

Introduction to Git – Fall 2024

Lecture 6: Working with remotes



UMEÅ
UNIVERSITET



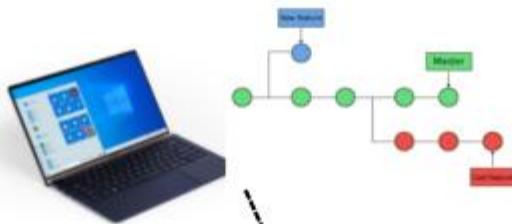
Slides: <https://hackmd.io/@git-fall-2023/L6-remotes#/>

Concepts

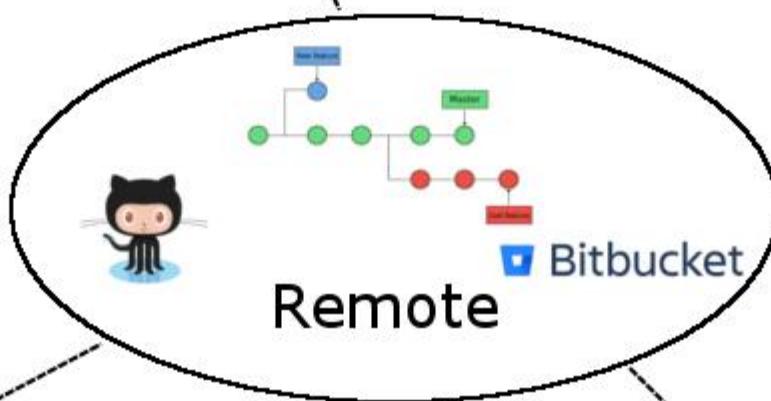
A remote repository is a version of the project which can be hosted in your local machine, some network, or over the internet (Pro Git, 2nd. Ed., Scott Chacon and Ben Straub) where you and your collaborators can push or pull code modifications.

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

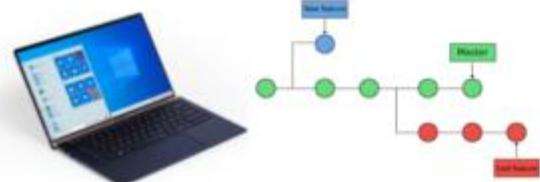
Mirko



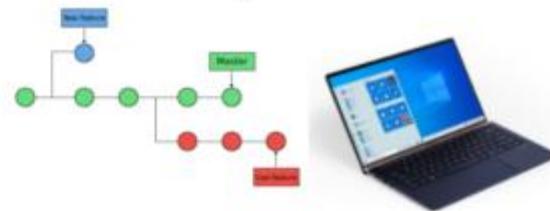
Remote



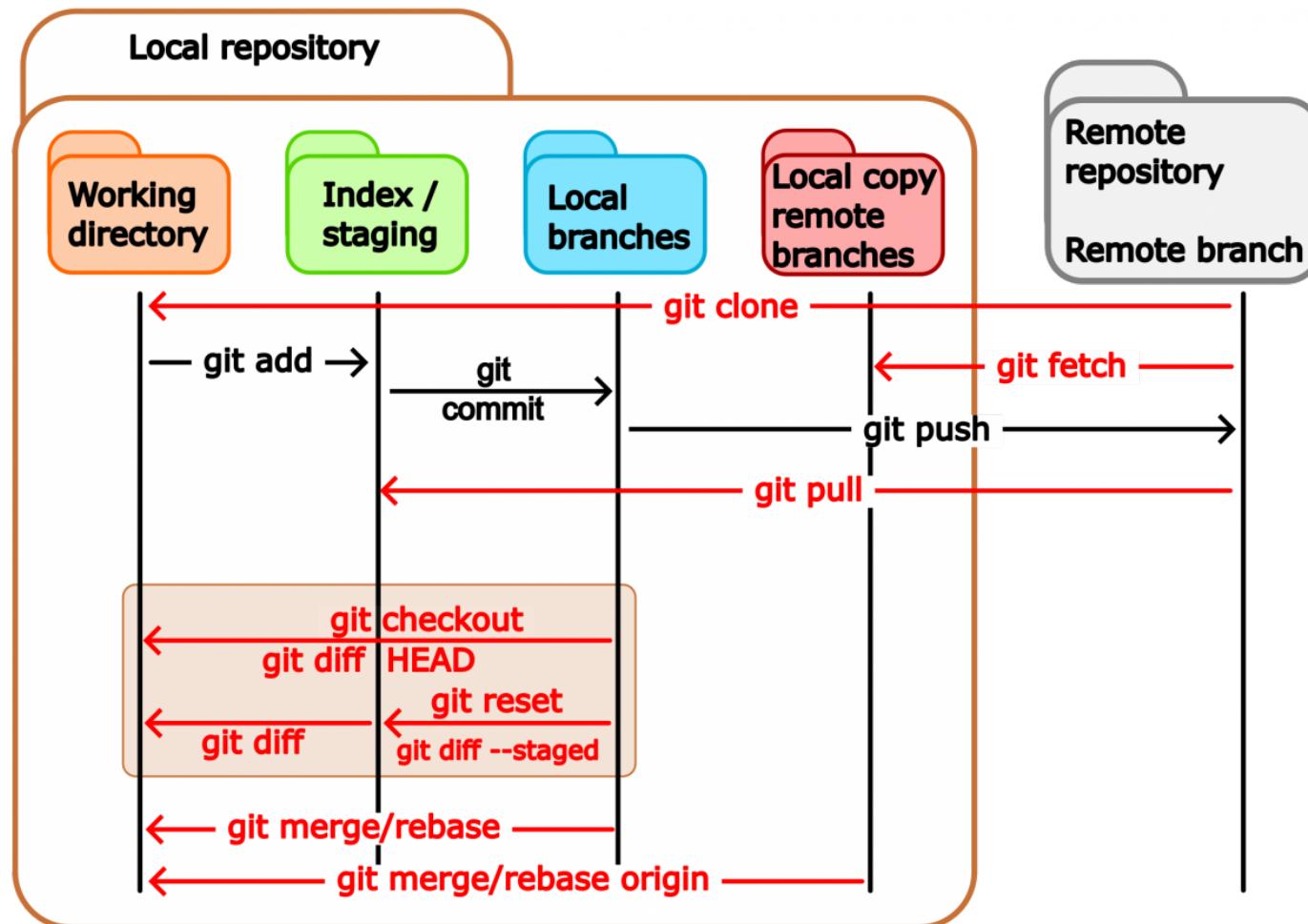
Pedro



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 remote called **origin**.

```
$ git graph
* 2e56d0a (HEAD -> main, origin/main, origin/HEAD) text of e
* 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

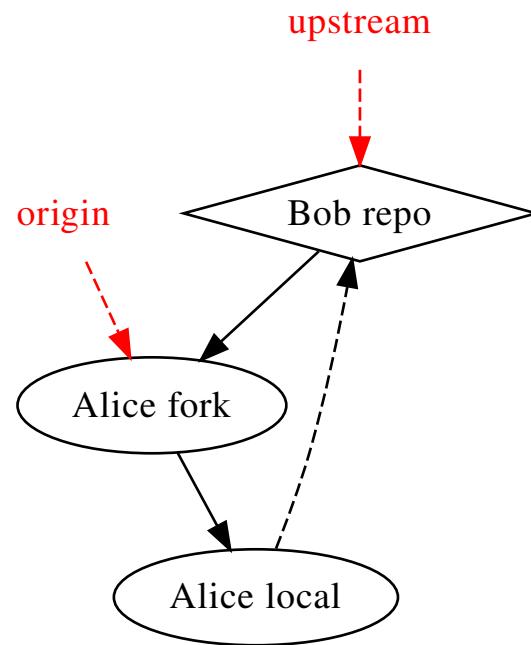
```
$ git remote add remote_name location  
$ git remote add remote_name git@github.com:aliceuser2020/my-first-project.git  
$ git remote -v  
remote_name git@github.com:aliceuser2020/my-first-project.git (fetch)  
remote_name git@github.com:aliceuser2020/my-first-project.git (push)
```

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 g
* 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:

```
$ 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 the current branch of the local repo. The default behavior of *git pull* (*fetch* part) 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
```

If you want to fetch all branches and merge the current one:

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

Advanced

The command

```
$ git push
```

will send the changes in the current branch to the remote by default.

The default behavior can be seen with:

```
$ git config --get push.default
```

This can be changed by applying:

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

If you have a brand-new branch called **new**, you can 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)
```

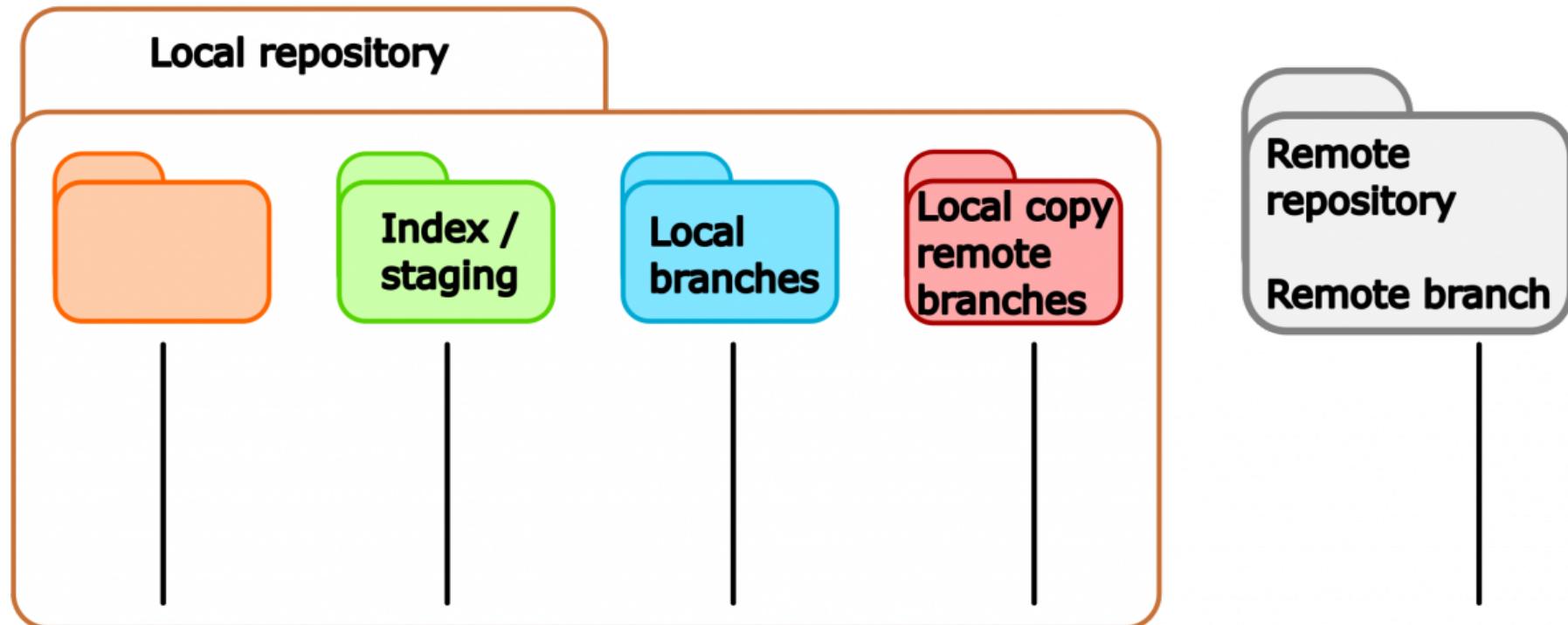
Renaming remotes

```
$ 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

The screenshot shows the GitHub homepage with a dark theme. On the left, there's a large white banner with the text "Built for developers". Below it, a paragraph explains GitHub's purpose: "GitHub is a development platform inspired by the way you work. From open source to business, you can host and review code, manage projects, and build software alongside 50 million developers." At the top, the URL https://github.com is in the address bar, along with standard browser icons. To the right of the address bar is a search bar with a magnifying glass icon and the word "Search". Below the search bar are links for "Sign in" and "Sign up". The main navigation menu includes "Why GitHub?", "Team", "Enterprise", "Explore", "Marketplace", and "Pricing". A prominent "Sign up" button is located at the bottom right of the sign-up form.

https://github.com

... 🌐 ⭐️ Search

Why GitHub? Team Enterprise Explore Marketplace Pricing

Search GitHub

Sign in Sign up

Built for developers

GitHub is a development platform inspired by the way you work. From open source to business, you can host and review code, manage projects, and build software alongside 50 million developers.

Username

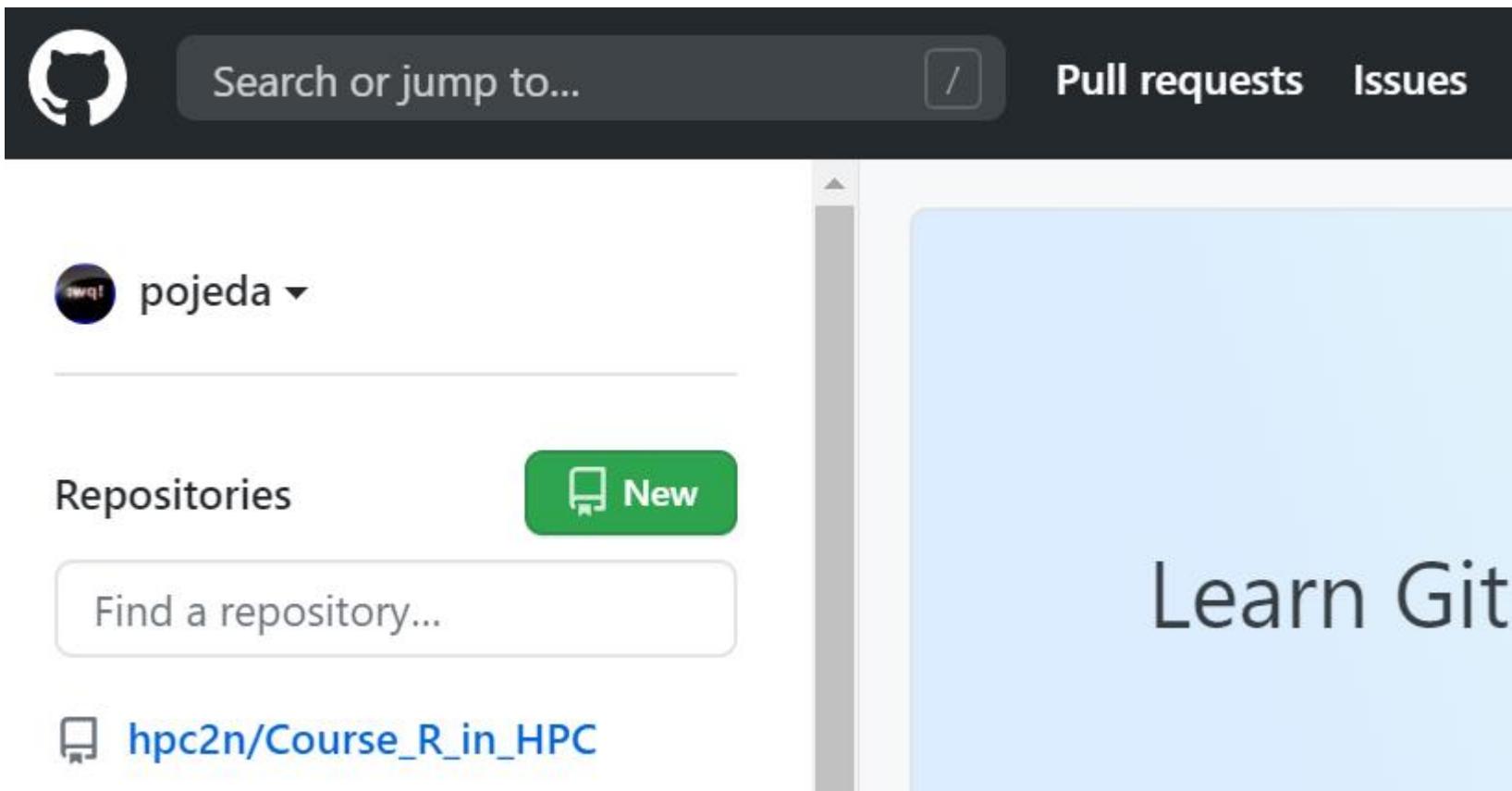
Email

Password

Make sure it's at least 15 characters OR at least 8 characters including a number and a lowercase letter. [Learn more](#).

Sign up for 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,

Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere?

[Import a repository.](#)

Owner *

Repository name *



pojeda ▾



/ my-first-repo



Great repository names are short and memorable. Need inspiration? How about [expert-waddle](#)?

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.

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

 Set up in Desktop

or

HTTPS

SSH

git@github.com:pojeda/my-first-repo.git

Get started by [creating a new file or uploading an existing file](#). We recommend every repository include a [README](#), [LICENSE](#), and [.gitignore](#).

...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

Pulse

Contributors

Traffic

Commits

Code frequency

Dependency graph

Network

Forks

Network graph

Timeline of the most recent commits to this repository and its network ordered by most recently pushed to.

The repository network shows the 100 most recently pushed forks. Do you need to see more forks? Please [give us feedback](#) on your usage of this feature.

pojeda

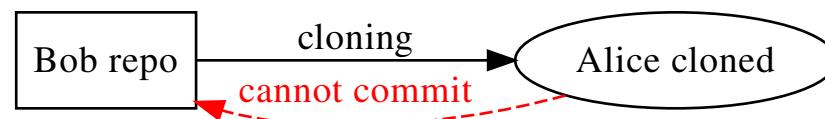
Owners ct

6

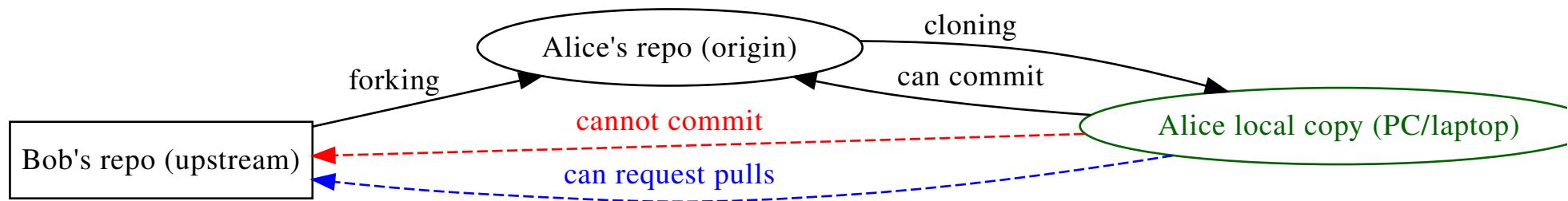
master

Working with other's repos

In the following scenario, a developer, Bob, has its repo on GitHub. Another developer, Alice, finds it useful. Alice can clone it but she cannot push changes unless Bob allows it:



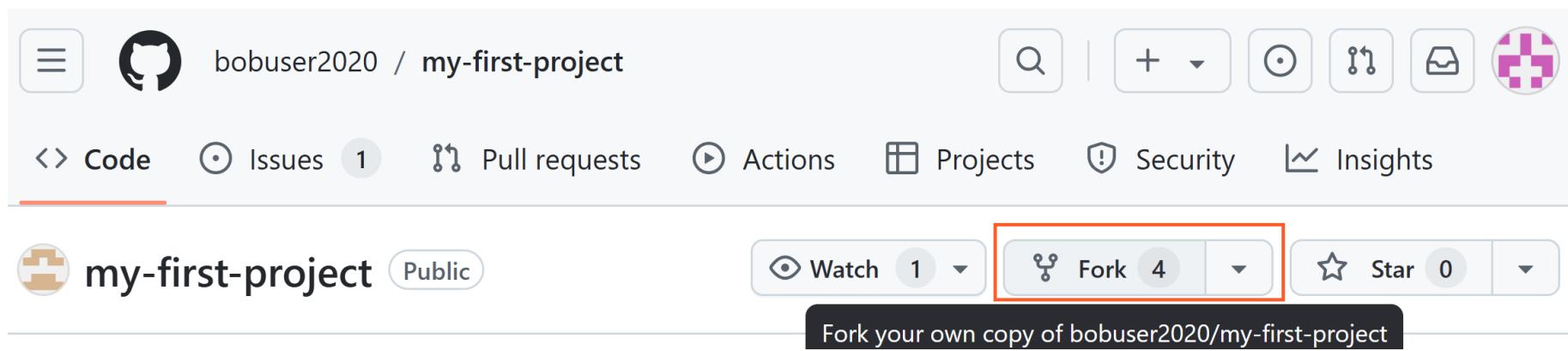
A better approach is to *fork* Bob's repository:



In this way, Alice can push changes to her repository and eventually make Bob aware of them as well.

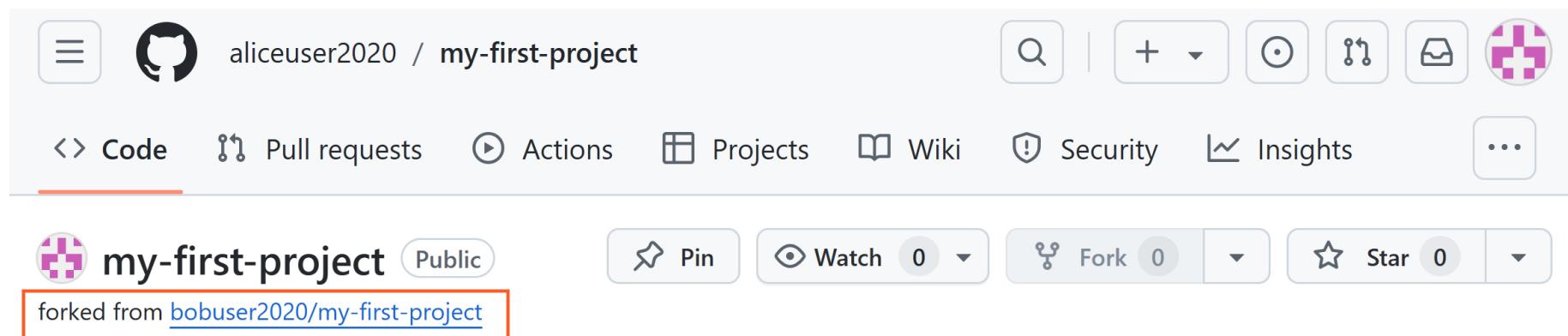
Forking a repository

To fork a repository, Alice go to the URL of the target repository and use the option *Fork* in Bob's repository:



Forking a repository

Then, Alice will see the forked repository on her user space:



The screenshot shows a GitHub repository page for 'aliceuser2020 / my-first-project'. The top navigation bar includes icons for issues, pull requests, code, actions, projects, wiki, security, insights, and more. Below the navigation bar, there's a summary card for the repository, showing it's public and has been forked from 'bobuser2020/my-first-project'. The 'Code' tab is currently active. At the bottom left of the page, there's a red box highlighting the text 'forked from bobuser2020/my-first-project'.

After doing some changes, Alice push them to her forked repository but she wants Bob become aware of them (1 commit in this case, click on this commit)

 my-first-project Public

forked from [bobuser2020/my-first-project](#)

 master ▾  

 Go to file  +  Code ▾

38

Pull request

A **pull request** will be suggested:

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](#) or [learn more about diff comparisons](#).



base repository: bobuser2020/my-first-project ▾

base: master ▾



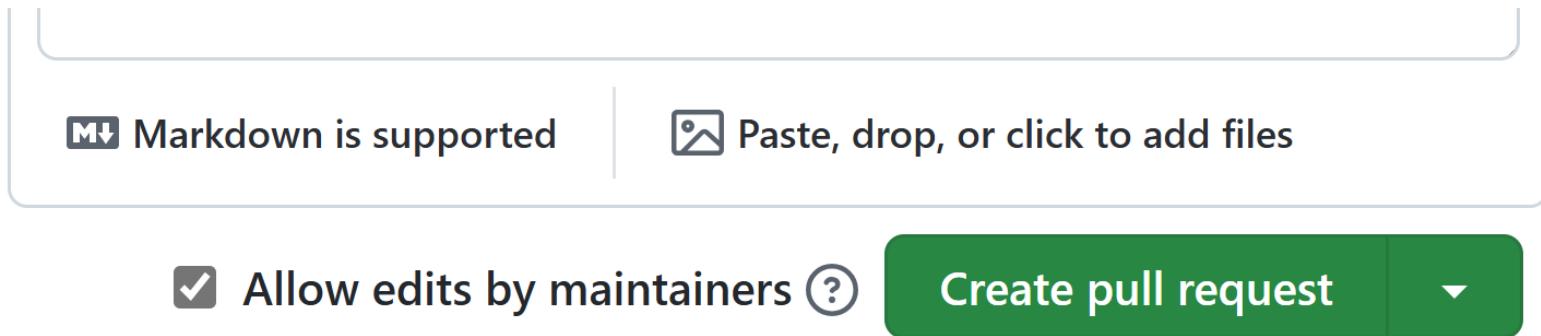
...

head repository: aliceuser2020/my-first-project ▾

compare: master ▾

✓ **Able to merge.** These branches can be automatically merged.

You can then create a the PR:



Remember, contributions to this repository should follow our [GitHub Community Guidelines](#).

Another way to create PR is with "Pull request" option:

The screenshot shows a GitHub interface for comparing branches. At the top, there are navigation links: Issues, Pull requests, Actions, Projects, Wiki, Security, and Insights. Below these, a section titled "Comparing changes" asks to choose two branches for a pull request. It shows a "base repository" dropdown set to "bobuser2020/my-first-project" and a "head repository" dropdown set to "aliceuser2020/my-first-project". Both dropdowns have "master" selected. A message indicates that the branches are "Able to merge".

Below this, a yellow banner allows users to "Discuss and review the changes in this comparison with others" and provides a "Create pull request" button.

Key statistics are displayed: 1 commit, 1 file changed, 0 comments, and 1 contributor. The commit details show a single commit from "Commits on Sep 28, 2020" that updated "README.md". This commit is verified and has the SHA "a8902e2".

The file change summary indicates 1 changed file with 3 additions and 1 deletion. The diff view shows the changes made to "README.md".

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

The screenshot shows a GitHub pull request page for the repository `bobuser2020 / my-first-project`. The pull request is titled "Update README.md #1". It shows a merge from `aliceuser2020:master` into `bobuser2020:master`. A comment from `aliceuser2020` states "change from Alice". The commit message is "Update README.md". The commit is verified and has a hash of `a8902e2`. Below the commit, there is a note: "Add more commits by pushing to the `master` branch on `aliceuser2020/my-first-project`". A green button at the bottom right says "Merge pull request". A sidebar on the left provides status updates: "Continuous integration has not been set up" and "This branch has no conflicts with the base branch".

bobuser2020 / my-first-project

Code Issues Pull requests 1 Actions Projects Wiki Security Insights Settings

Update README.md #1

Open aliceuser2020 wants to merge 1 commit into bobuser2020:master from aliceuser2020:master

Conversation 0 Commits 1 Checks 0 Files changed 1

aliceuser2020 commented 11 minutes ago

First-time contributor

change from Alice

Update README.md Verified a8902e2

Add more commits by pushing to the `master` branch on `aliceuser2020/my-first-project`.

Continuous integration has not been set up

This branch has no conflicts with the base branch

Merge pull request

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

bobuser2020 / my-first-project

Code Issues Pull requests 1 Actions Projects Wiki Security Insights Settings

Update README.md #1

Merged bobuser2020 merged 1 commit into bobuser2020:master from aliceuser2020:master 5 minutes ago

Conversation 0 Commits 1 Checks 0 Files changed 1

aliceuser2020 commented 17 minutes ago
change from Alice

Contributor

Update README.md Verified a8902e2

bobuser2020 merged commit ba421a0 into bobuser2020:master 5 minutes ago Revert

The screenshot shows a GitHub pull request merge history. At the top, it displays the repository name 'bobuser2020 / my-first-project' and various navigation links. Below this, the pull request title 'Update README.md #1' is shown, followed by a 'Merged' button and a message indicating the merge details. Underneath, there are tabs for 'Conversation', 'Commits', 'Checks', and 'Files changed'. The 'Commits' tab is active, showing a single commit from 'aliceuser2020' with a comment 'change from Alice'. This commit is marked as 'Verified' and has a commit hash 'a8902e2'. Below this, another commit is shown from 'bobuser2020' merging the previous commit into 'bobuser2020:master', which occurred 5 minutes ago. A 'Revert' button is also present next to this merge commit.

Issues

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

The screenshot shows the GitHub interface for a repository named 'bobuser2020 / my-first-project'. The 'Issues' tab is selected, indicated by a red underline. A search bar at the top contains the text 'support email'. Below the search bar, there are two tabs: 'Write' (selected) and 'Preview'. The main area is a rich text editor with a blue border, containing the text 'email from support team needed'. Above the editor is a toolbar with various formatting icons: H, B, I, bold, italic, etc. At the bottom of the editor area, there is a placeholder text 'Attach files by dragging & dropping, selecting or pasting them.' and a small 'M+' icon. At the very bottom of the screen, there is a footer note 'Styling with Markdown is supported' and a green button labeled 'Submit new issue'.

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

- Communicate 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.