Introduction to Git — Fall 2023

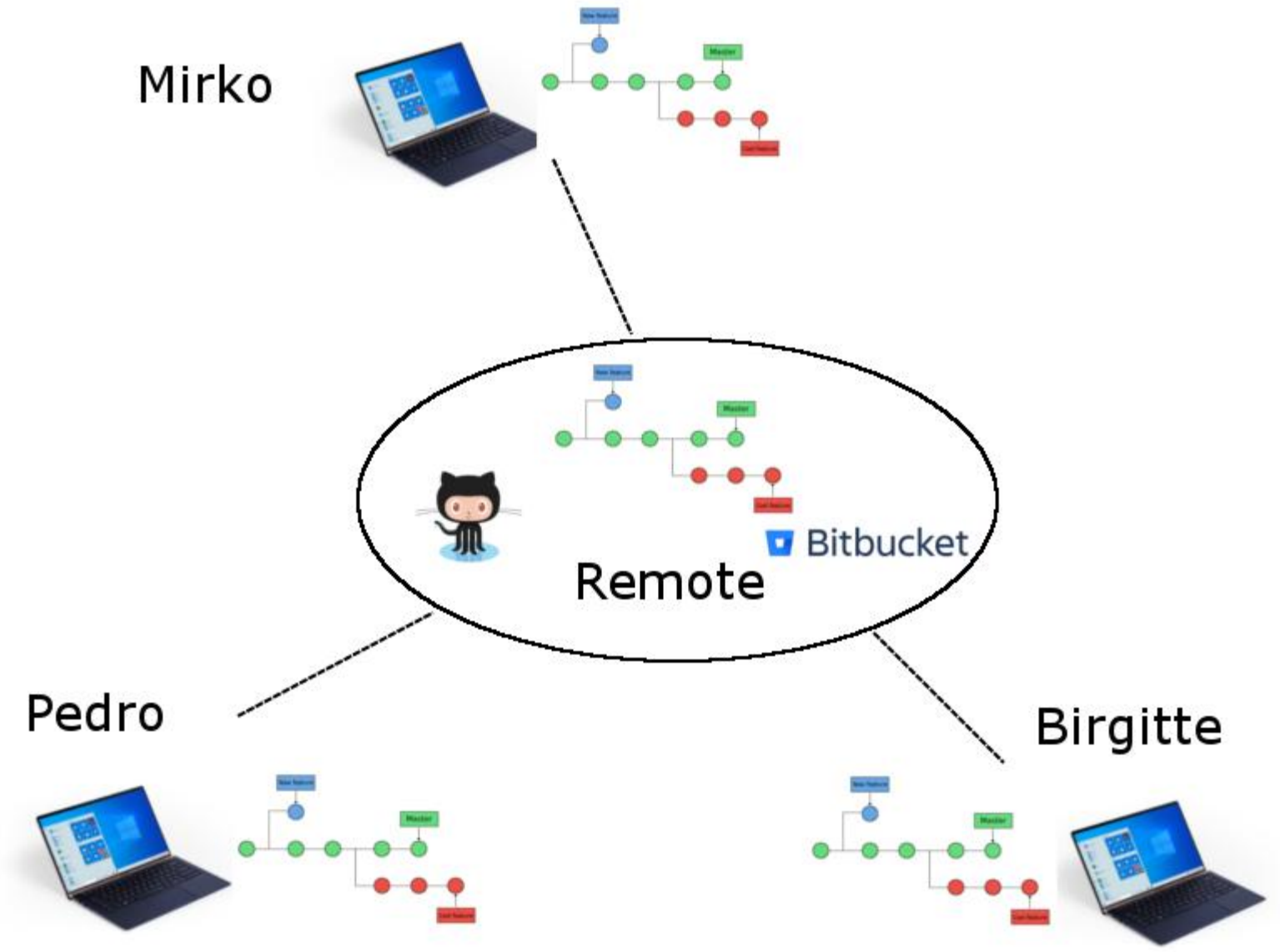
Lecture 6: Working with remotes

Slides: https://hackmd.io/@git-fall-2023/L6-remotes#/

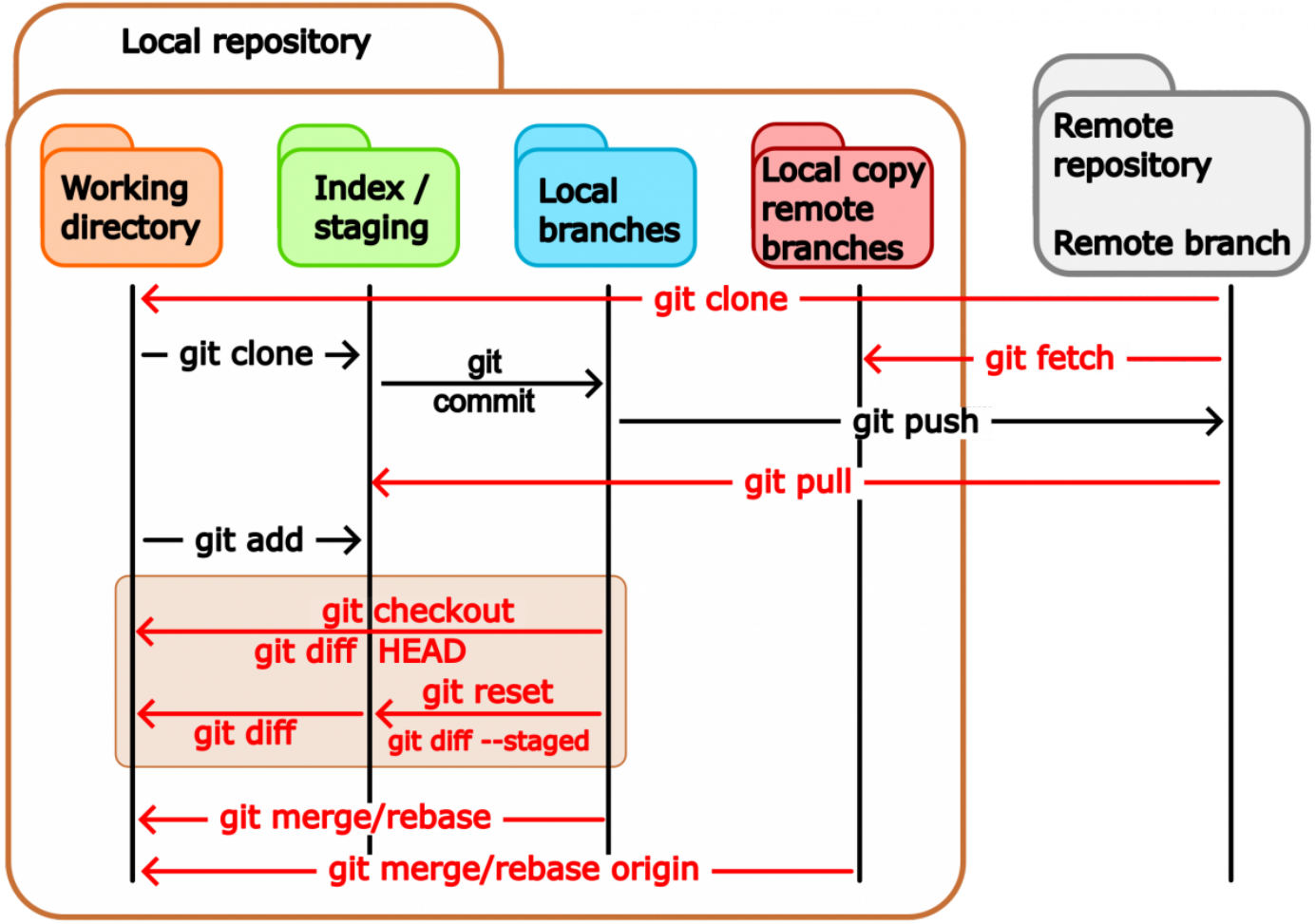
Concepts

A remote repository is a version of the project which can be hosted in your local machine, some network, or over the internet (Pro Git, 2nd. Ed., Scott Chacon and Ben Straub) where you and your collaborators can push or pull code modifications.

In addition to this, a remote is a way to backup your repository.


Mirko
Remote
Bitbucket
Pedro
Birgitte

Updated scheme for file stages



Concepts cont.

The command

```
$ git remote -v
origin  git@bitbucket.org:arm2011/gitcourse.git (fetch)
origin  git@bitbucket.org:arm2011/gitcourse.git (push)
```

displays the remotes that are already set up where you can *fetch* and *pull* changes. In this case there is only a single remoted called **origin**.

```
$ git graph
* 2e56d0a (HEAD -> main, origin/main, origin/HEAD) text of ex
* 22a7316 Adding yet more lectures
* 0ddb791 Adding some more of the lectures
* 3ff9f8f Adding some of the lectures
```

Adding remotes

A remote repository can be added manually with the command

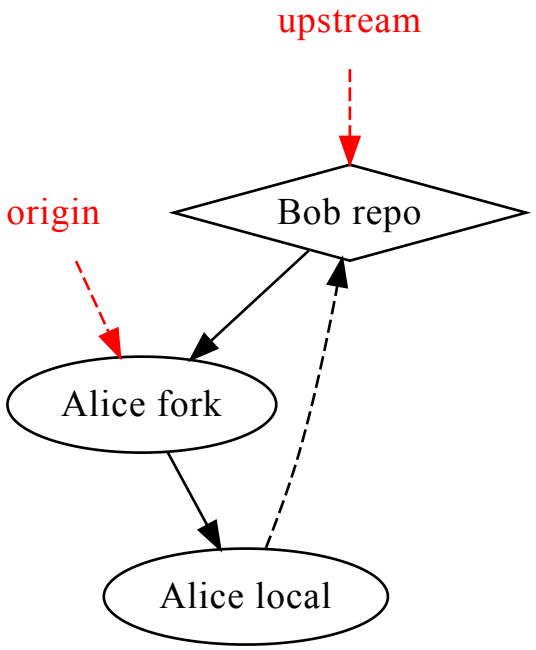
```
$ git remote add remote_name location

$ git remote add remote_name git@github.com:aliceuser2020/my-first-project.git

$ git remote -v
remote_name git@github.com:aliceuser2020/my-first-project.git (fetch)
remote_name git@github.com:aliceuser2020/my-first-project.git (push)
```

where the location of the remote can be an URL or the path if that is in your local machine.

Protocols:

- local -> git clone /opt/git/project.git
- SSH -> git clone ssh://user@server:project.git
- HTTP -> git clone http://example.com/gitproject.git
- Git

Why do we need more than one remote?



```
$ git remote add upstream git@github.com:bob/my-first-project.git

$ git remote -v
origin  git@github.com:aliceuser2020/my-first-project.git (fetch)
origin  git@github.com:aliceuser2020/my-first-project.git (push)
upstream  git@github.com:bobuser2020/my-first-project.git (fetch)
upstream  git@github.com:bobuser2020/my-first-project.git (push)
```

```
$git graph
* 2e56d0a (HEAD -> main, upstream/main, origin/main, origin/HEAD) text of exercise
* 22a7316 Adding yet more lectures
* 0ddb791 Adding some more of the lectures
* 3ff9f8f Adding some of the lectures
```

Working with remotes

One can push or fetch/pull to or from remotes by

```
$ git push  remote_name branch_name
$ git fetch remote_name branch_name
$ git pull  remote_name branch_name
```

In case you obtained the repository by cloning an existing one you will have the **origin** remote. You can do push/fetch/pull for this remote with

```
$ git push  origin master
$ git fetch origin master
$ git pull  origin master
```

or

```
$ git push
$ git fetch
$ git pull
```

because the remote *origin* and the *master* branch are configured for pushing and pulling by default upon cloning.

The command:

```
$ git pull
```

brings all the changes (branches) that are in the remote and tries to merge them with your local repo. The default behavior of *git pull* is in the *$GIT_DIR/config* file:

```
[remote "origin"]
  fetch = +refs/heads/*:refs/remotes/origin/*
```

In fact, *git pull* is a combination of two commands:

```
$ git fetch remote_name branch_name
$ git merge remote_name/branch_name
```

or

```
$ git fetch
$ git merge
```

Advanced

The command

```
$ git push
```

will send all the changes (branches) to the remote by default. This can be changed by applying:

```
git config --global push.default matching(default), current,
```

If you have a brand-new branch called **new**, then it is recommended to push it the first time with the command:

```
git push -u origin new
```

which is equivalent to

```
git push origin new
git branch --set-upstream new origin/new
```

then, you will be able to push/pull the changes in the branch by simply typing **git push/pull**

Displaying remote information

```
$ git remote show origin
* remote origin
  Fetch URL: git@bitbucket.org:arm2011/gitcourse.git
  Push  URL: git@bitbucket.org:arm2011/gitcourse.git
  HEAD branch: master
  Remote branches:
    experiment     tracked
    feature        tracked
    less-salt      tracked
    master         tracked
    nested-feature tracked
  Local branches configured for 'git pull':
    feature        merges with remote feature
    master         merges with remote master
    nested-feature merges with remote nested-feature
  Local refs configured for 'git push':
    feature        pushes to feature        (fast-forwardable)
    master         pushes to master         (up to date)
    nested-feature pushes to nested-feature (up to date)
```

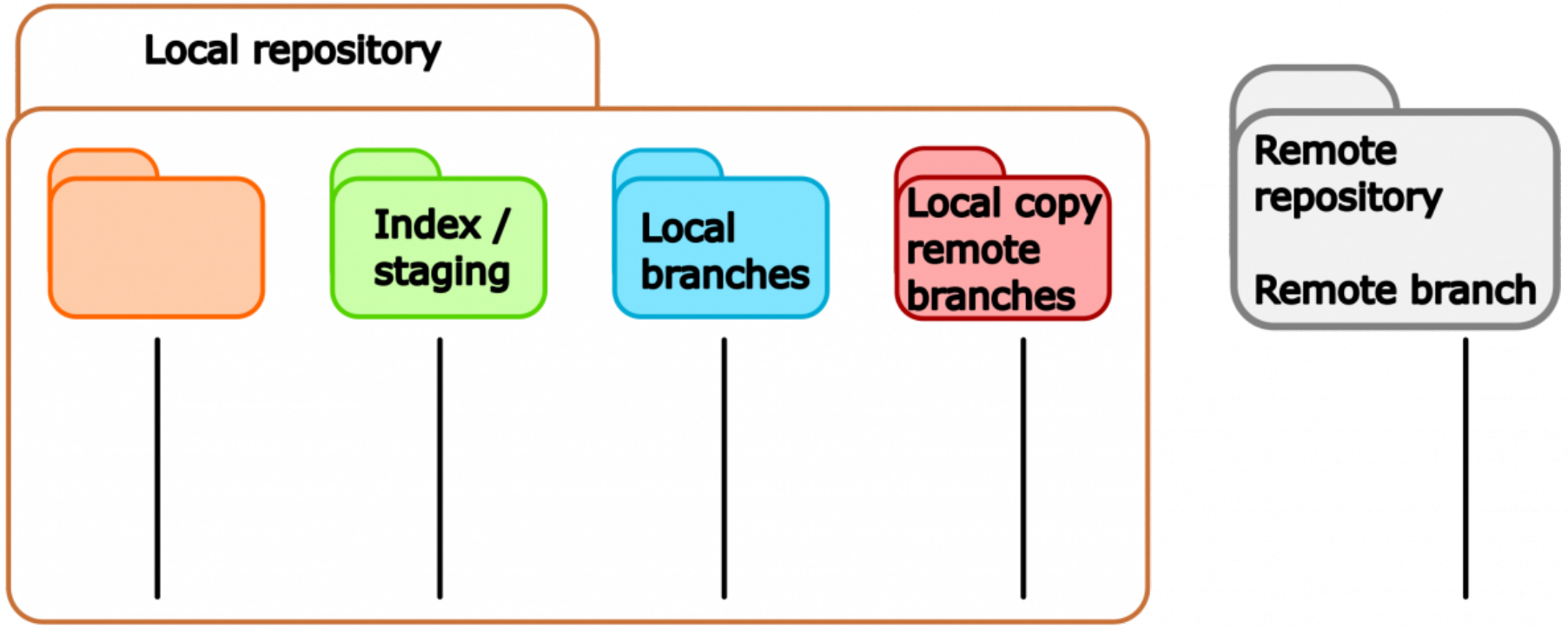
Renaming remotes

```
$ git remote rename initial_name new_name
```

Deleting remotes

```
$ git remote remove remote_name
```

Bare repositories



A bare repository is a repository with no working directory.

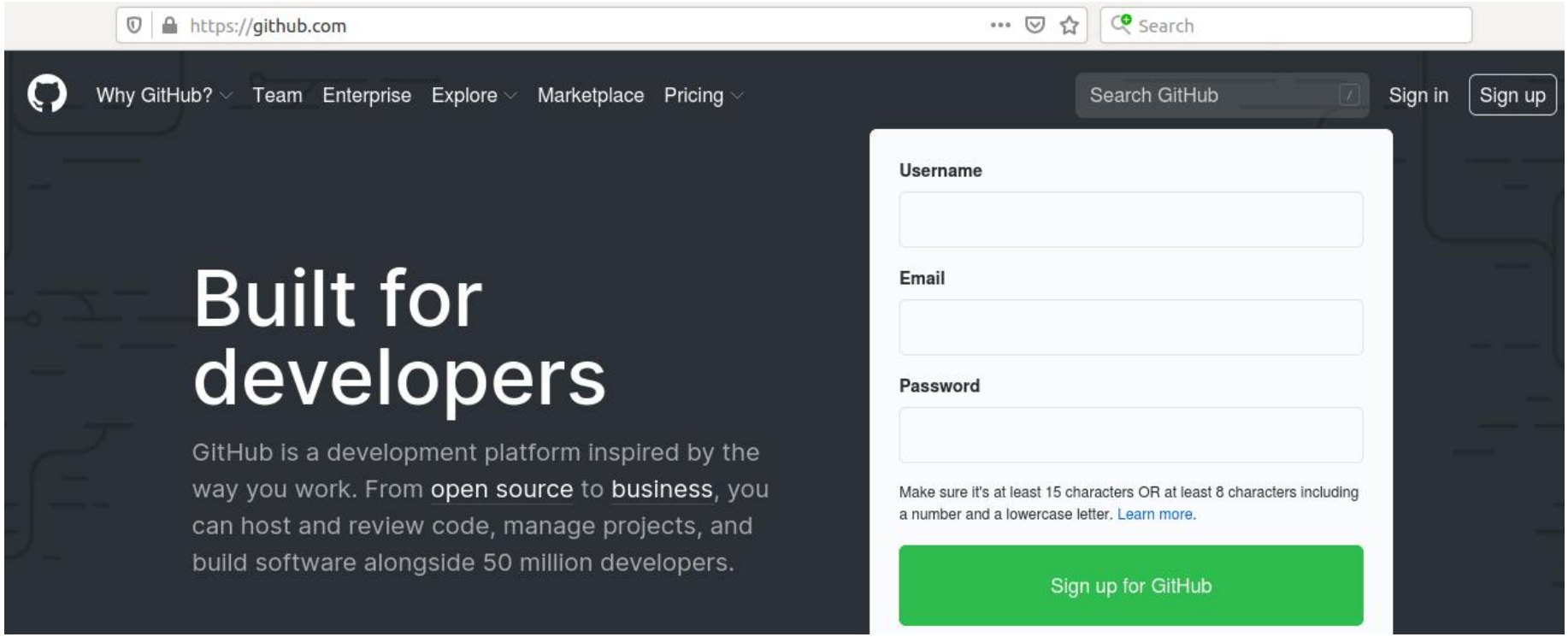
Creating a bare repository

```
$ mkdir bare.git && cd bare.git
$ git init --bare
```

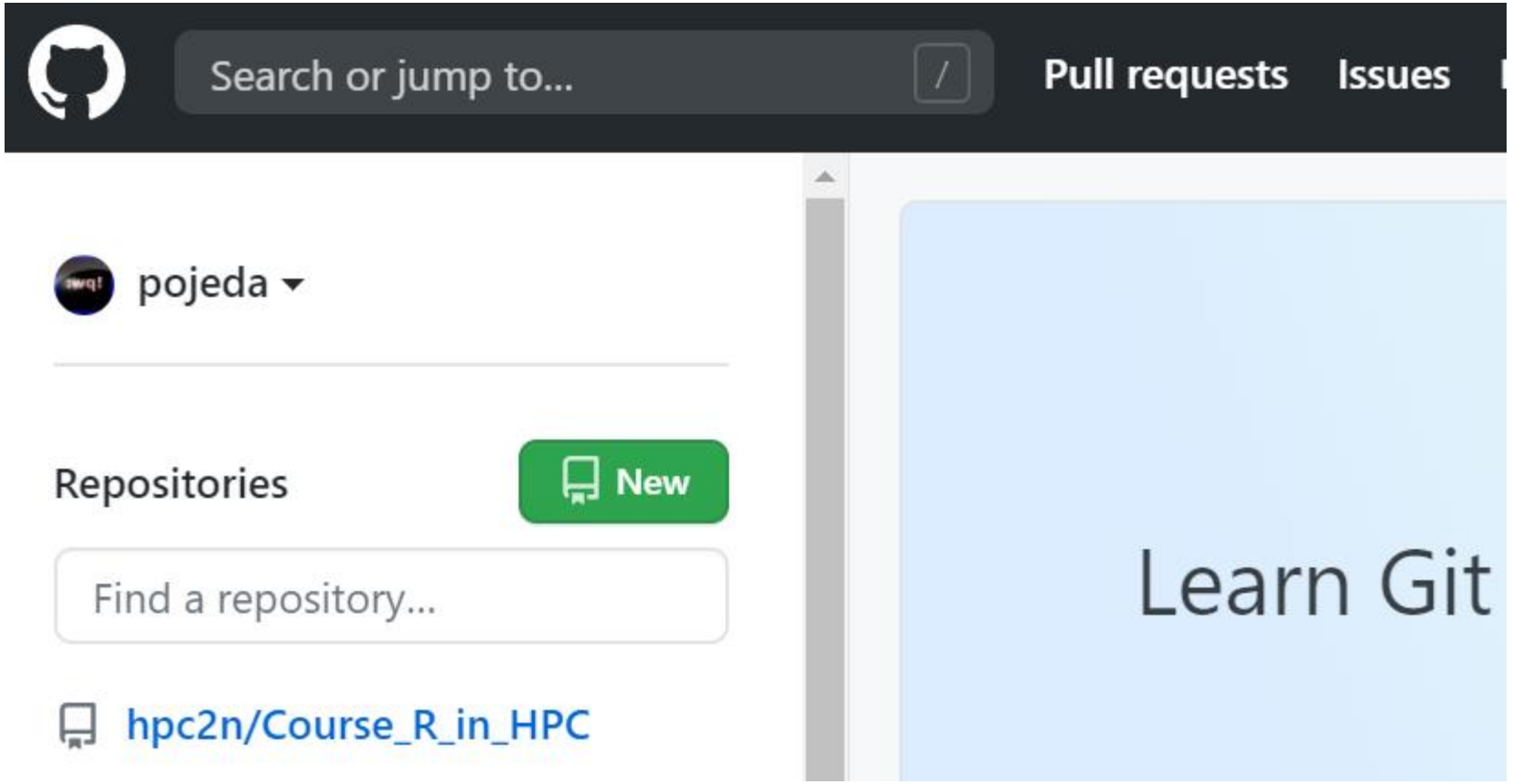
Cloning a bare repository cont.

```
$ git clone --bare location
```

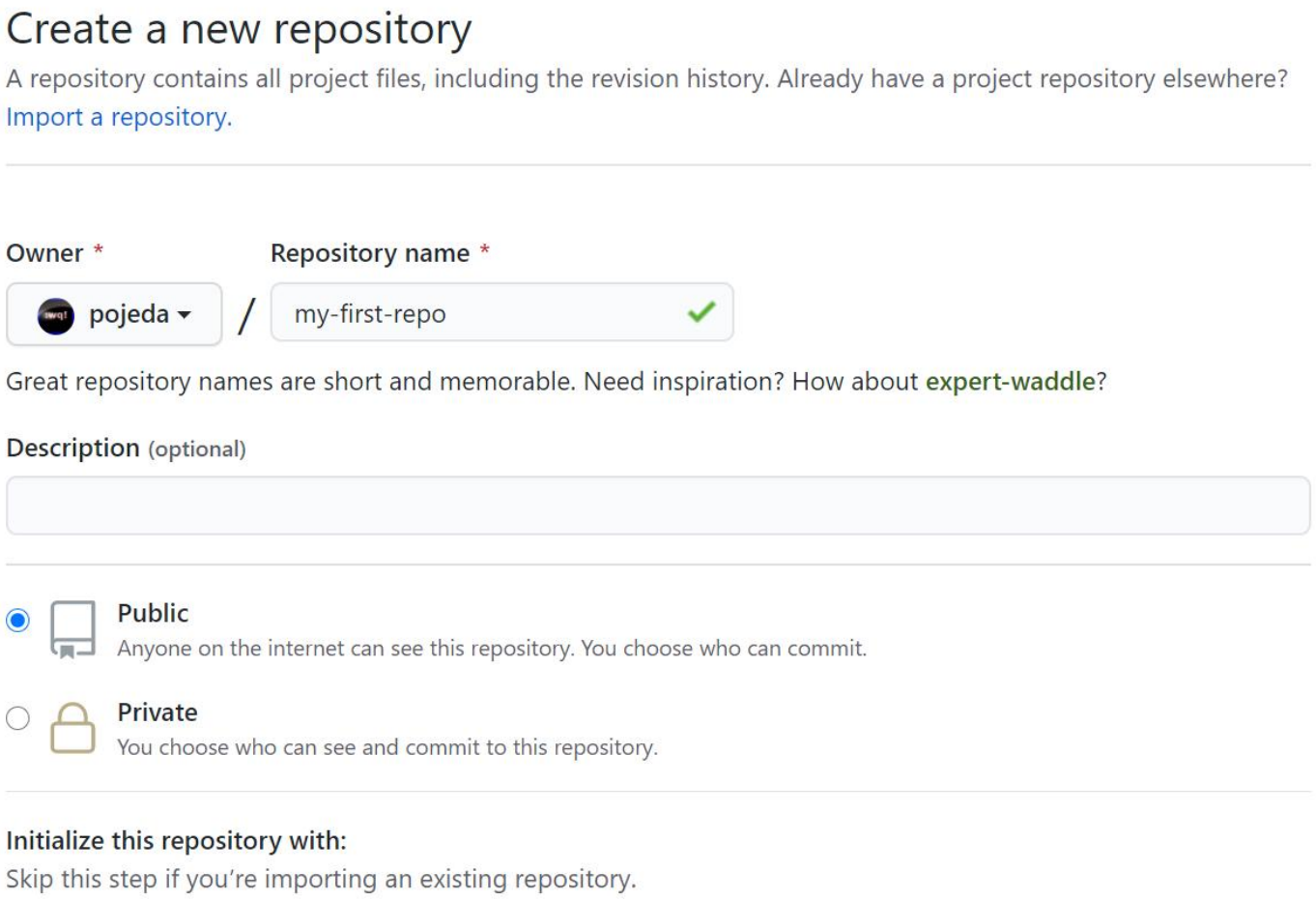
Using GitHub



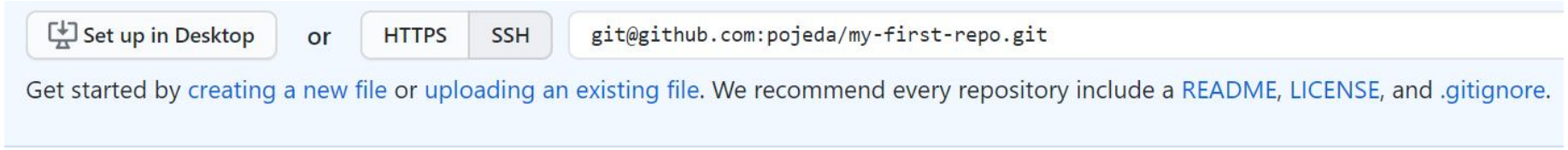
Upon login into your GitHub account you will see the following option to create a new repository



Here, you can choose the type of repository that is appropriate to your needs (public/private), if you want to add *README* and *.gitignore* files and also the type of license for your project,



GitHub will suggest some steps that you can take for your brand-new repository:



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

```
echo "# my-first-repo" >> README.md
git init
git add README.md
git commit -m "first commit"
git branch -M master
git remote add origin git@github.com:pojeda/my-first-repo.git
git push -u origin master
```

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

```
git remote add origin git@github.com:pojeda/my-first-repo.git
git branch -M master
git push -u origin master
```

...or import code from another repository

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

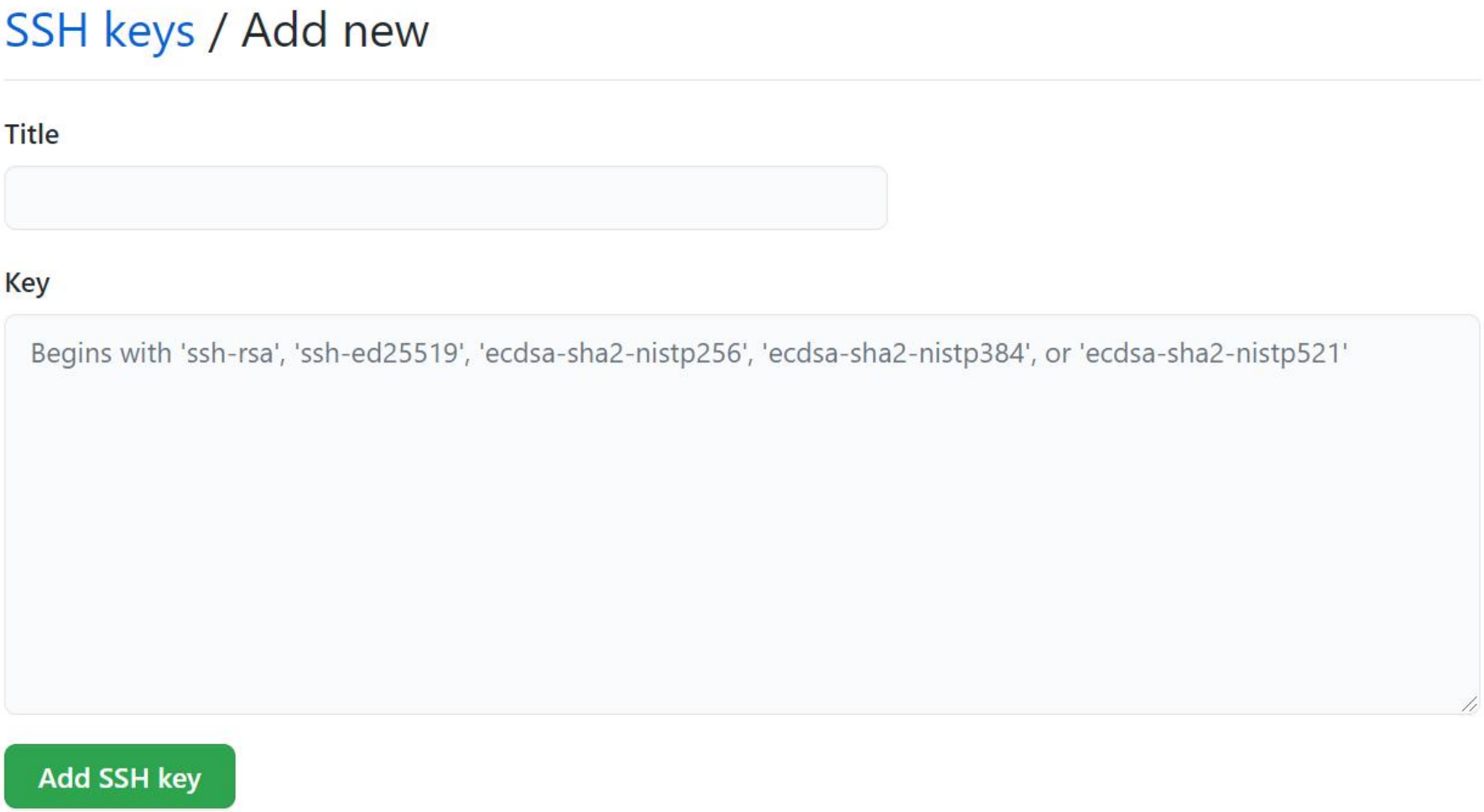
Import code

Setting ssh-keys

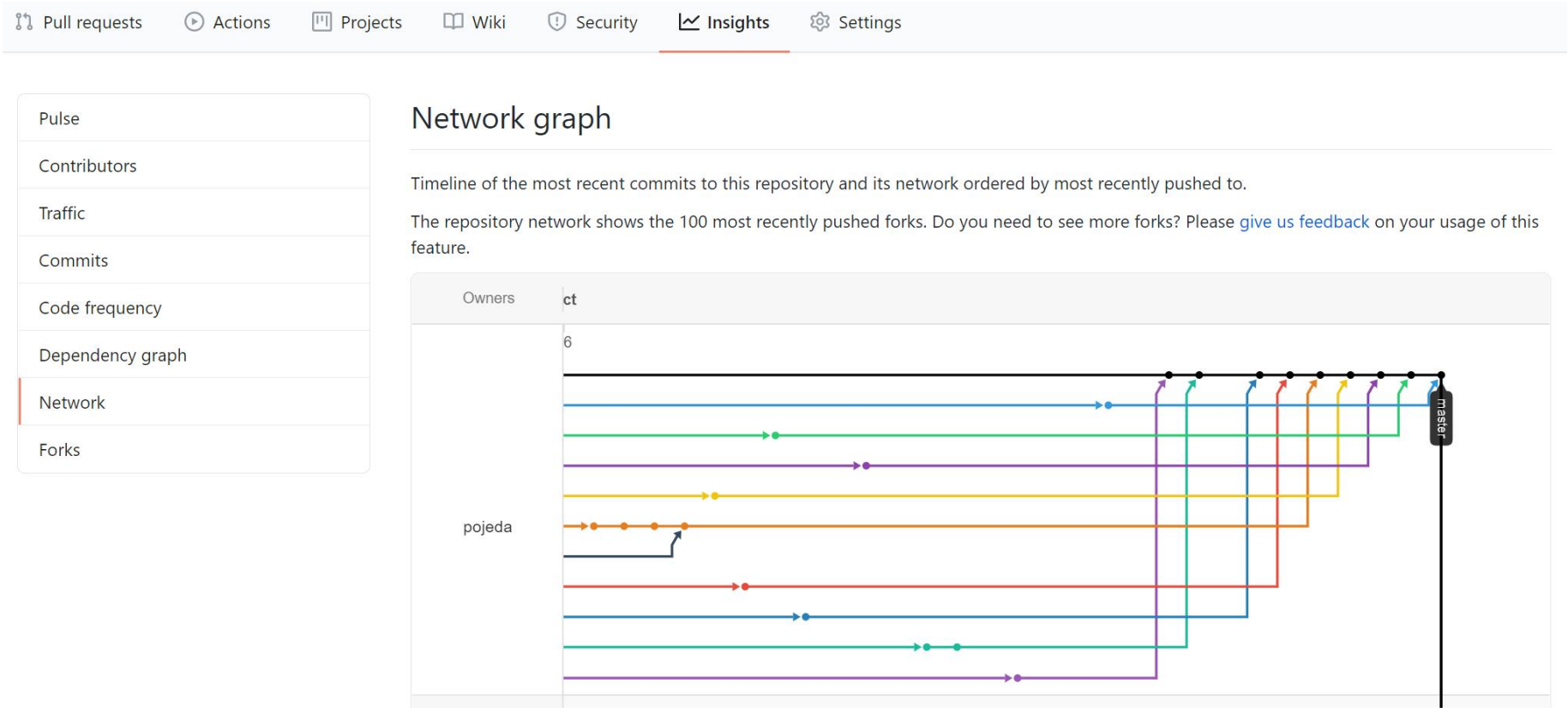
1. ssh-keygen -t rsa -b 4096 -C “pedro@gemail.com”
2. eval $(ssh-agent -s)
3. ssh-add ~/.ssh/id_rsa
4. clip < ~/.ssh/id_rsa.pub (it copies the ssh key that has got generated)

5. Go to your remote repository on github.com and then **Settings** -> **SSH and GPG keys** ->new SSH key -> write a title and paste the copied SSH key and save it
6. check if the key was properly set on github/bitbucket

```
$ ssh -T git@bitbucket.org
$ ssh -T git@github.com
```

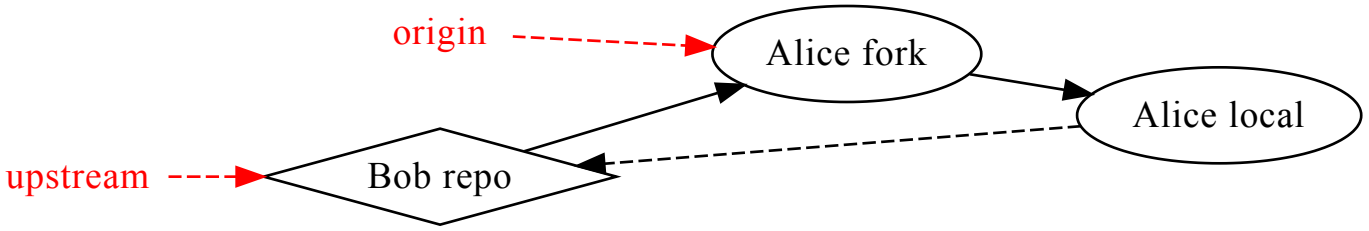

SSH keys / Add new
Title
Key
Begins with 'ssh-rsa', 'ssh-ed25519', 'ecdsa-sha2-nistp256', 'ecdsa-sha2-nistp384', or 'ecdsa-sha2-nistp521'
Add SSH key

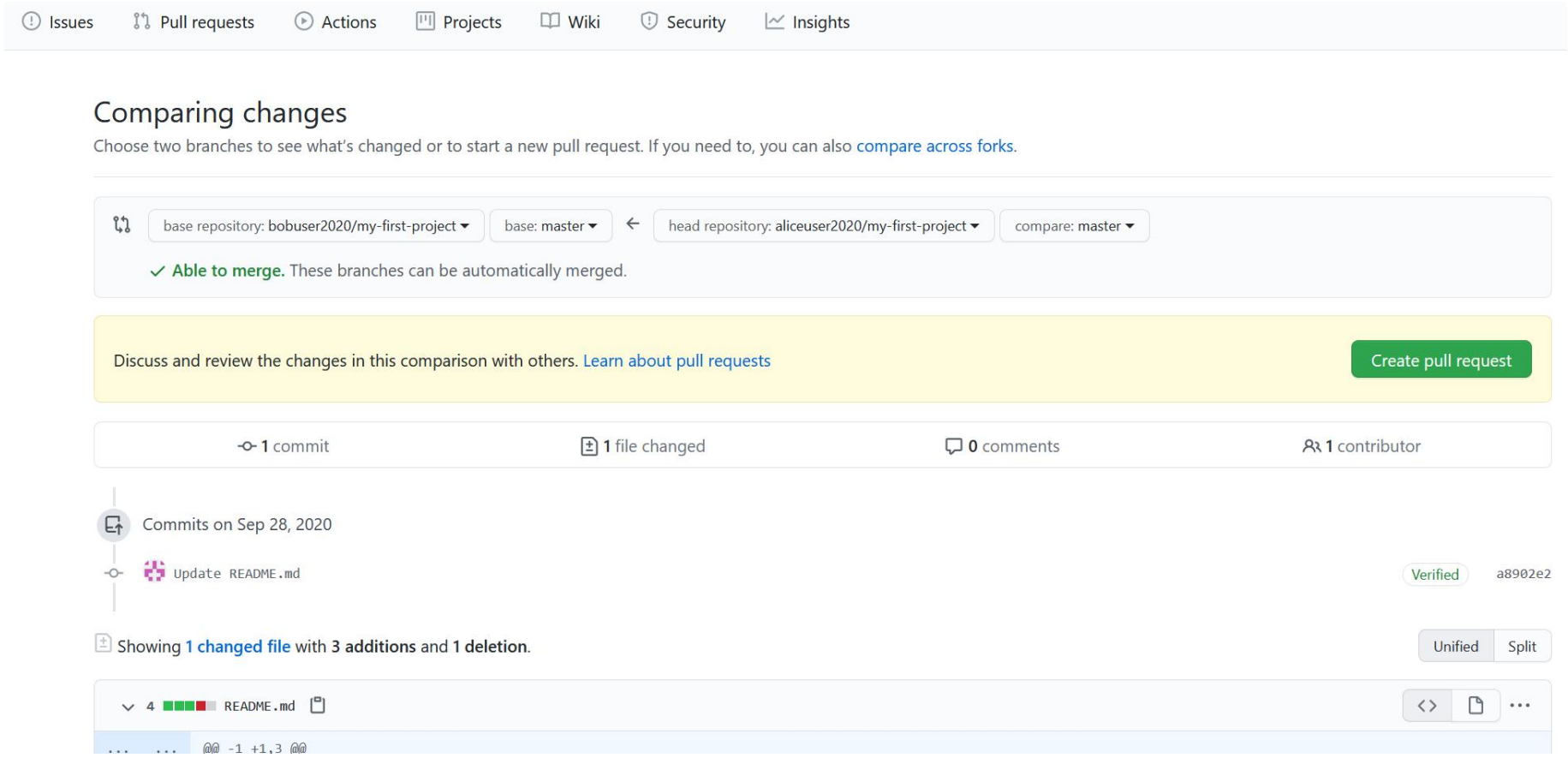
Network visualization



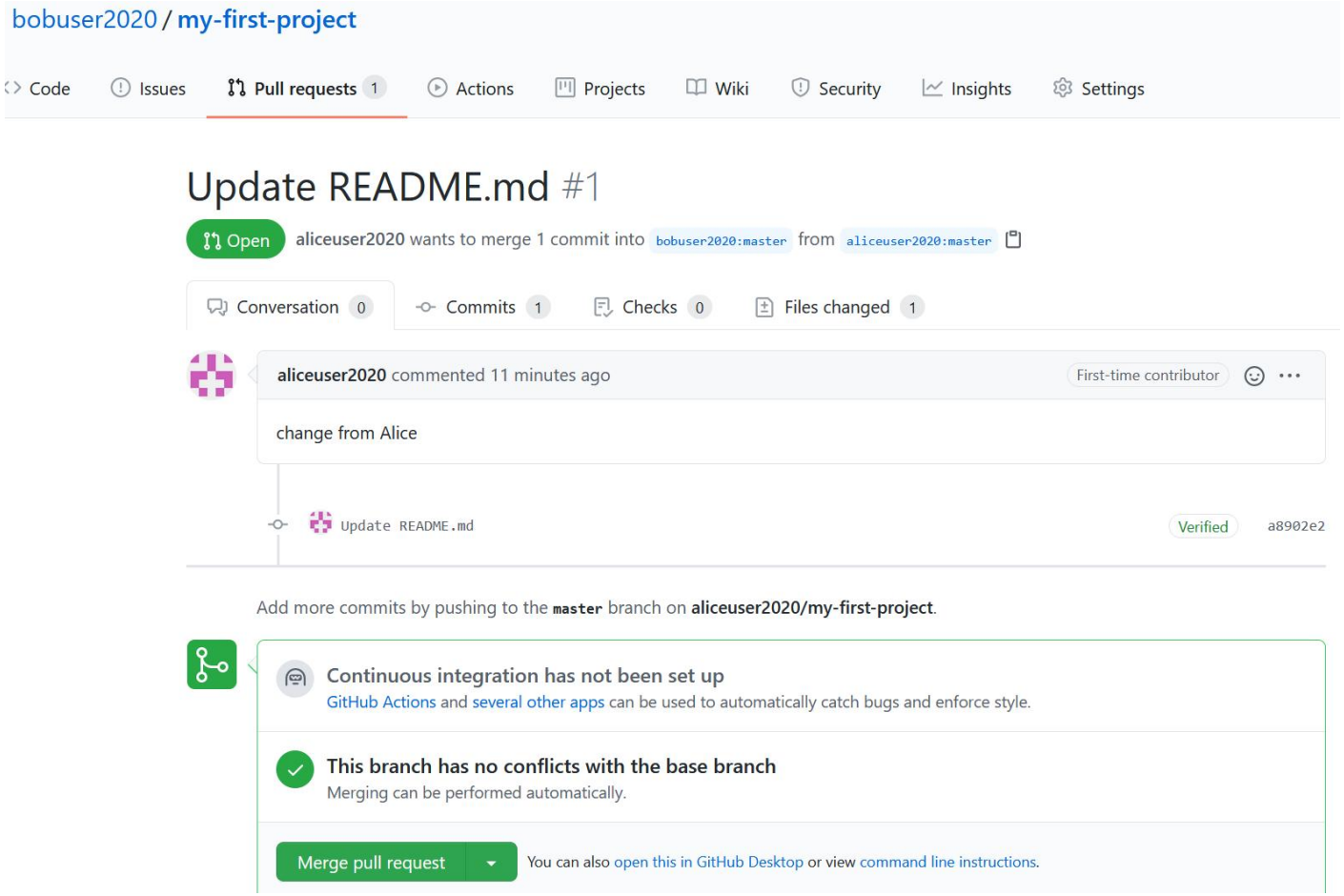
Pull requests

In the following scenario, a developer, Bob, has its repo on GitHub. Another developer, Alice, finds it useful and forks it. After doing some changes, Alice push them and do a “pull request”

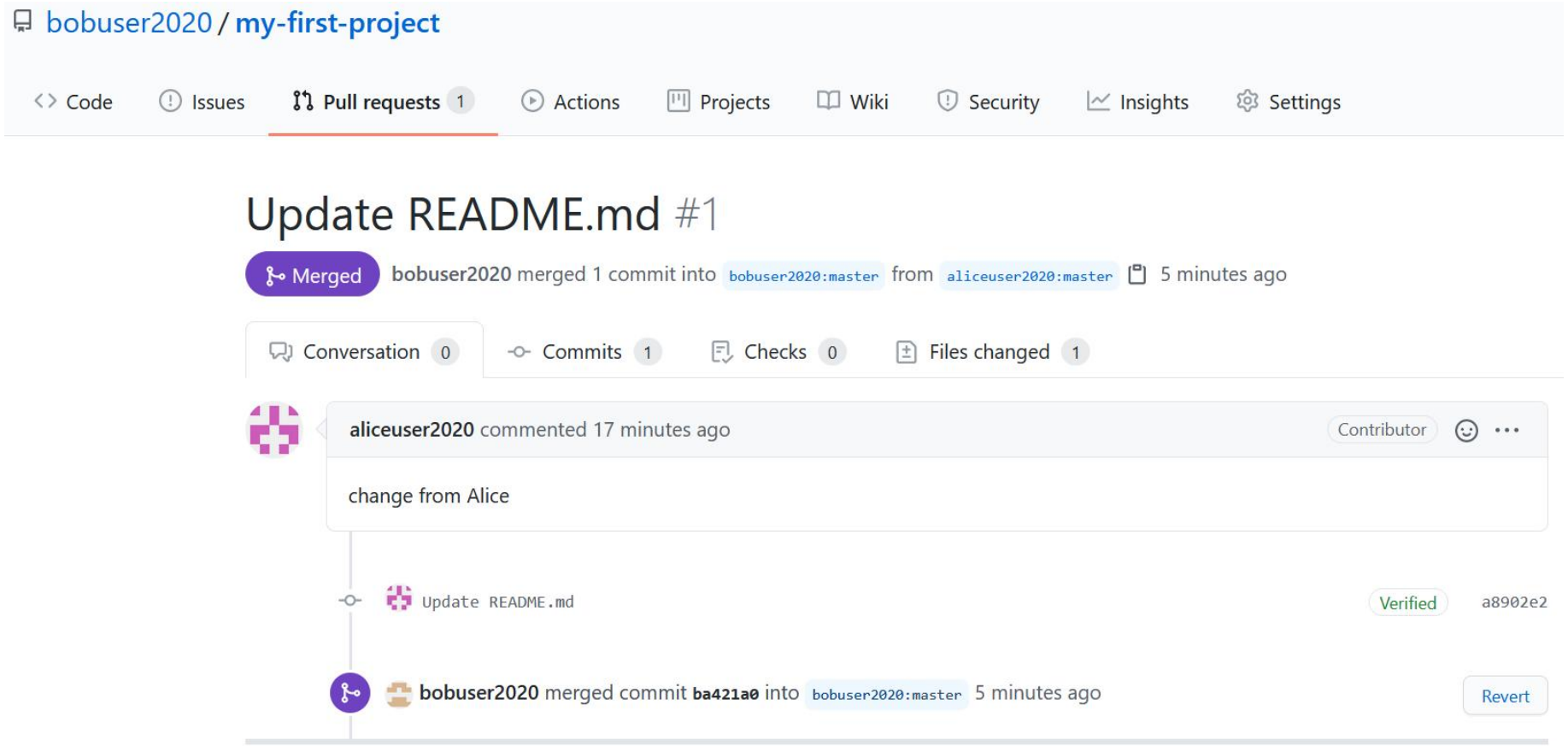



Issues
Pull requests
Actions
Projects
Wiki
Security
Insights
Comparing changes
Choose two branches to see what's changed or to start a new pull request. If you need to, you can also compare across forks.
base repository: bobuser2020/my-first-project
base: master
head repository: aliceuser2020/my-first-project
compare: master
Able to merge. These branches can be automatically merged.
Discuss and review the changes in this comparison with others. Learn about pull requests
Create pull request
1 commit
1 file changed
0 comments
1 contributor
Commits on Sep 28, 2020
Update README.md
Verified
a8902e2
Showing 1 changed file with 3 additions and 1 deletion.
Unified
Split
4
README.md
@@ -1 +1,3 @@

Then, Bob receives an email with the pull request information about Alice modifications. On the GitHub site he sees the request:

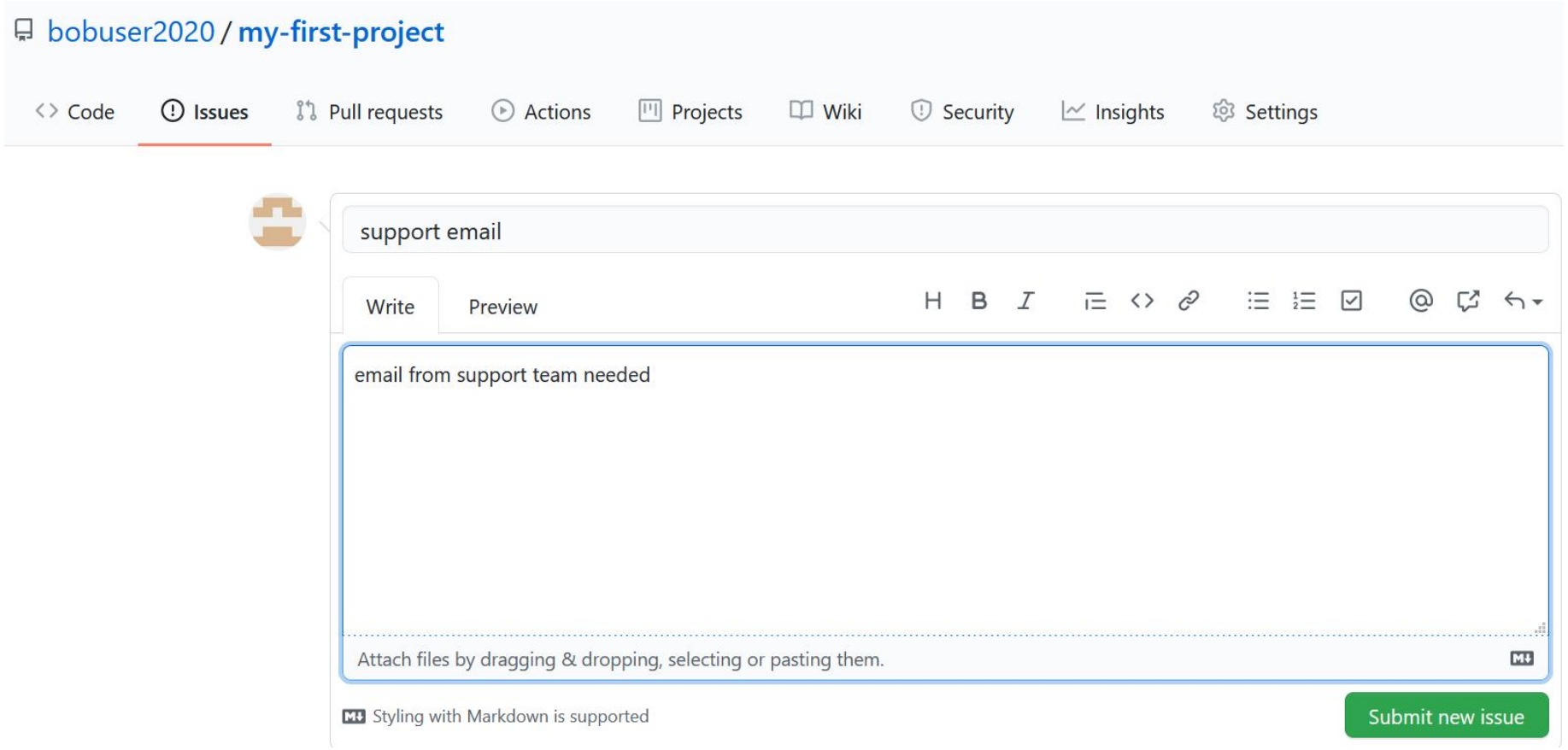


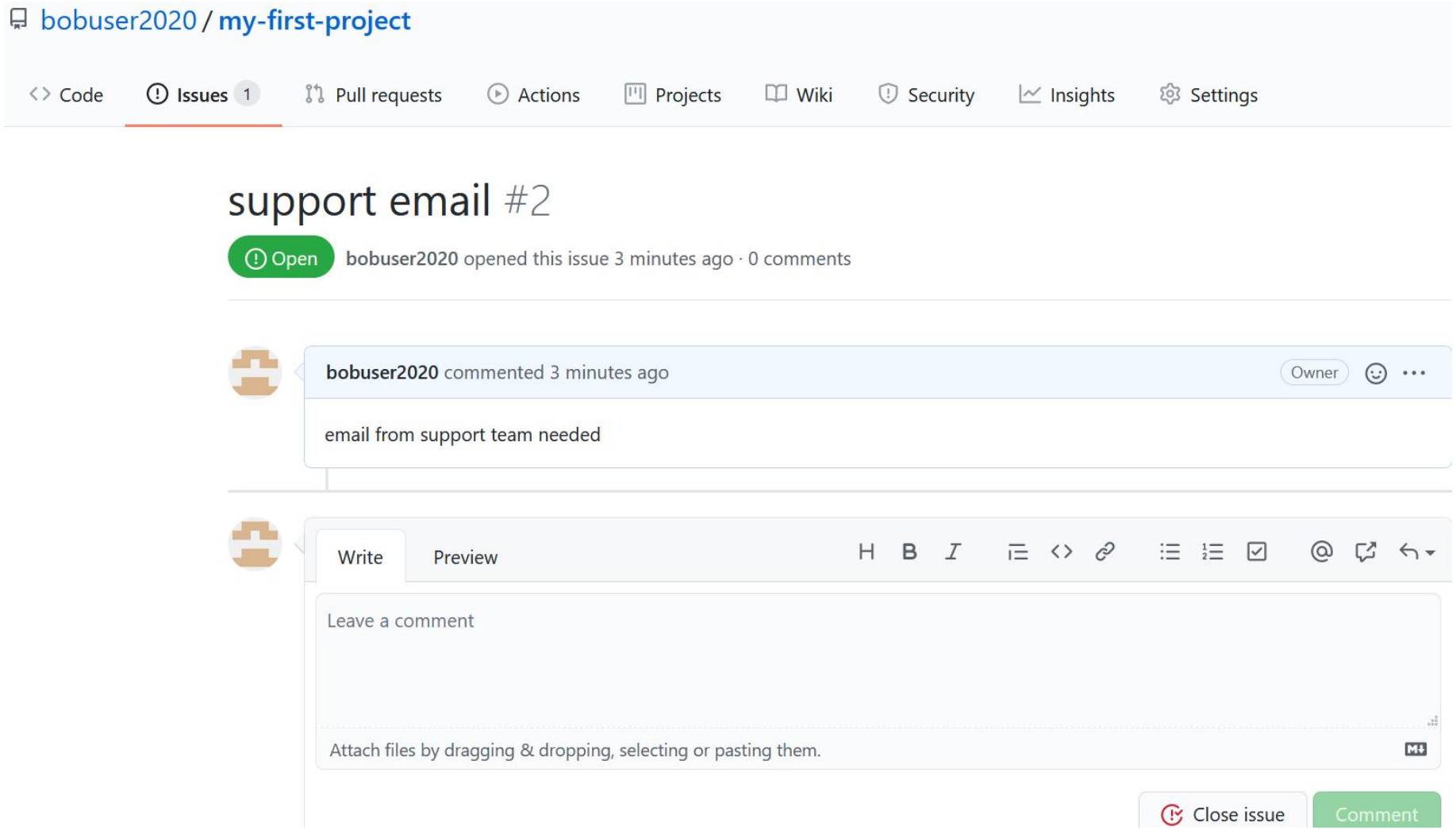
Because Bob find the changes from Alice useful and there are no conflicts he can merge them straight away,



Issues

If you find some issues in the files/code you can open an “Issue” on GitHub




bobuser2020 / my-first-project
Code
Issues 1
Pull requests
Actions
Projects
Wiki
Security
Insights
Settings
support email #2
Open
bobuser2020 opened this issue 3 minutes ago · 0 comments
bobuser2020 commented 3 minutes ago
Owner
email from support team needed
Write
Preview
Leave a comment
Attach files by dragging & dropping, selecting or pasting them.
Close issue
Comment

You may also assign people to the issues that are more related to that topic.

In future commits you may refer to this issue by using the issue number, #2 in this case. This will allow you to track the evolution of the issue on GitHub.

Best practices

- Talk with your colleagues.
- Some commands such as **git rebase** change the history. It wouldn’t be a good idea to use them on public branches.
- Don’t accept pull requests right away.