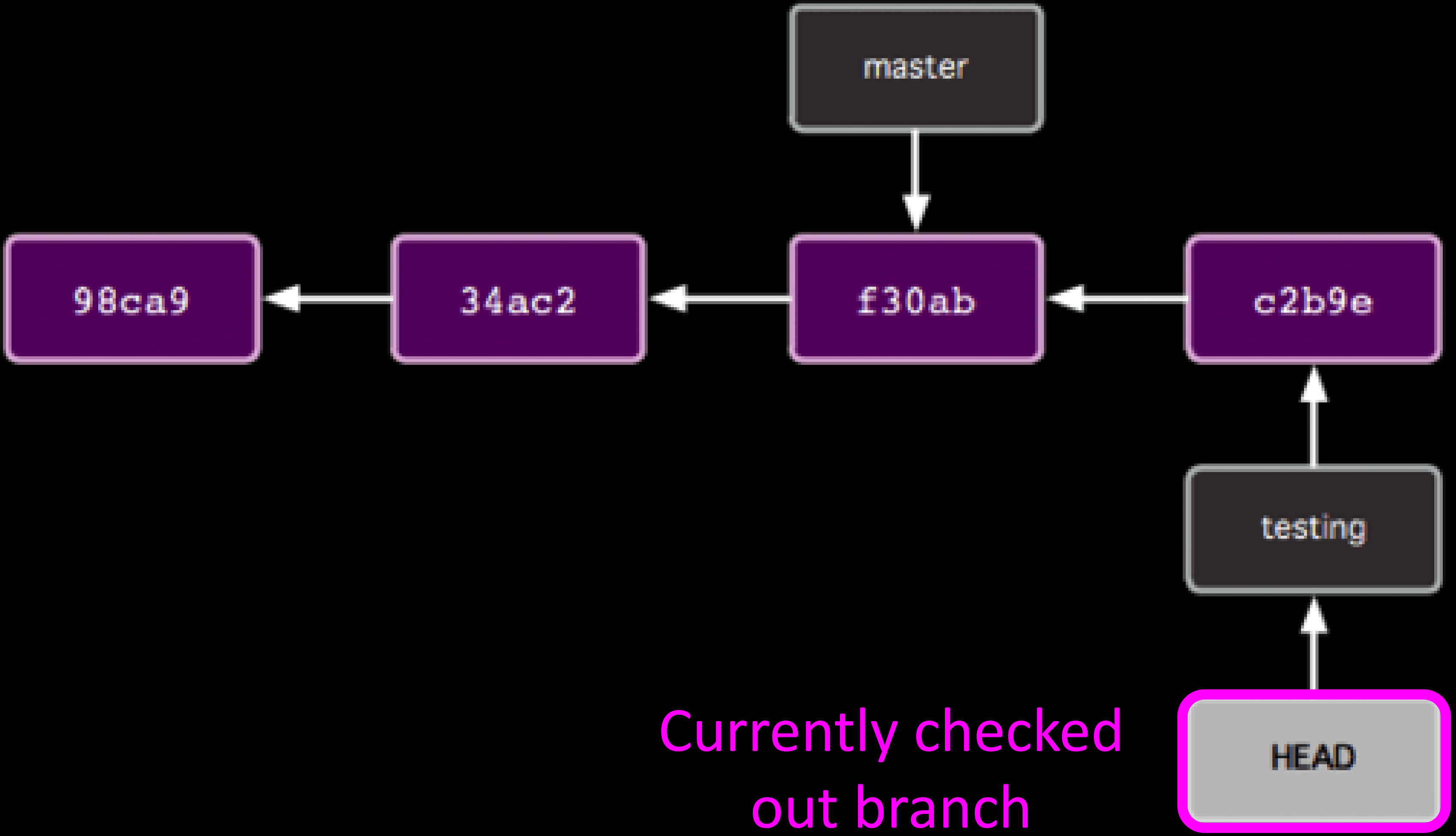


Organization with two branches



Last commit of each branch

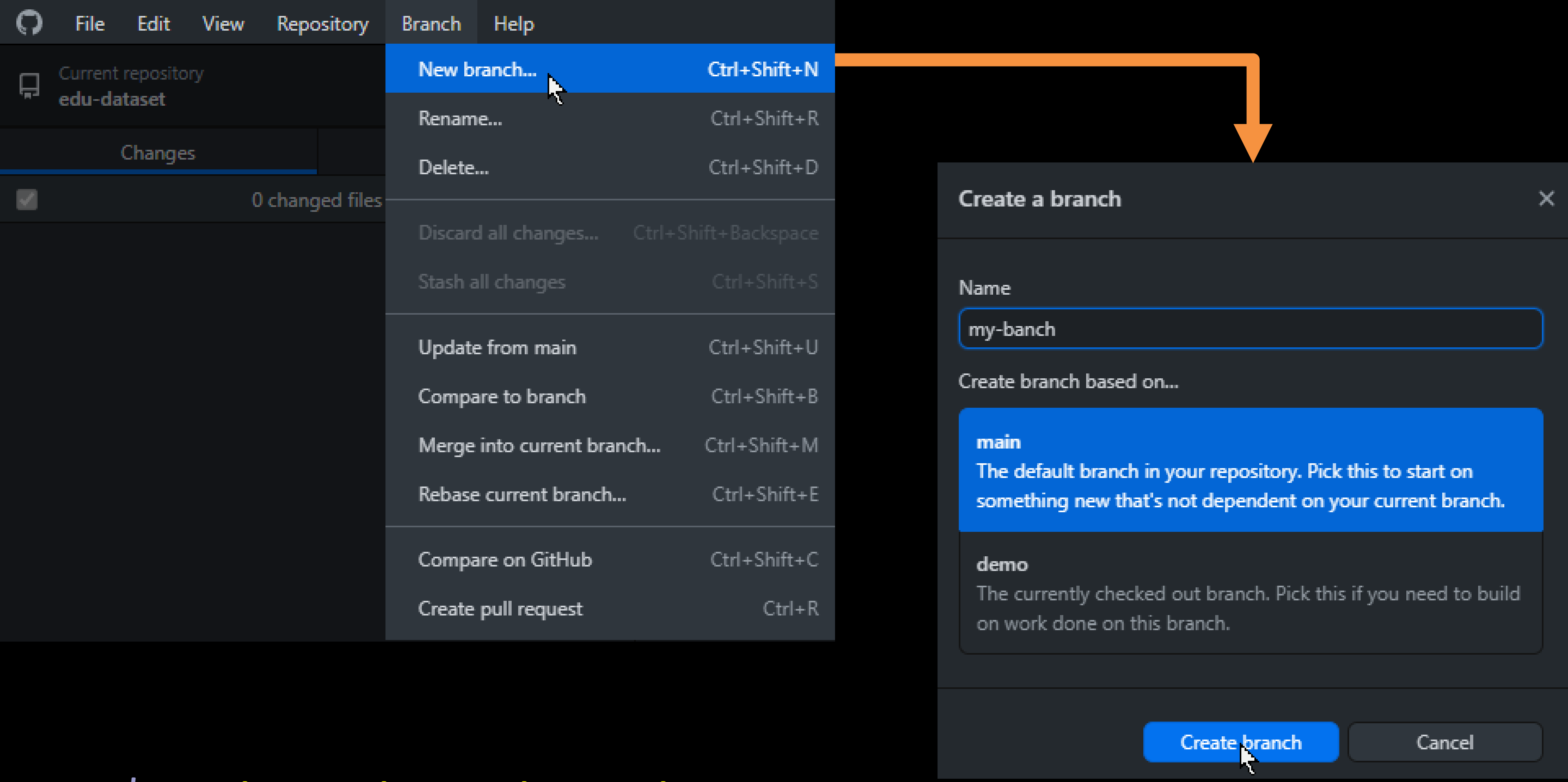
Organization with two branches



Currently checked out branch

Common Workflow

1. Create temp local branch
2. Checkout temp branch
3. Edit/Add/Commit on temp branch
4. Checkout master branch
5. Pull to update master branch
6. Merge temp branch with updated master
7. Delete temp branch
8. Push to update server repos



File
Edit
View
Repository
Branch
Help
Current repository
edu-dataset
Changes
0 changed files
New branch... Ctrl+Shift+N
Rename... Ctrl+Shift+R
Delete... Ctrl+Shift+D
Discard all changes... Ctrl+Shift+Backspace
Stash all changes Ctrl+Shift+S
Update from main Ctrl+Shift+U
Compare to branch Ctrl+Shift+B
Merge into current branch... Ctrl+Shift+M
Rebase current branch... Ctrl+Shift+E
Compare on GitHub Ctrl+Shift+C
Create pull request Ctrl+R
Create a branch
Create branch
Cancel

Name: my-banch

Create branch based on...

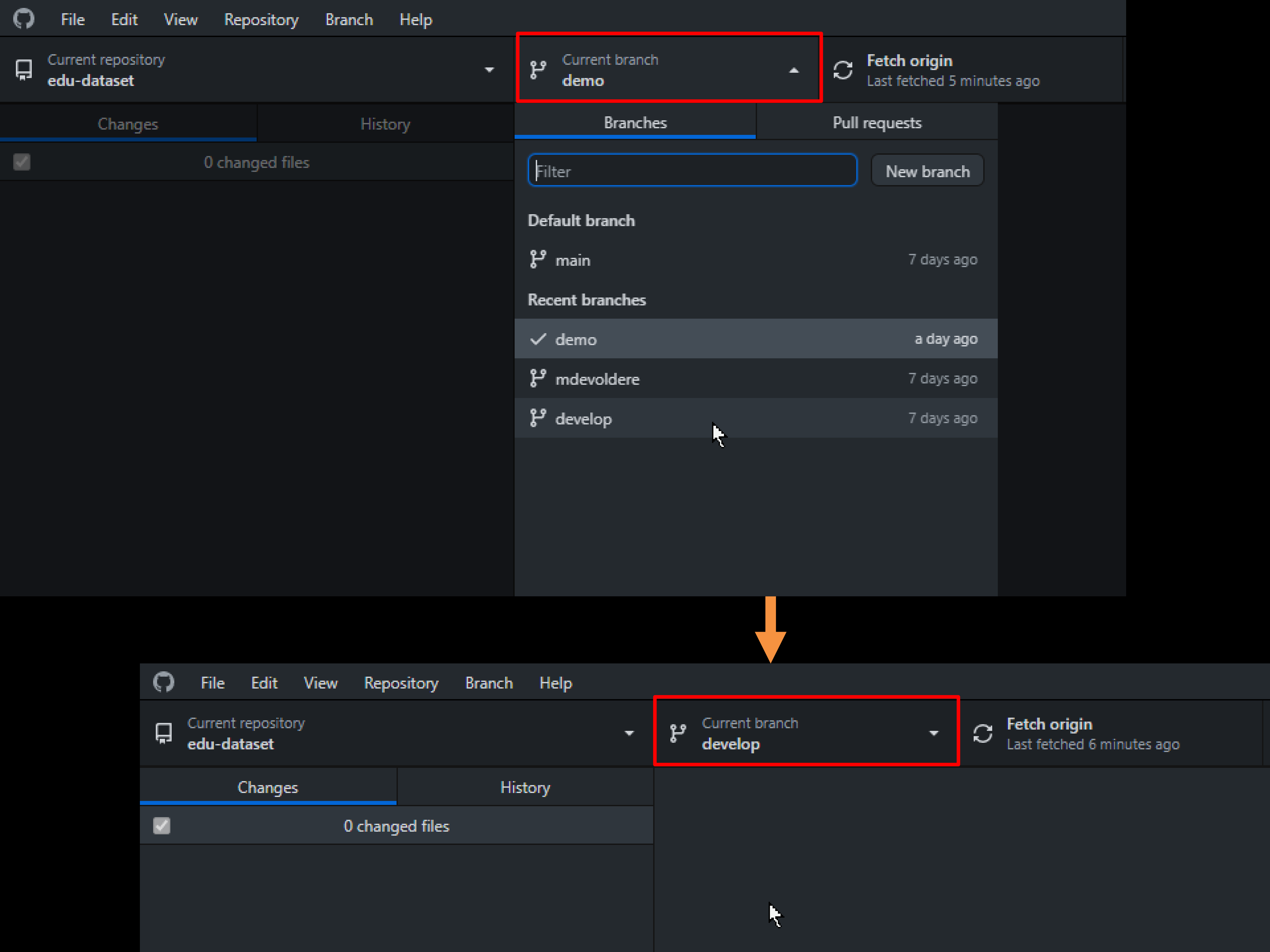
main
The default branch in your repository. Pick this to start on something new that's not dependent on your current branch.

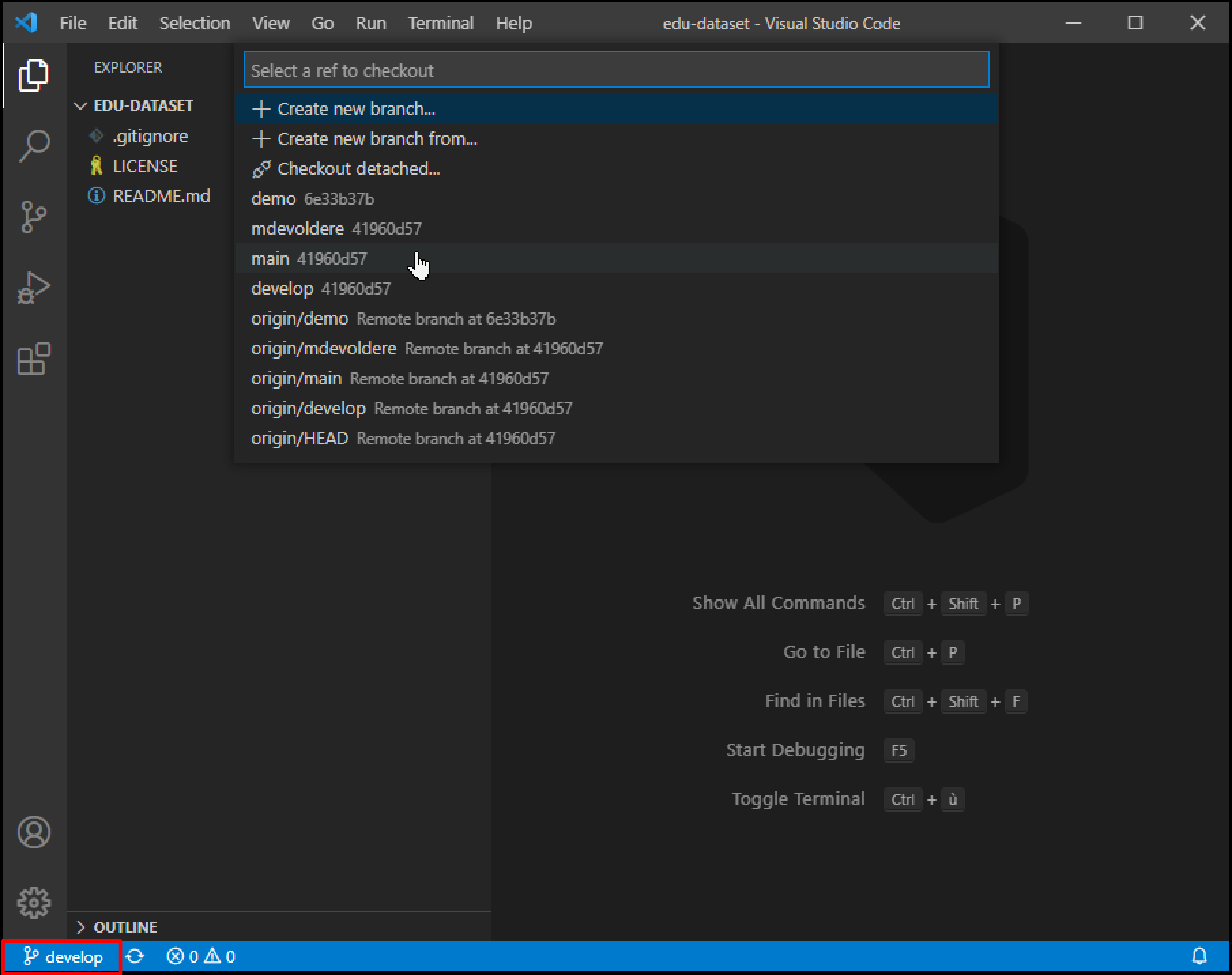
demo
The currently checked out branch. Pick this if you need to build on work done on this branch.

```
$ git branch my-branch
$ git checkout my-branch
```

ou

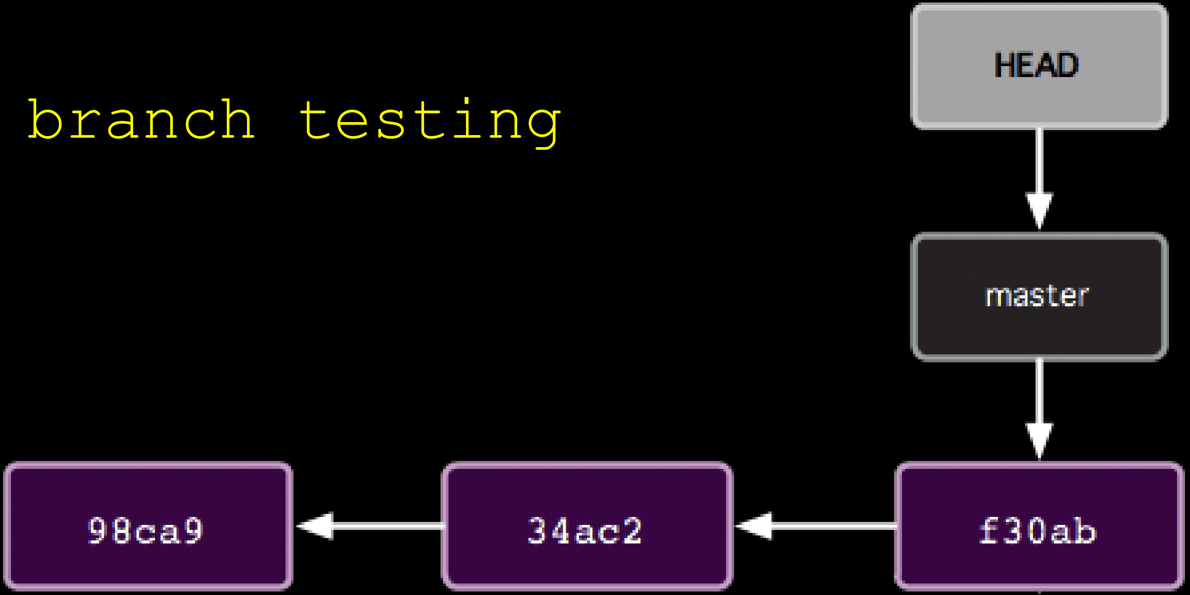
```
$ git checkout –b my-banch
```


File
Edit
View
Repository
Branch
Help
Current repository
edu-dataset
Current branch
demo
Fetch origin
Last fetched 5 minutes ago
Changes
History
0 changed files
Branches
Pull requests
Filter
New branch
Default branch
main
7 days ago
Recent branches
✓ demo
a day ago
mdevoldere
7 days ago
develop
7 days ago
File
Edit
View
Repository
Branch
Help
Current repository
edu-dataset
Current branch
develop
Fetch origin
Last fetched 6 minutes ago
Changes
History
0 changed files


File
Edit
Selection
View
Go
Run
Terminal
Help
edu-dataset - Visual Studio Code
EXPLORER
EDU-DATASET
.gitignore
LICENSE
README.md
OUTLINE
Select a ref to checkout
+ Create new branch...
+ Create new branch from...
Checkout detached...
demo 6e33b37b
mdevoldere 41960d57
main 41960d57
develop 41960d57
origin/demo Remote branch at 6e33b37b
origin/mdevoldere Remote branch at 41960d57
origin/main Remote branch at 41960d57
origin/develop Remote branch at 41960d57
origin/HEAD Remote branch at 41960d57
Show All Commands Ctrl + Shift + P
Go to File Ctrl + P
Find in Files Ctrl + Shift + F
Start Debugging F5
Toggle Terminal Ctrl + ù
develop
⊗ 0 ⚠ 0

How git branch works

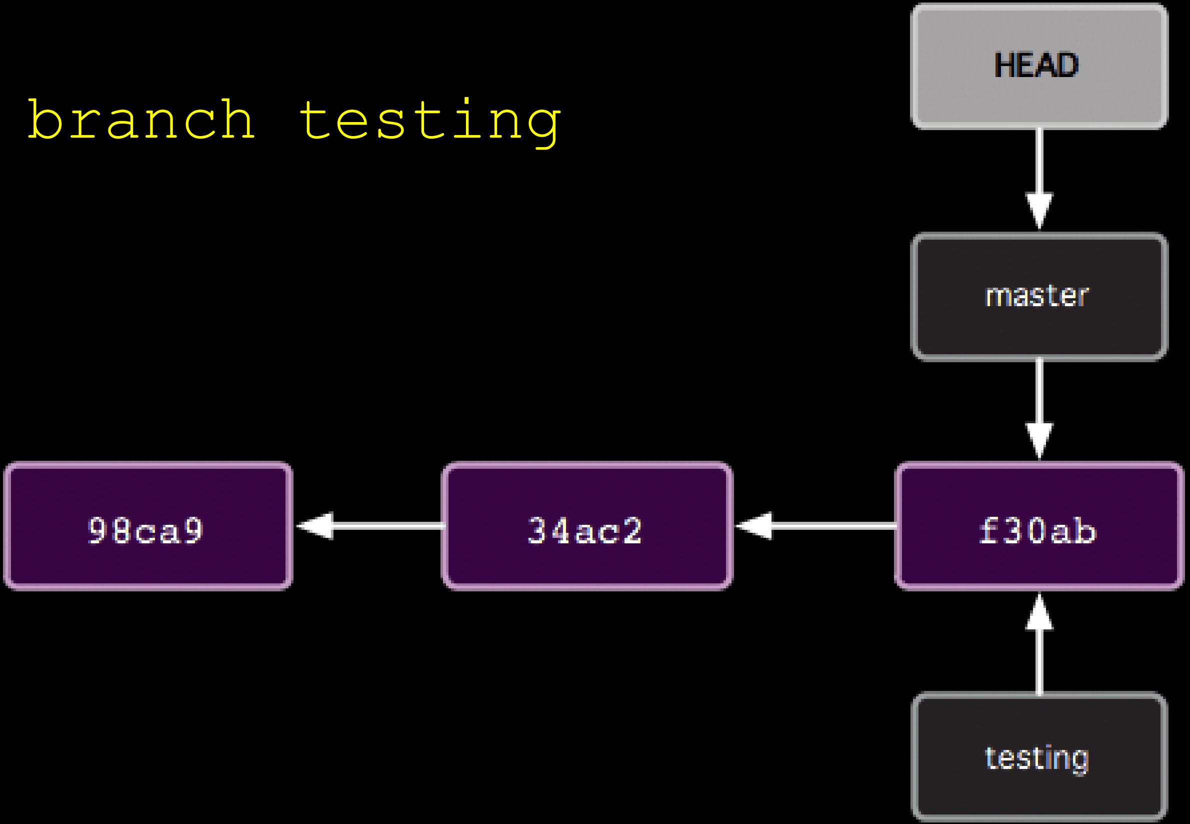
```
$ git branch testing
```



Before

How git branch works

```
$ git branch testing
```



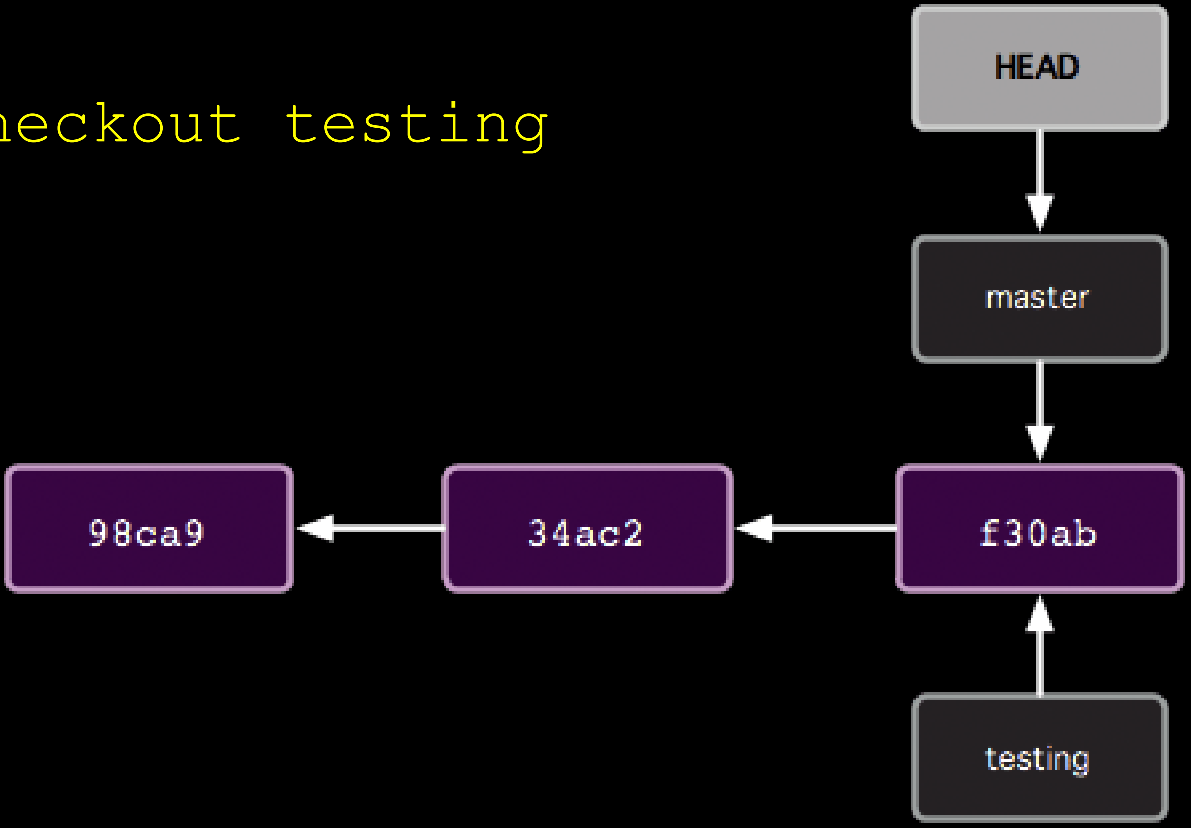
After

Common Workflow

1. Create temp local branch
2. Checkout temp branch
3. Edit/Add/Commit on temp branch
4. Checkout master branch
5. Pull to update master branch
6. Merge temp branch with updated master
7. Delete temp branch
8. Push to update server repos

How git checkout works

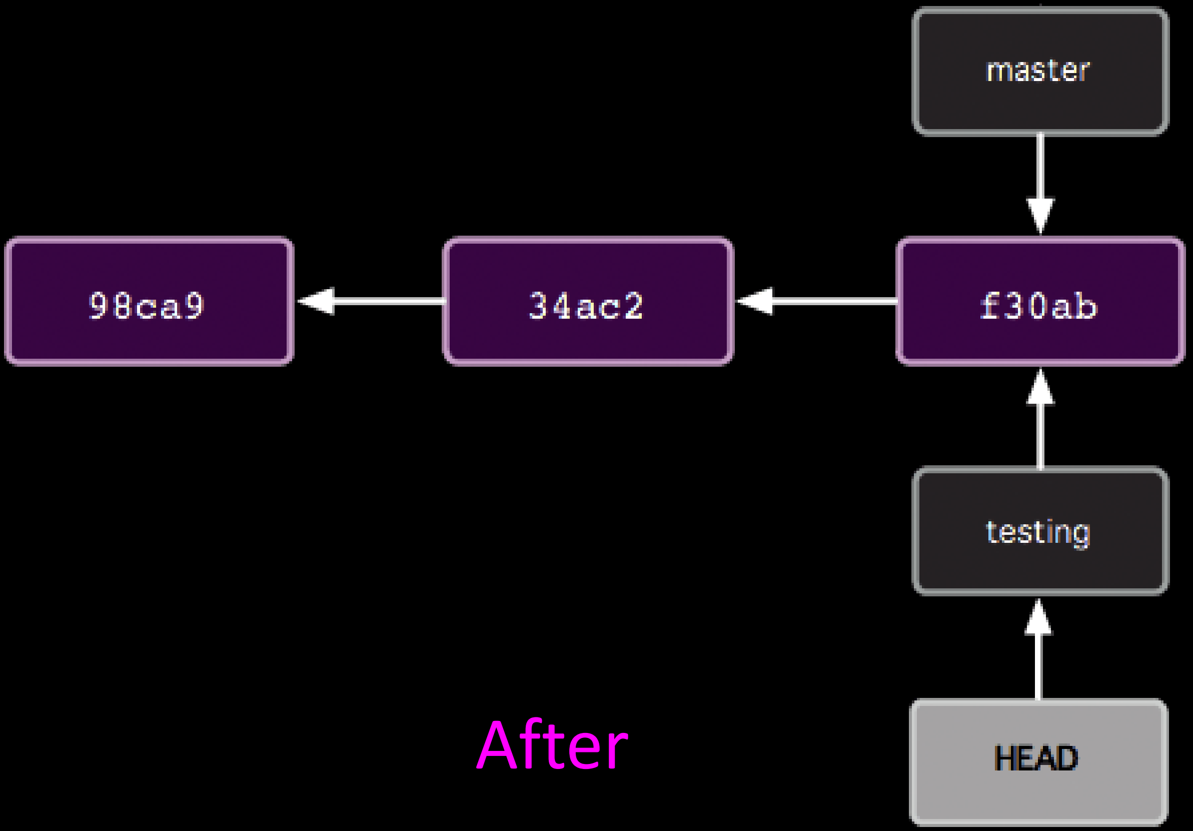
```
$ git checkout testing
```



Before

How git checkout works

```
$ git checkout testing
```



After

Common Workflow

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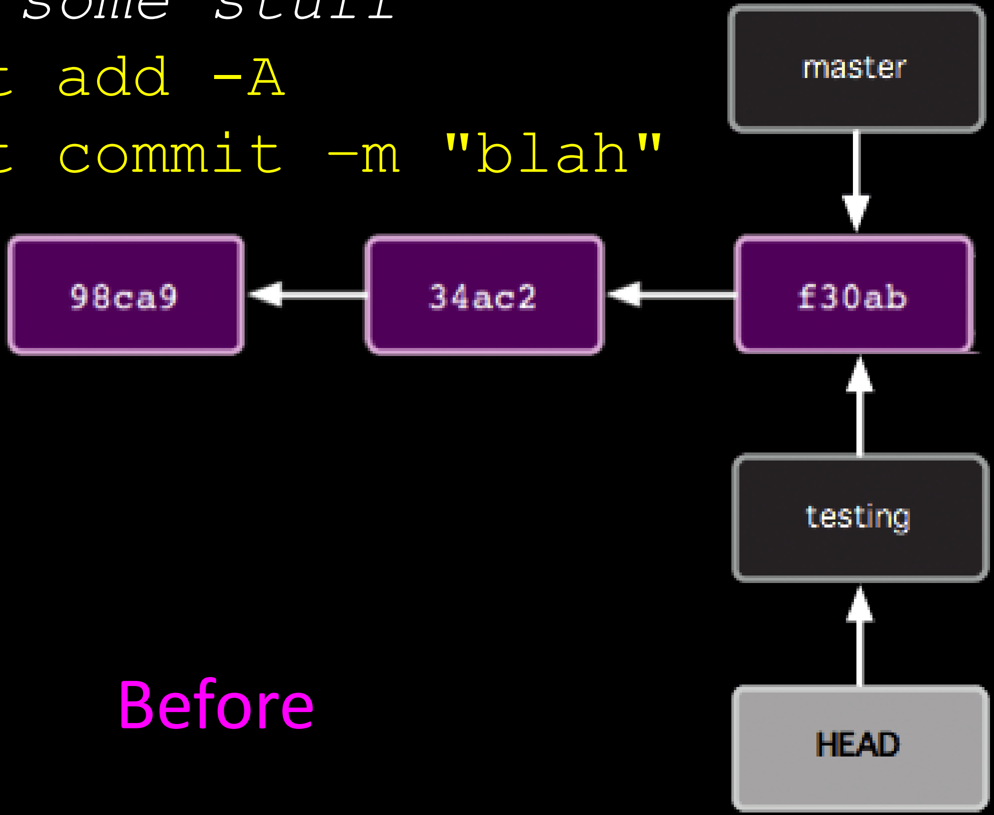
2. Checkout temp branch
3. Edit/Add/Commit on temp branch
4. Checkout master branch
5. Pull to update master branch
6. Merge temp branch with updated master
7. Delete temp branch
8. Push to update server repos

How git commit works with multiple branches

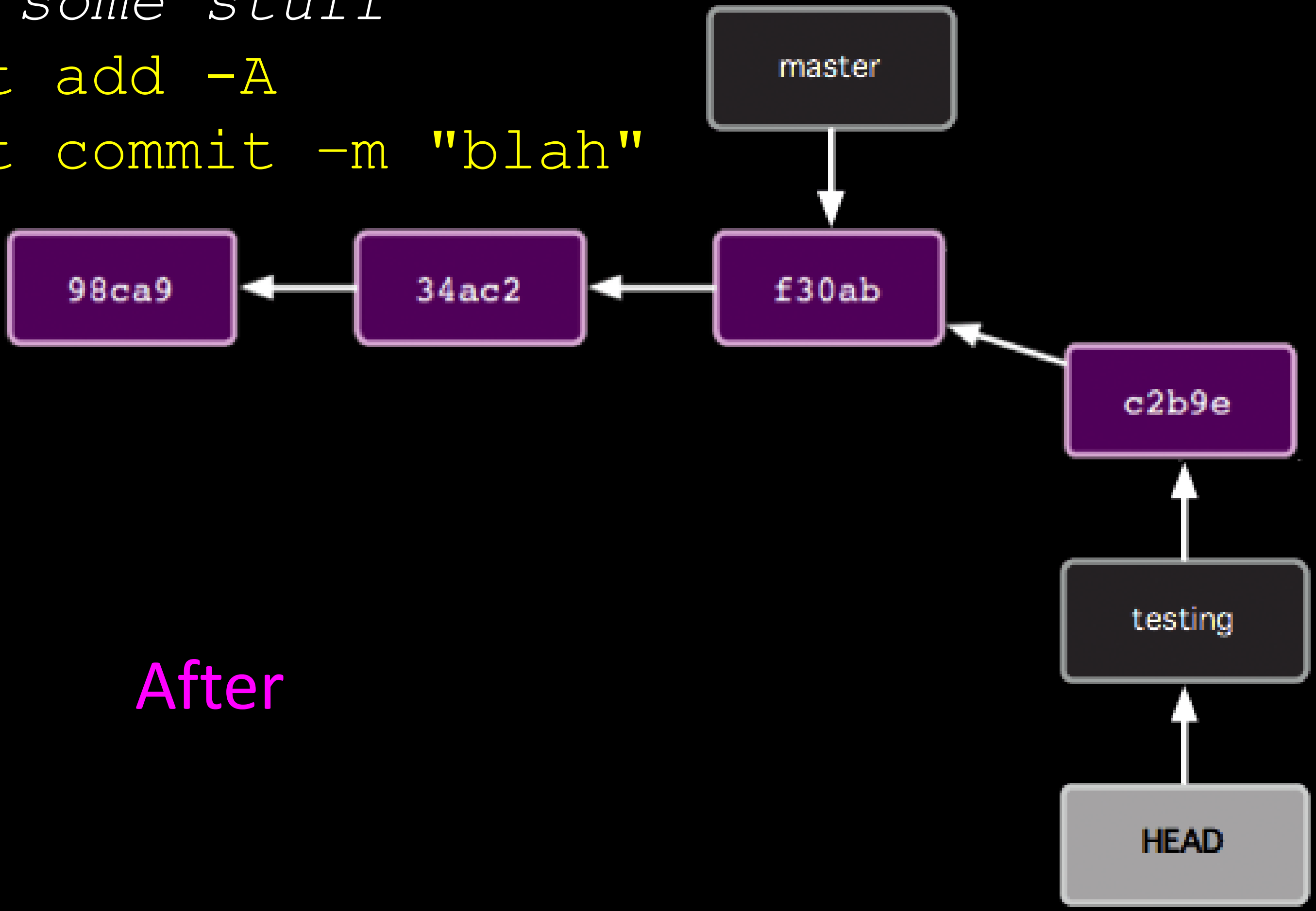
```
Edit some stuff
$ git add -A
$ git commit -m "blah"
```



Before

How git commit works with multiple branches

```
Edit some stuff
$ git add -A
$ git commit -m "blah"
```



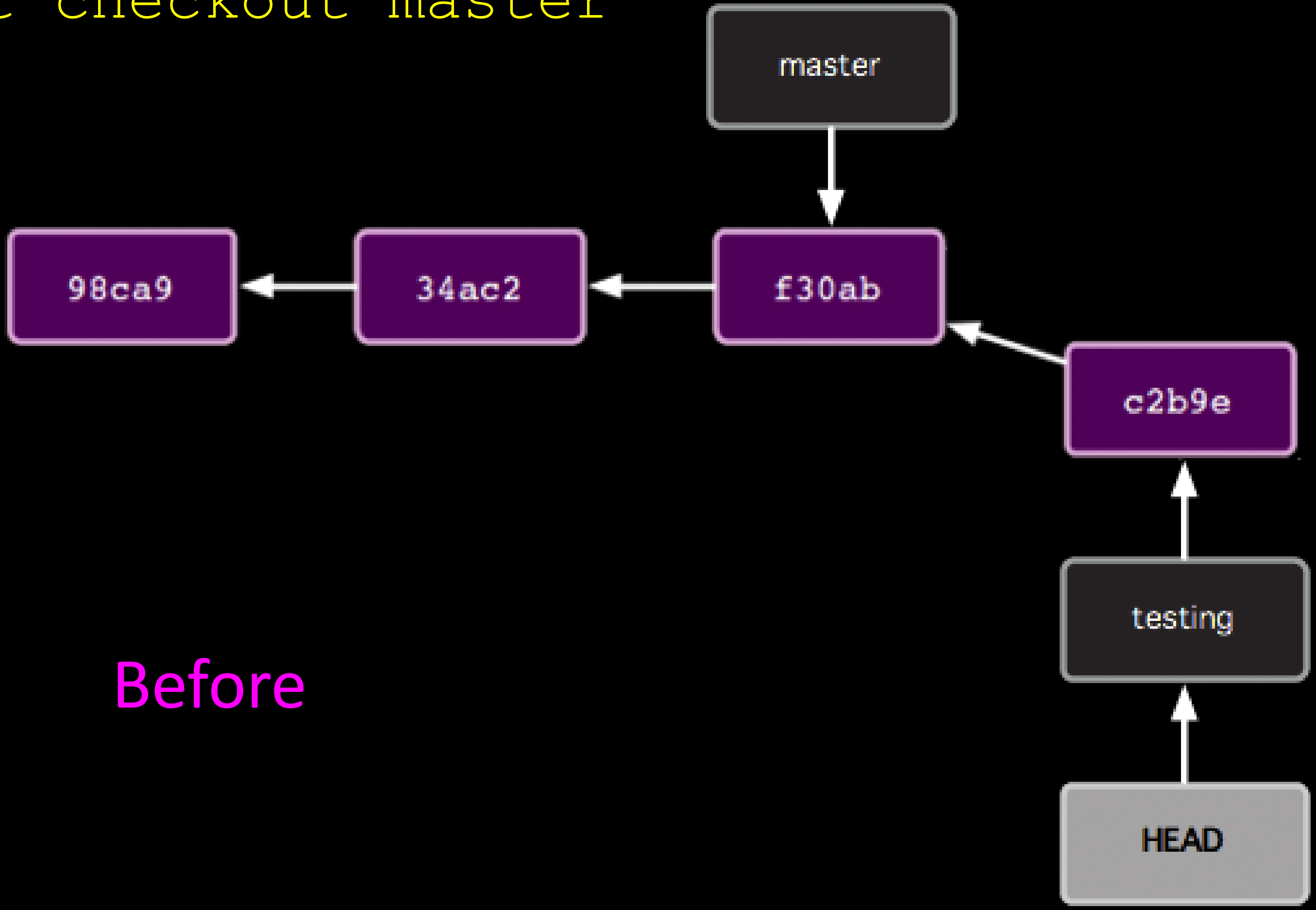
After

Common Workflow

1. Create temp local branch
2. Checkout temp branch
3. Edit/Add/Commit on temp branch
4. Checkout master branch
5. Pull to update master branch
6. Merge temp branch with updated master
7. Delete temp branch
8. Push to update server repos

How git checkout works

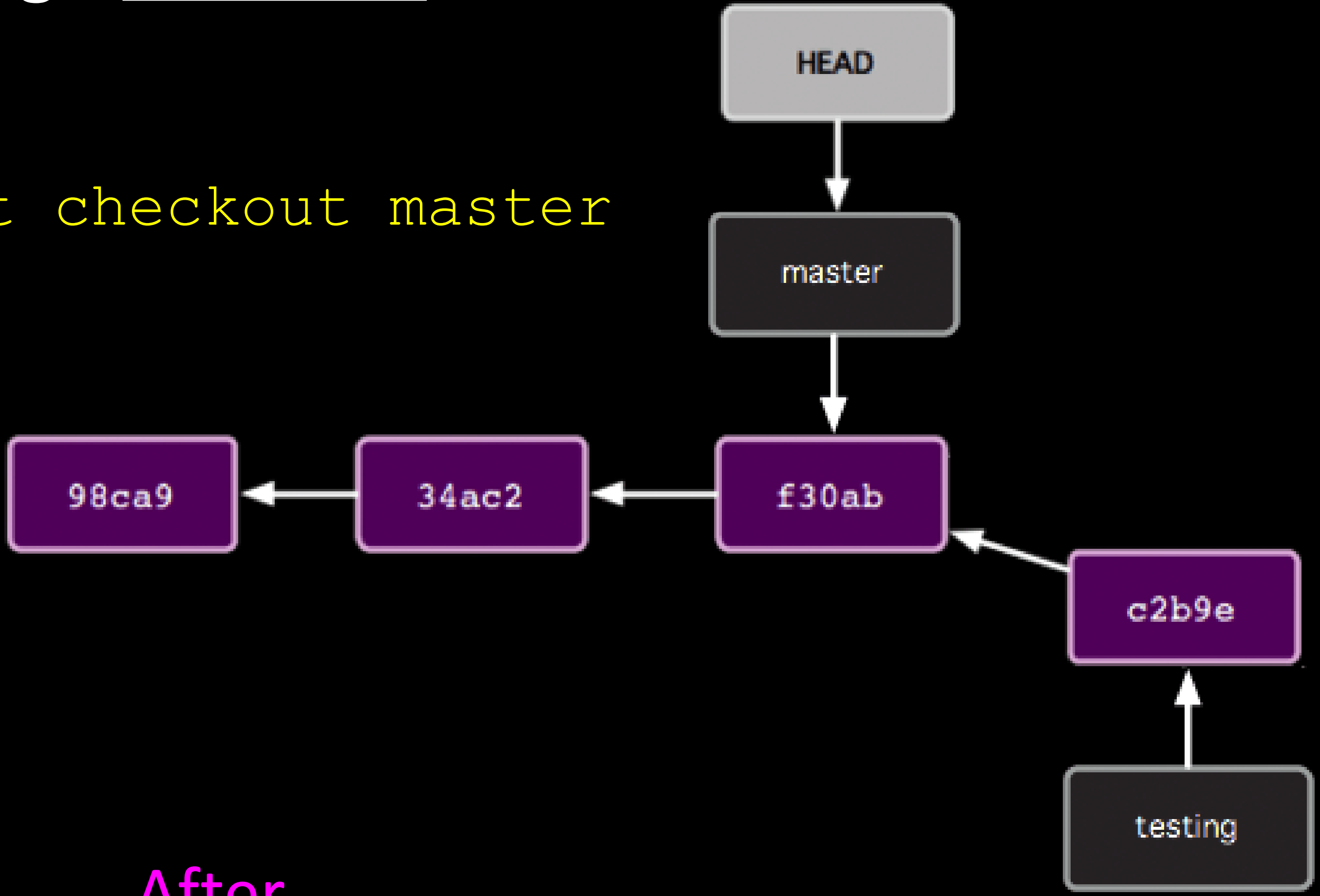
```
$ git checkout master
```



Before

How git checkout works

```
$ git checkout master
```



After

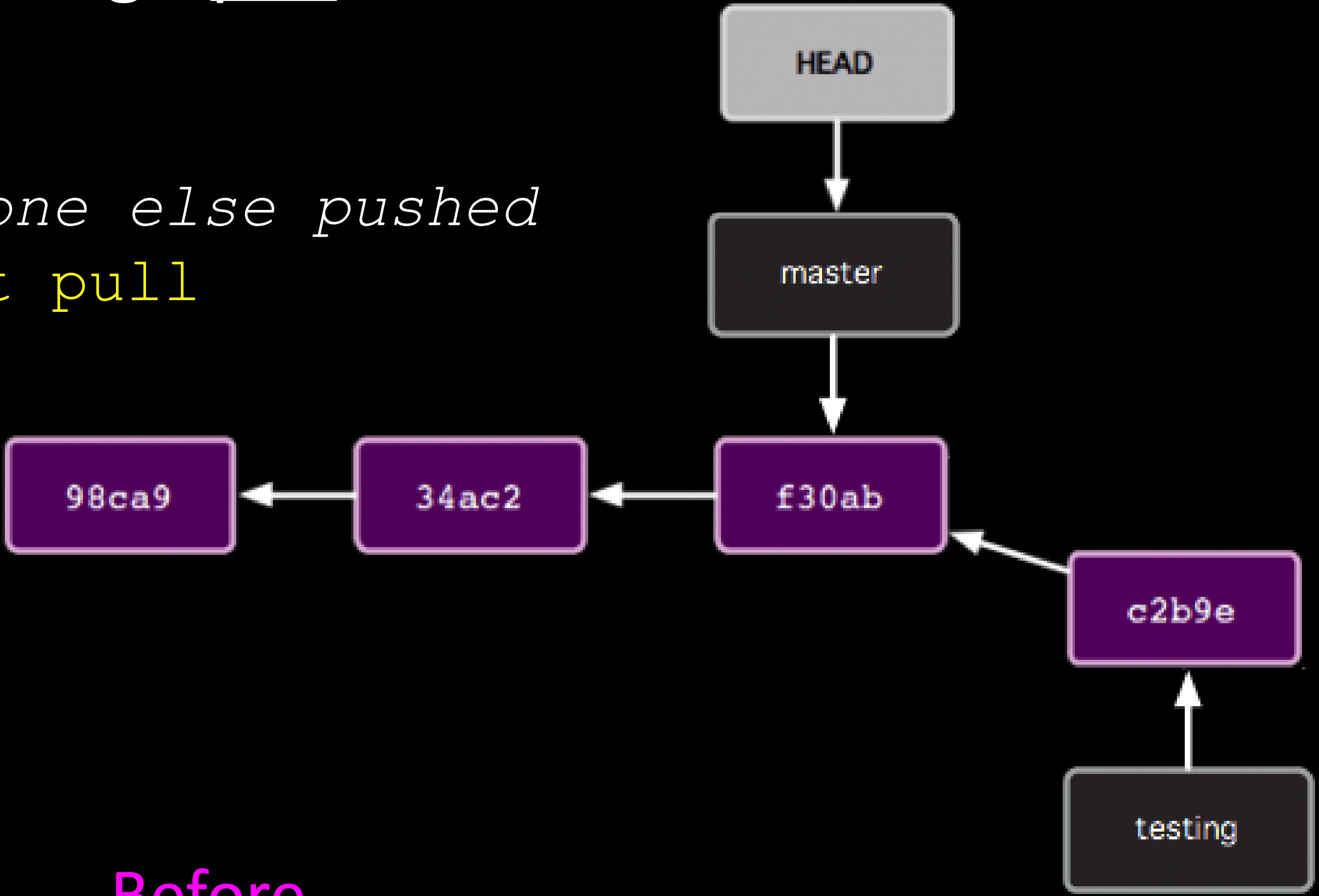
Common Workflow

1. Create temp local branch
2. Checkout temp branch
3. Edit/Add/Commit on temp branch
4. Checkout master branch
5. Pull to update master branch
6. Merge temp branch with updated master
7. Delete temp branch
8. Push to update server repos

How git pull works

Someone else pushed

```
$ git pull
```

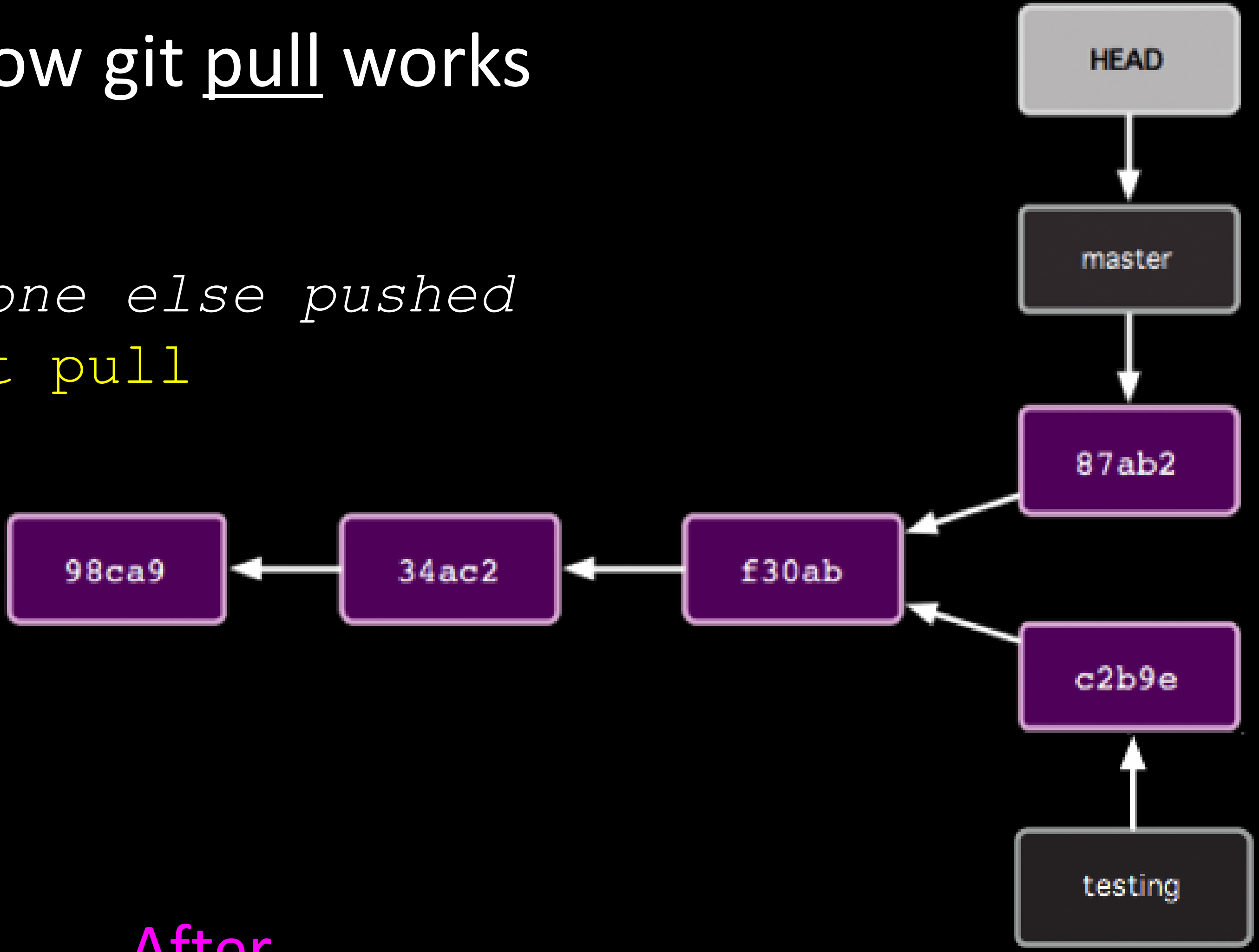


Before

How git pull works

Someone else pushed

```
$ git pull
```



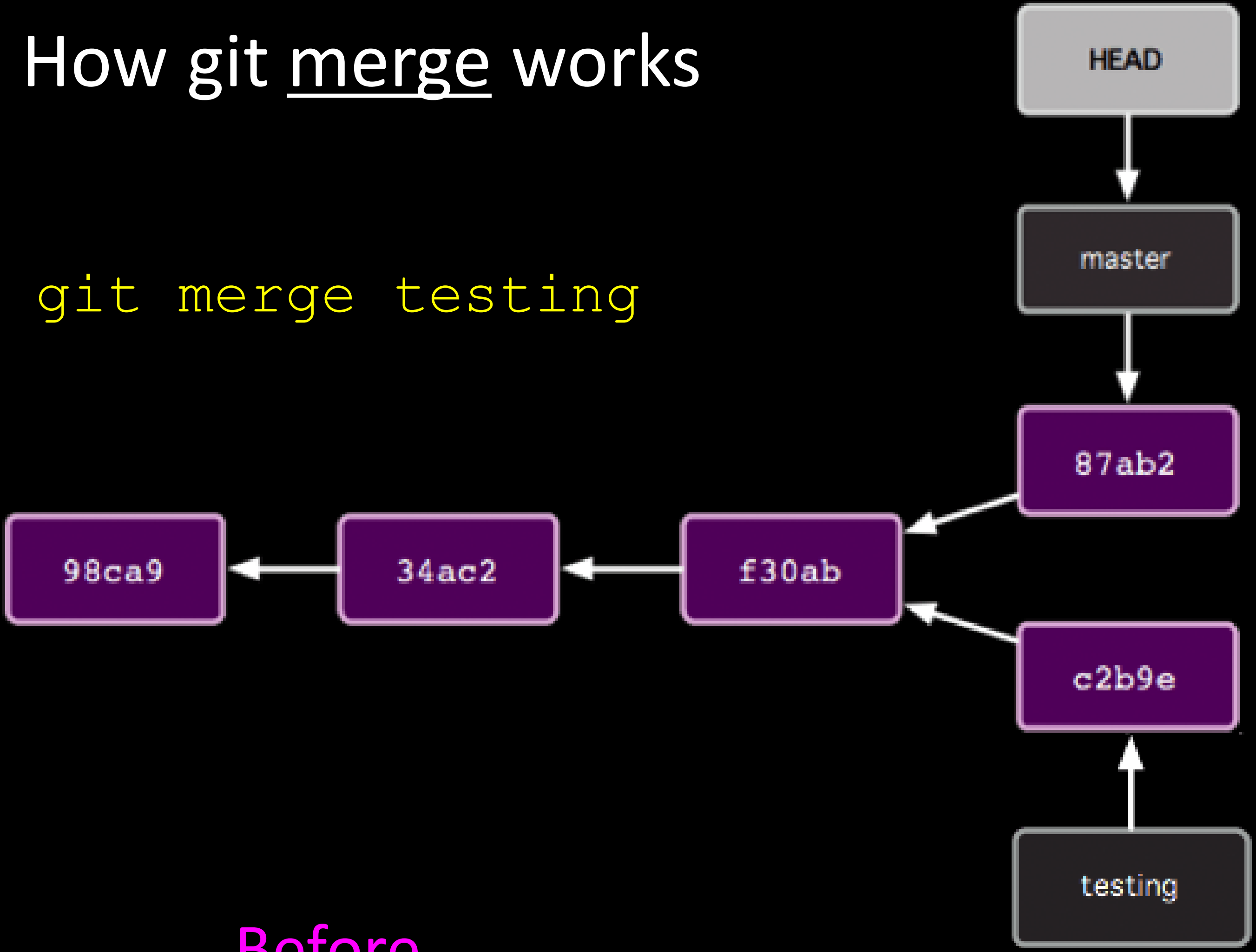
After

Common Workflow

1. Create temp local branch
2. Checkout temp branch
3. Edit/Add/Commit on temp branch
4. Checkout master branch
5. Pull to update master branch
6. Merge temp branch with updated master
7. Delete temp branch
8. Push to update server repos

How git merge works

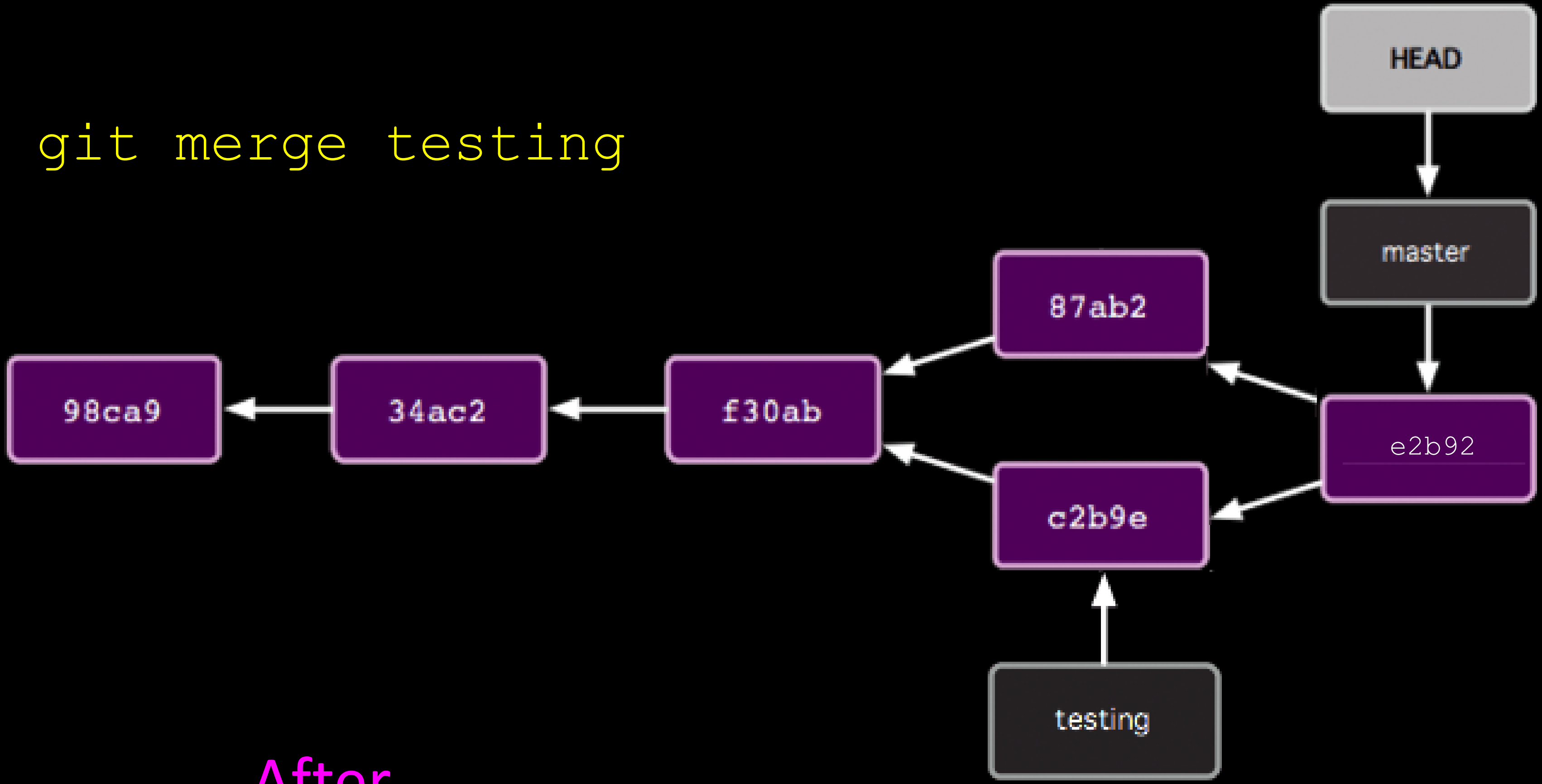
```
$ git merge testing
```



Before

How git merge works

```
$ git merge testing
```



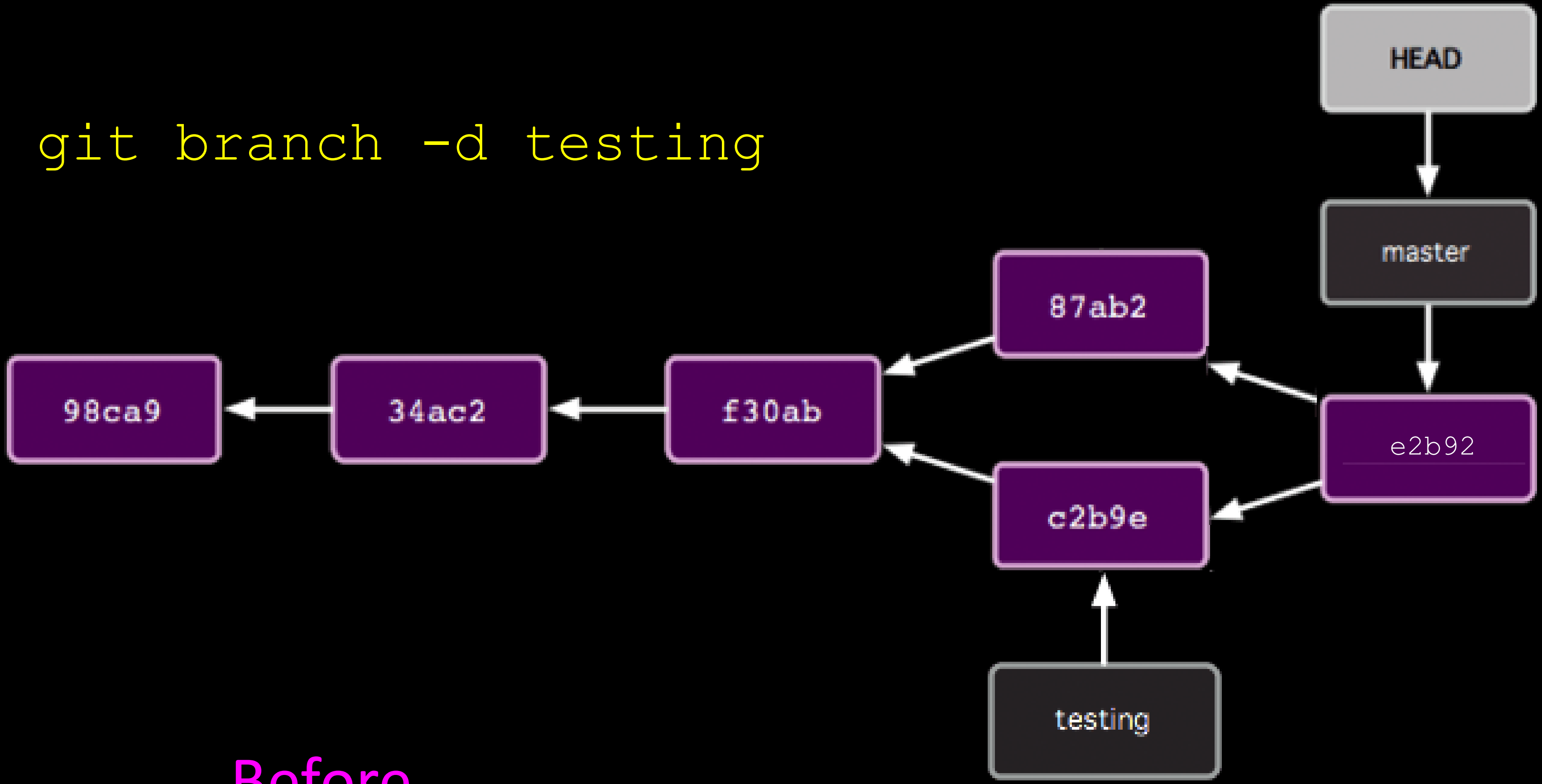
After

Common Workflow

1. Create temp local branch
2. Checkout temp branch
3. Edit/Add/Commit on temp branch
4. Checkout master branch
5. Pull to update master branch
6. Merge temp branch with updated master
7. Delete temp branch
8. Push to update server repos

How to delete branches

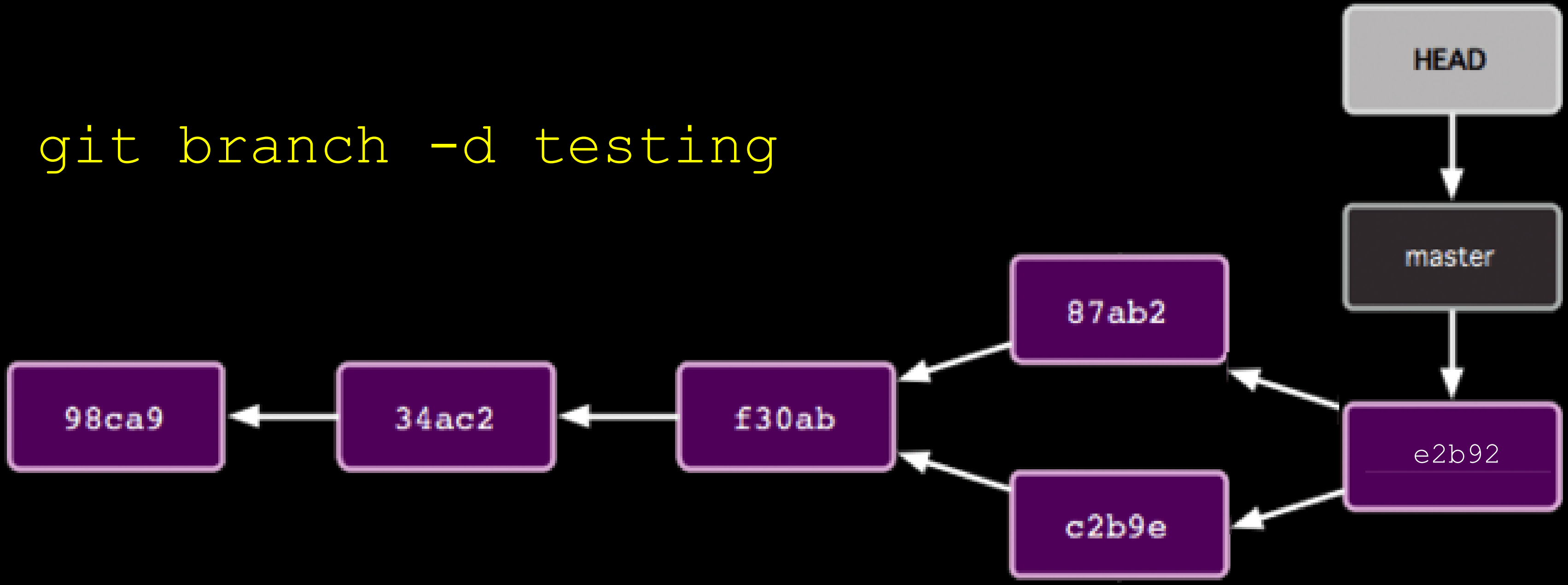
```
$ git branch -d testing
```



Before

How to delete branches

```
$ git branch -d testing
```



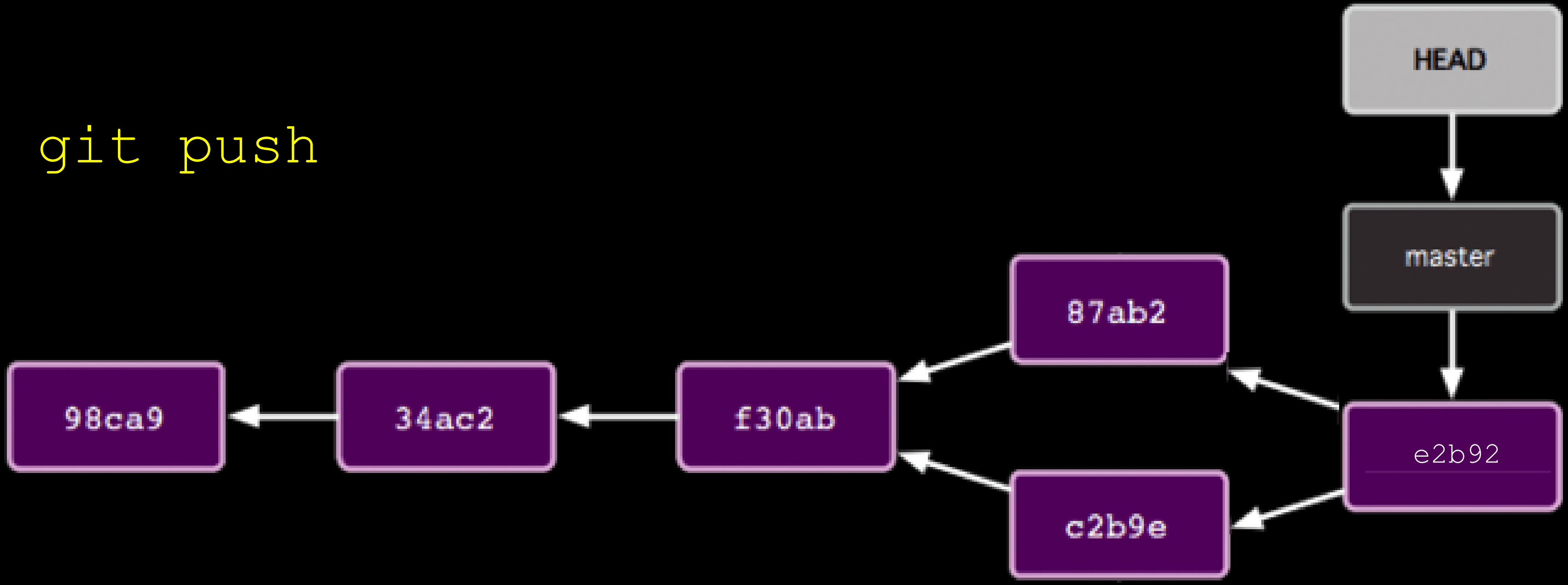
After

Common Workflow

1. Create temp local branch
2. Checkout temp branch
3. Edit/Add/Commit on temp branch
4. Checkout master branch
5. Pull to update master branch
6. Merge temp branch with updated master
7. Delete temp branch
8. Push to update server repos

How git push works

```
$ git push
```



Should update server repos
(if no one else has pushed commits to master branch since last pull)

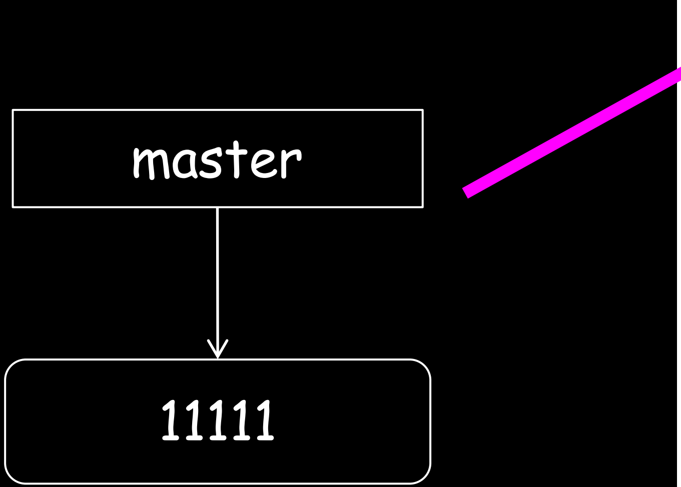
Tips

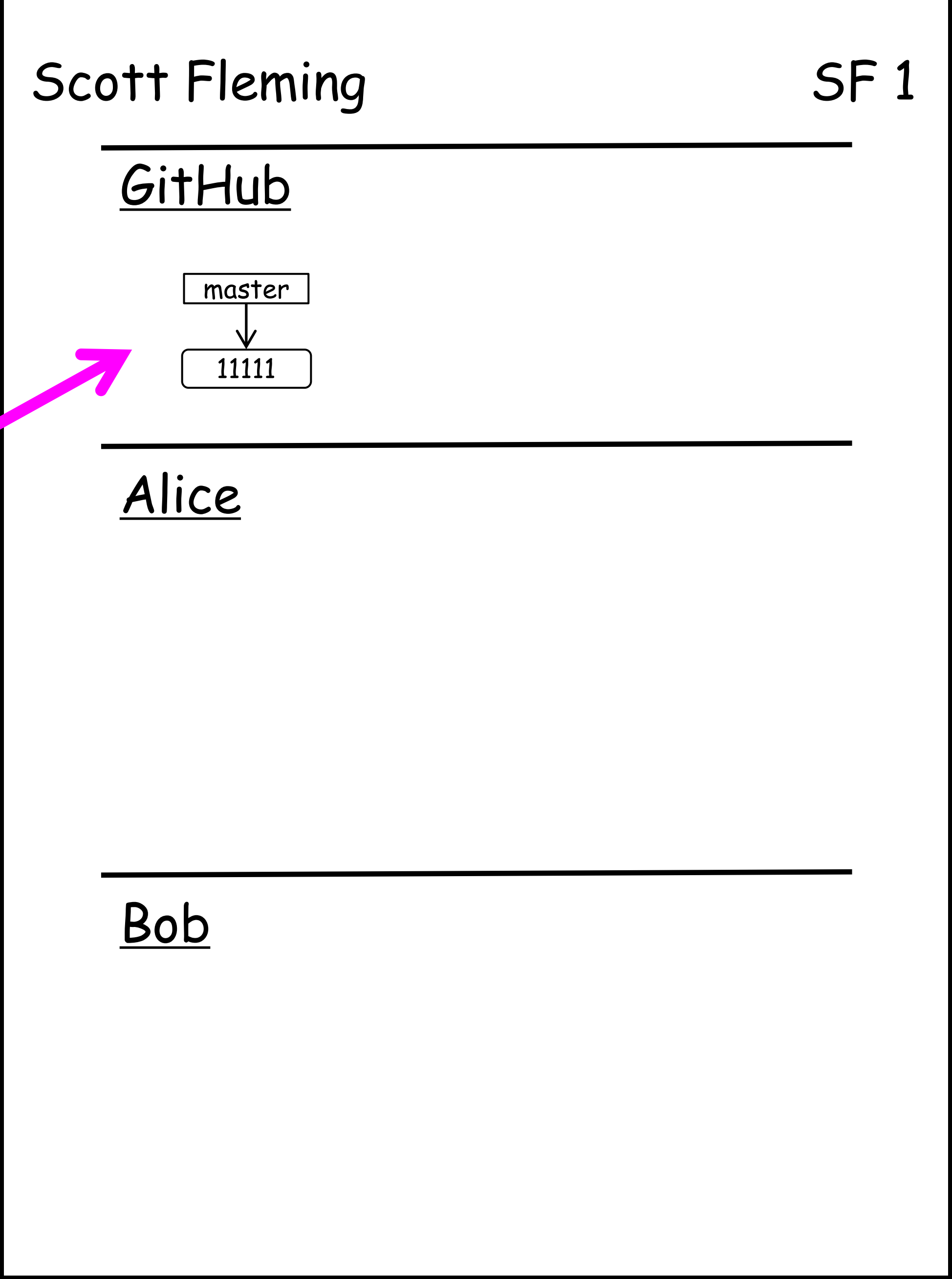
- git output contains lots of hints
  - git status is your friend!
- Merging may not be as easy as showed
  - E.g.: Multiple collabs updated same parts of file
- Pull before starting temp branch
- Team communication important !

Pop Quiz

- 5 questions
- Update diagram in each
  - Commit nodes
  - Branch nodes
- Based on actions of Alice and Bob
  - Collaborating via GitHub repo

Start like this




Scott Fleming SF 1

GitHub

master
11111

Alice

Bob

Question 1

- Alice:

```
$ git clone https://github.com/whatever.git
$ cd whatever
```

- Bob:

```
$ git clone https://github.com/whatever.git
$ cd whatever
```

(include the HEAD node)

Question 2

- Alice:
  ```
  $ git branch myfix
  $ git checkout myfix
  ```

- (Alternatively)
  ```
  $ git checkout -b myfix
  ```

Question 3

- Alice:
  - $ rails generate scaffold User …
  - $ git add -A
  - $ git commit -m "Added User" # 22222

- Bob:
  - $ rails generate scaffold Micropost …
  - $ git add -A
  - $ git commit -m "Added Micropost" # 33333

Question 4

- Bob:
  - git push

Question 5

- Alice:
  - git pull

Appendix

What if…

Alice did this:

app/models/micropost.rb

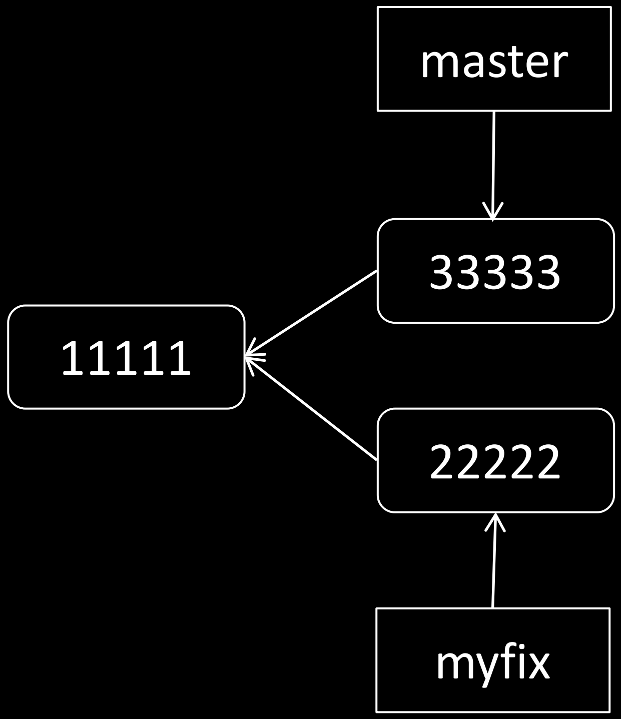
```
class Micropost < ActiveRecord::Base
  validates :content, length: { maximum: 140 }
end
```

Bob did this:

app/models/micropost.rb

```
class Micropost < ActiveRecord::Base
  validates :content, length: { maximum: 120 }
end
```

What if Alice did this?



```
$ git checkout master
$ git merge myfix
$ git merge myfix
Auto-merging app/models/micropost.rb
Automatic merge failed; fix conflict and then commit result.
```

app/models/micropost.rb

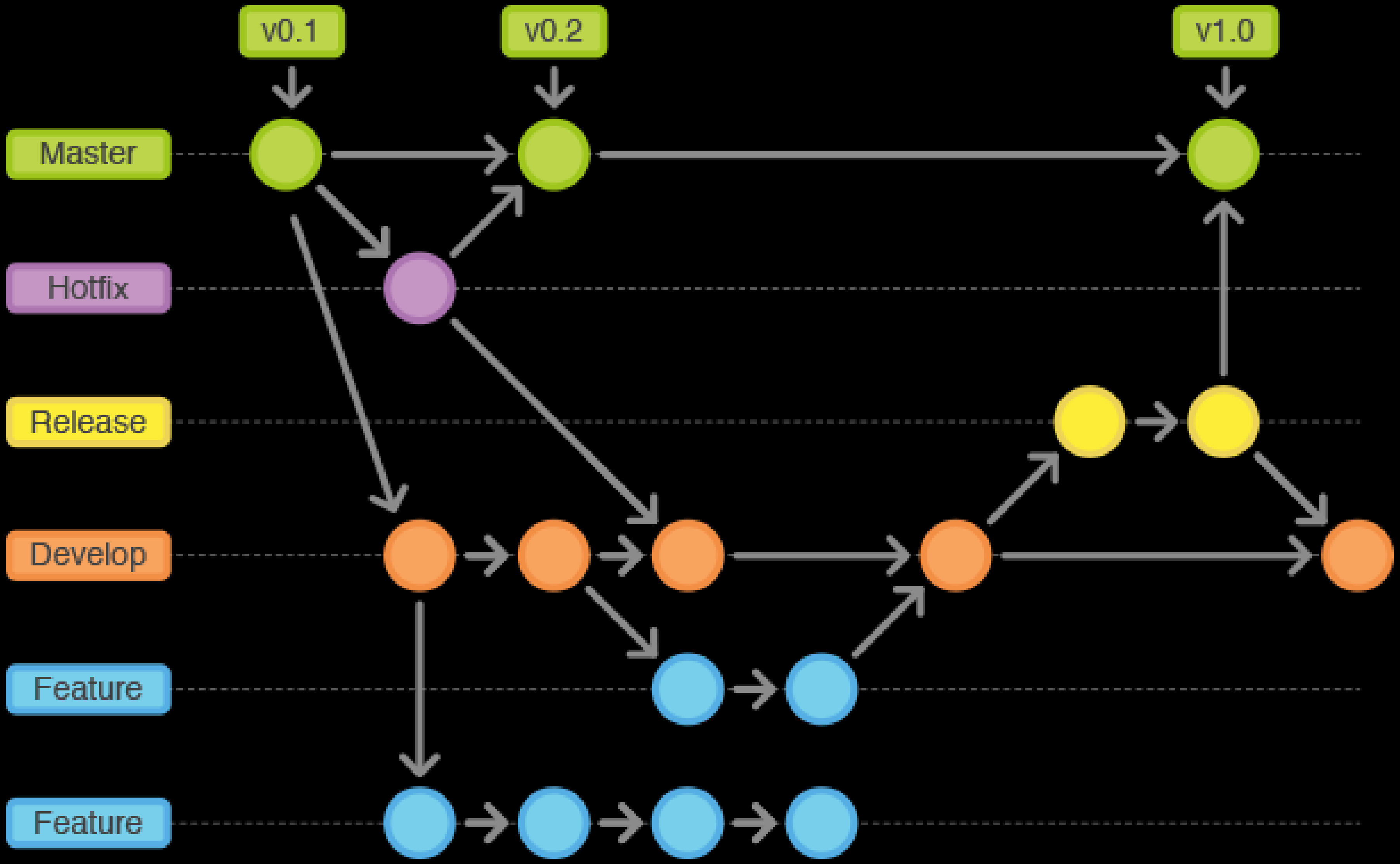
```
class Micropost < ActiveRecord::Base
<<<<<<< HEAD
  validates :content, length: { maximum: 140 }
=======
  validates :content, length: { maximum: 120 }
>>>>>>> myfix
end
```

To resolve:

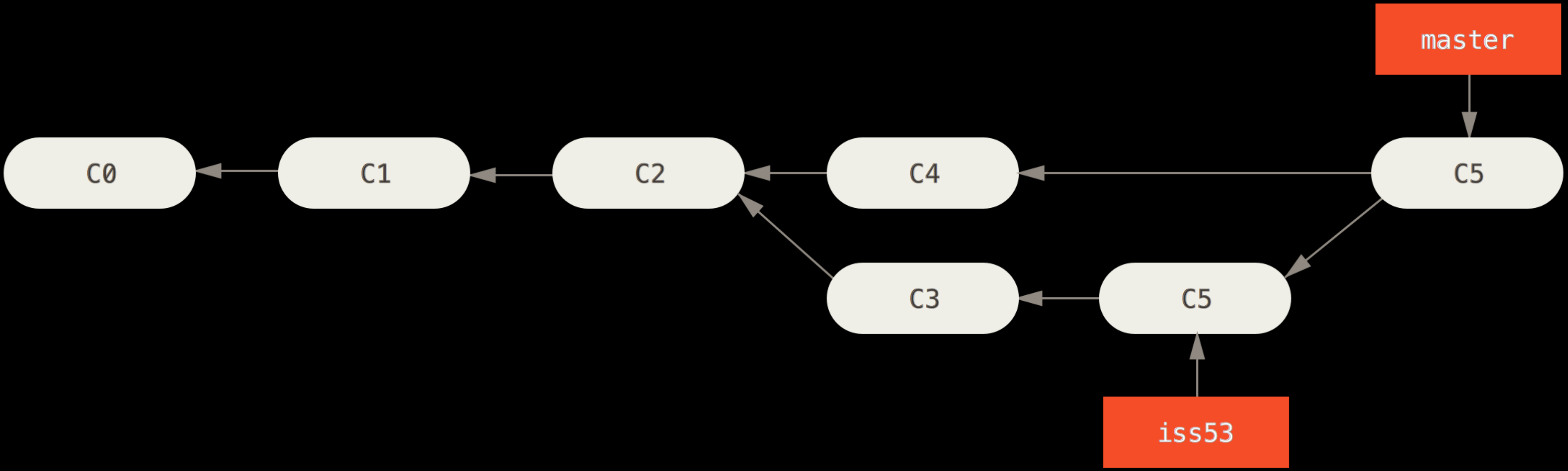
Manually fix the file; git add and commit

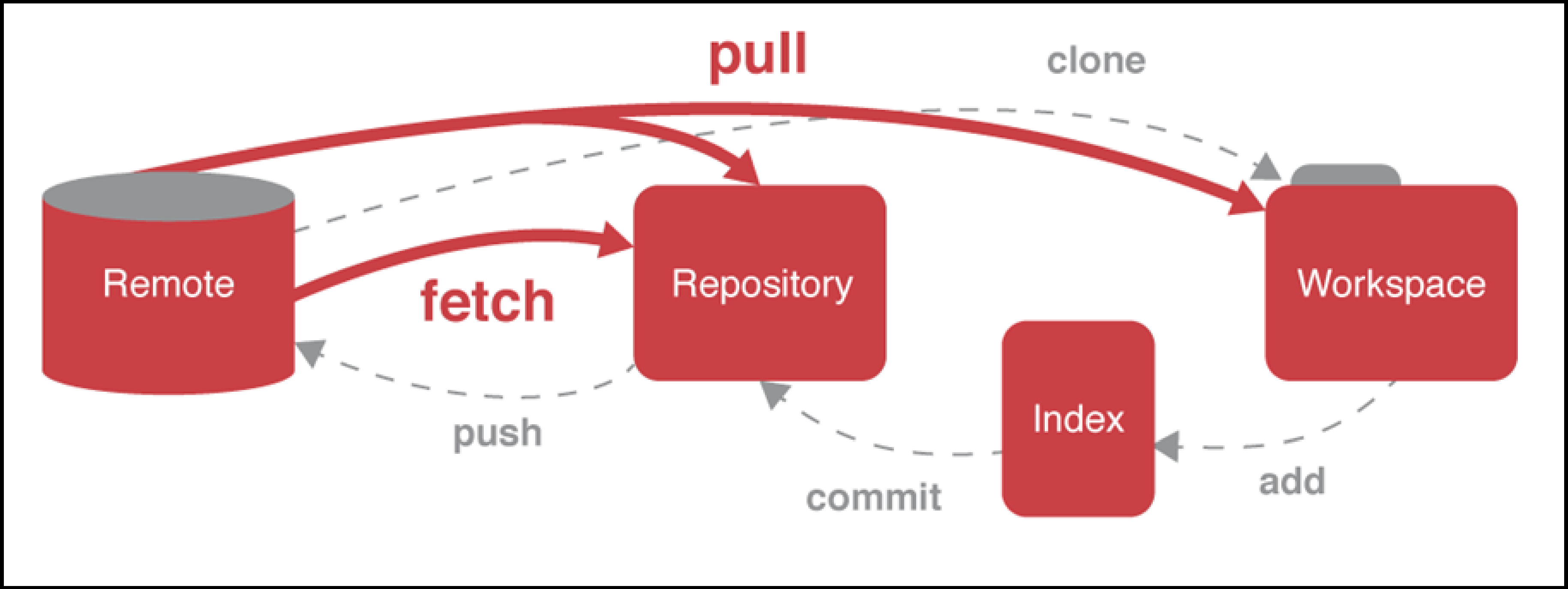
Reality

Reality



End


master
C0
C1
C2
C4
C5
C3
C5
iss53


pull
clone
Remote
Repository
Workspace
fetch
Index
push
commit
add