

# Introduction to version control with Git

Day 2: Branching, Merging and collaboration workflows

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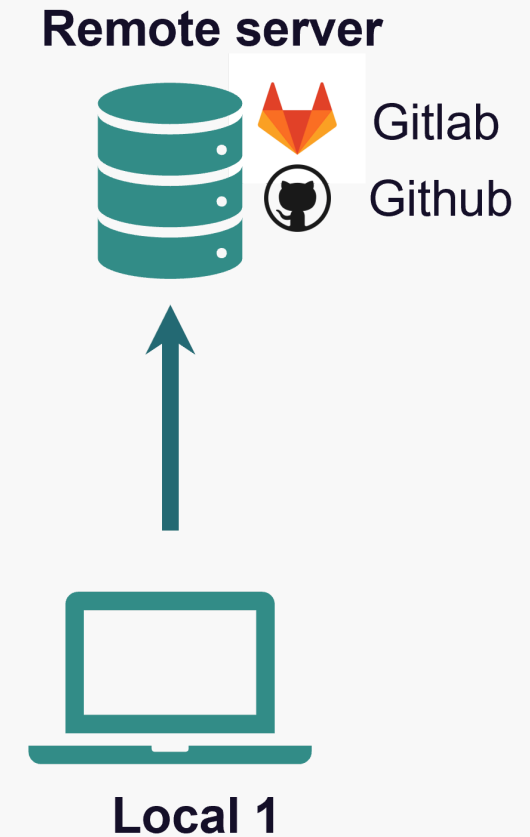
# Before we start

Let's check if we are all set with the [teams](#).

# Recap

Basic Git workflow:

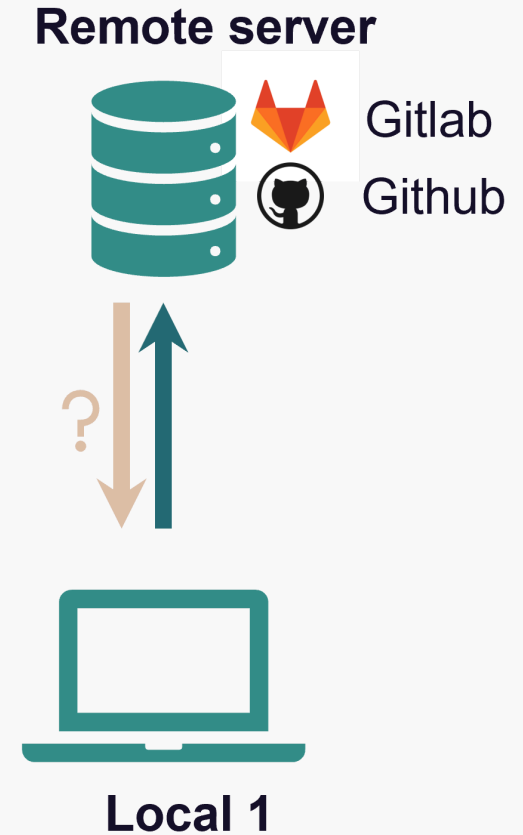
1. **Initialize** a Git repository
2. **Work** on the project
3. **Stage** and **commit** changes to the local repository
4. **Push** to the remote repository



# Recap

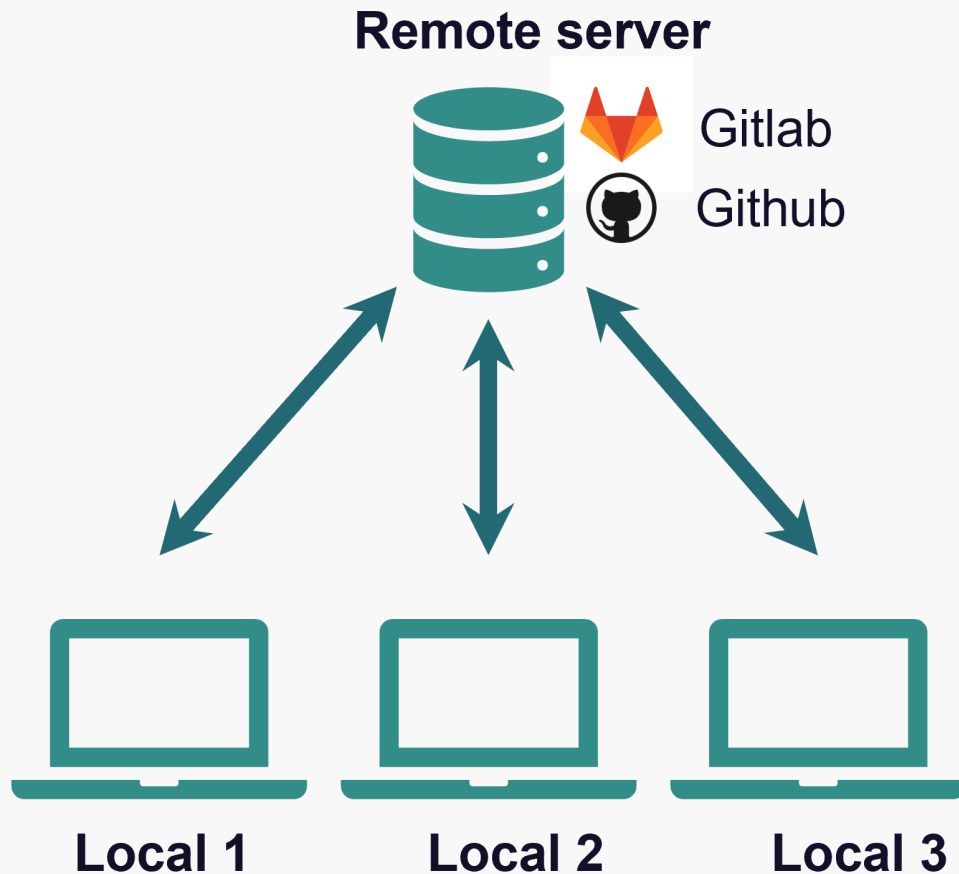
Basic Git workflow:

1. **Initialize** a Git repository
2. **Work** on the project
3. **Stage** and **commit** changes to the local repository
4. **Push** to the remote repository



# Recap

Git is a **distributed version control system**

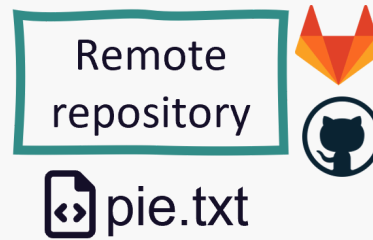


- Idea: many *local* repositories synced via one *remote* repo
- Collaborate with
  - **yourself** on different machines
  - your **colleagues** and friends
  - **strangers** on open source projects

# Get a repo from a remote

In Git language, this is called **cloning**

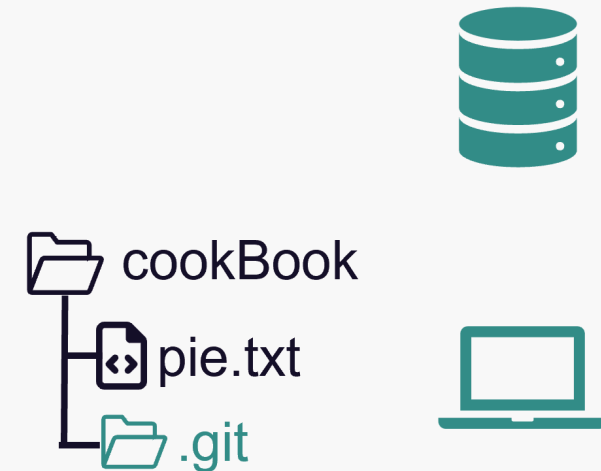
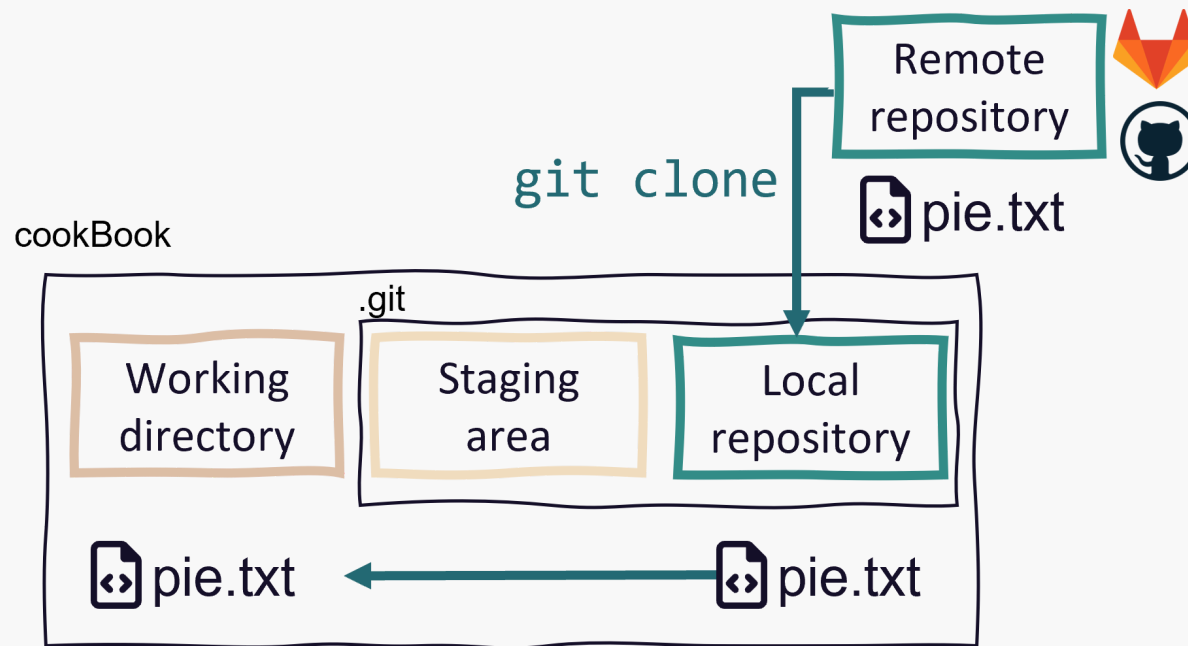
- Get a **full copy** of the remote repo



# Get a repo from a remote

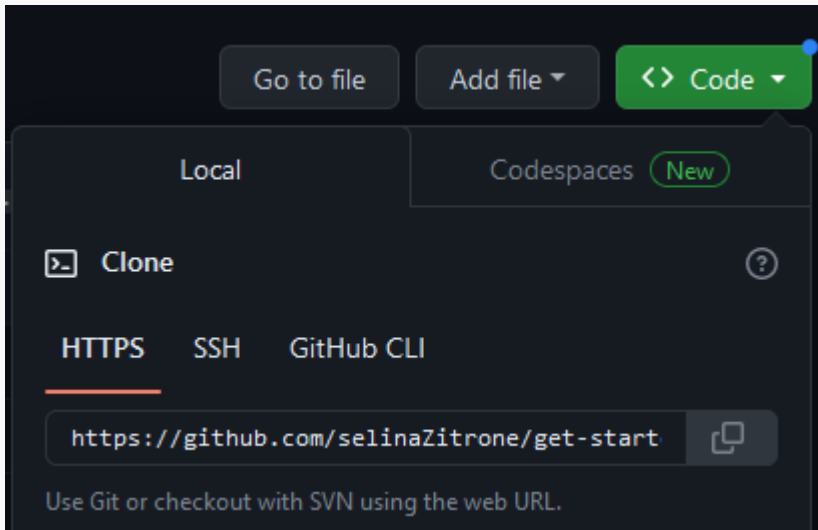
In Git language, this is called **cloning**

- Get a **full copy** of the remote repo



# Get a repo from a remote

To clone a repo, you need to know the repo's URL



- You can clone all public repositories
  - You can only push if you are authorized
- You can clone private repositories if you are a owner/collaborator

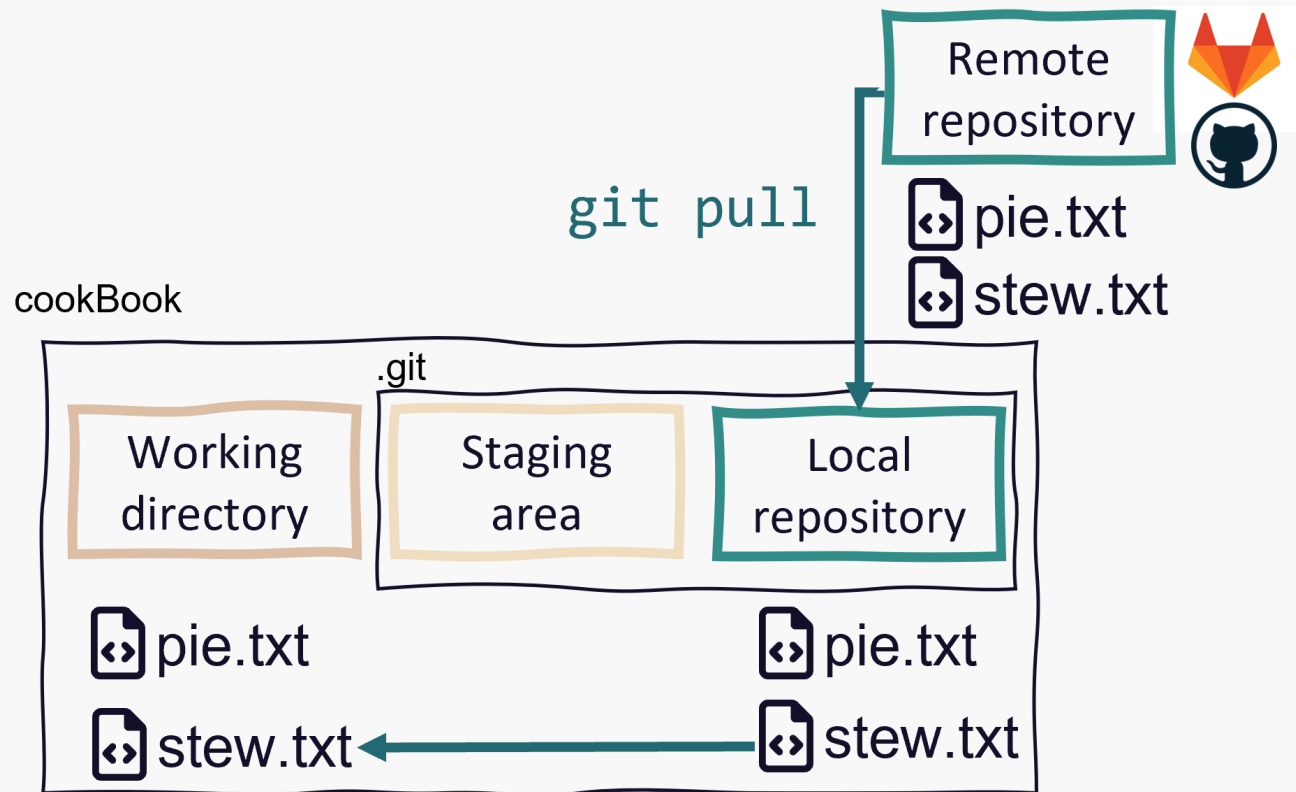


# Now you (5 min)

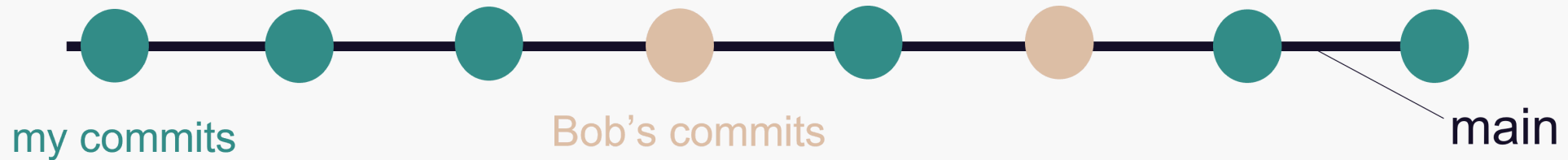
Clone your team mate's cook Book repo  
Details in [Task 2 "Clone"](#)

# Get changes from the remote

- Local changes, publish to remote: `git push`
- Remote changes, pull to local: `git pull`

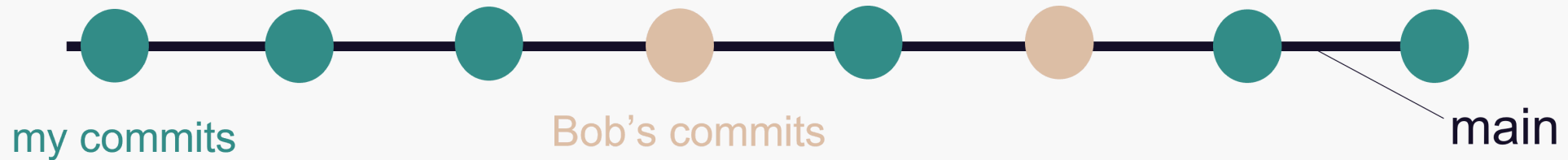


# A simple collaboration workflow



- One remote repo on GitHub, multiple local repos
- Idea: Everyone works on the same branch
  - Pull before you start working
  - Push after you finished working

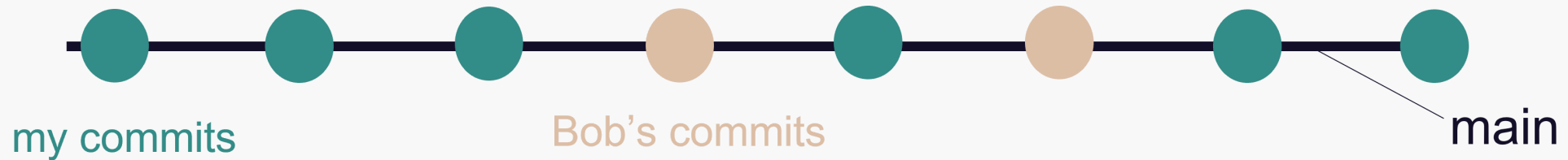
# A simple collaboration workflow



This works well if

- Repo is not updated often
- You don't work on the same files simultaneously
- No need to discuss changes before they are integrated
- You collaborate with yourself

# A simple collaboration workflow



This workflow starts to be problematic when

- People push often/forget to pull regularly
  - Potential conflicts on main
- You just want to experiment
  - Everything goes directly to main

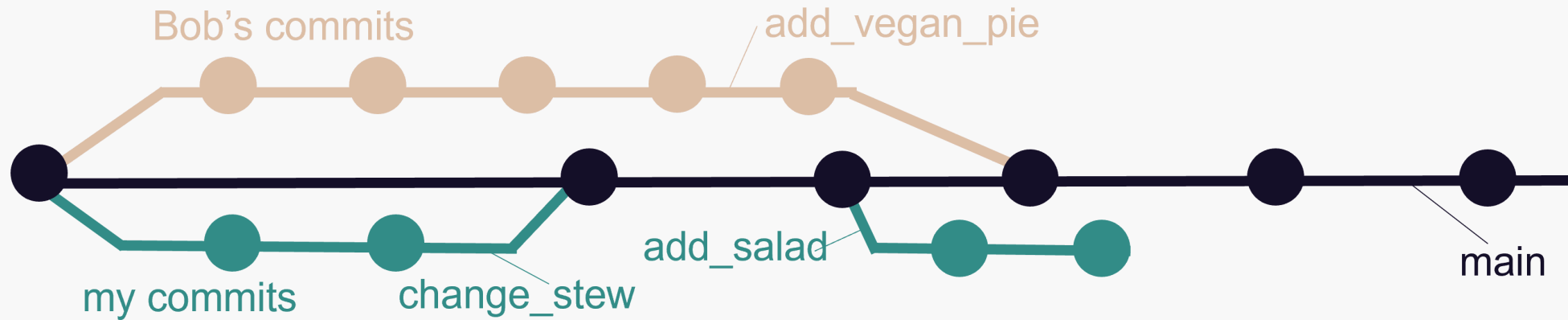
# Let's give it a try

- Make sure you are in the repository of your team mate
- Open a recipe in the cook book of your team mate
  - Repository -> Show in Explorer
- Change something in there
- Commit the change and push it

Get the changes of your team mate from the remote.

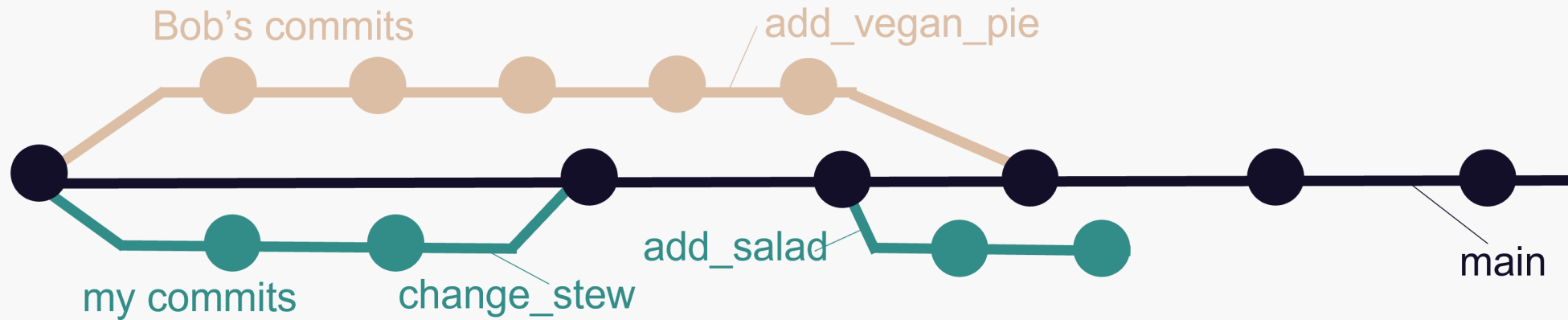
- Switch to your own cook book repository
- Pull the changes (Same button as the push button)
- Have a look at the commit history to see what changed

# A branching-merging workflow



- One remote repo on GitHub, multiple local repos
- Idea: Everyone works on their **separate branch**
  - **Merge** branch with the main when work is done
- **Pull before** and **push after** working

# A branching-merging workflow



## Advantages of this approach

- Guarantee that `main` always works
- Potential conflicts don't have to be solved on `main`
- You can experiment without messing up the `main`



# Working on a separate branch

The steps to create and work on a separate branch are easy:



- Create a local branch and switch to it
- Work on the branch like you are used to
  - Make changes, **stage** and **commit**

# Merging changes from a branch

To bring changes to the main branch you need to **merge** them.

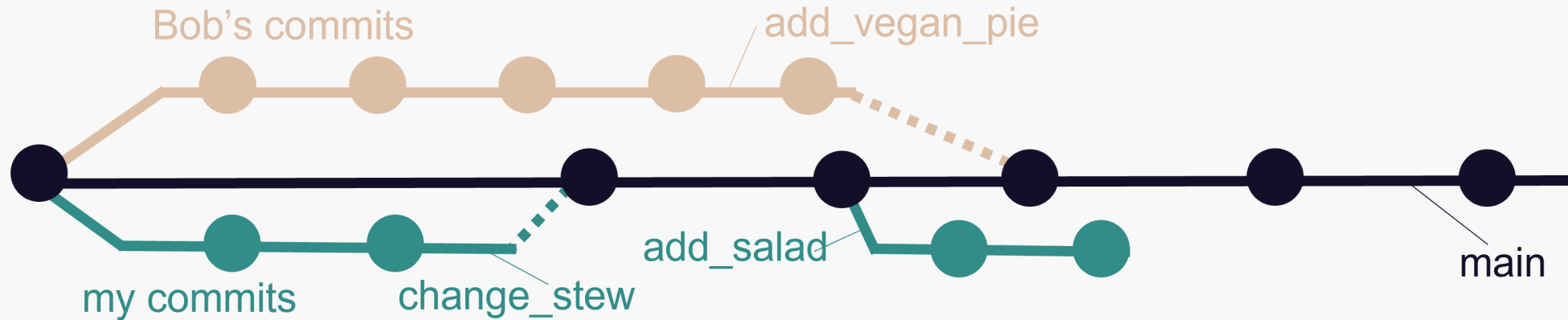


Git merge brings the commits from the branch to main

# Now you (10 min)

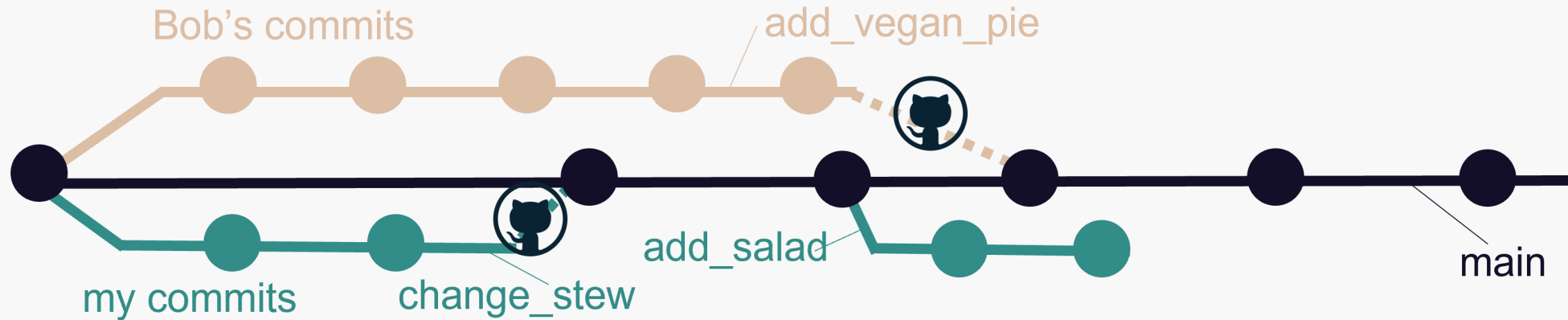
Create a branch and merge it in your team mate's cook book  
Complete task 2 "Branch and merge"

# A branching-merging workflow with GitHub



- One remote repo on GitHub, multiple local repos
- Idea: Everyone works on their separate branch
  - ~~Merge branch with the main when work is done~~

# A branching-merging workflow with GitHub



- One remote repo on GitHub, multiple local repos
- Idea: Everyone works on their separate branch
  - ~~Merge~~ branch with the main when work is done
  - Create a **pull request** on GitHub to ask for a merge
- Pull **before** and push **after** working

# A branching-merging workflow with GitHub

A pull request is basically asking your collaborators:

What do you think of my changes? Can we integrate them in main or do we still need to change something?

GitHub has nice features for pull requests, e.g.:

- **Provide context and explanations** for your changes
- Collaborators can easily **compare versions**
- Collaborators can **discuss and comment** on your changes

A pull request is merged on GitHub when **everyone agreed on the code**.

# Now you (10 min)

Create a pull request on your team mate'S repo  
Complete task 3 "Pull requests"

# Thanks for your attention

Questions?



# Next week

- Monday 2.30 - 3.30 on Webex (link via email)
- Until then: work with Git on your own (~ 1 - 2 h)
  - Pick something you find most interesting/useful to you
- Collect questions/problems/discoveries
- More Git topics

# Some ideas

- **Start working** with Git on one of **your research projects**
- **Publish** one of your projects on GitHub including a nice README
- **Practice collaboration** by contributing to your team mate's cook using pull requests
  - Your team mate can answer your pull requests and request some changes :)

# Some ideas

- Check out the How-To guides if you want to
  - [Recap GH Desktop](#)
  - learn about Git in the [terminal](#)
  - learn about [Git + R](#)
- If you find a mistake on my websites
  - **Edit the page** on GitHub (and make a Pull request) or **report an issue**
- Checkout the additional [resources](#)

# Appendix

# Merging changes from a branch

To bring changes to the main branch you need to **merge** them.



If there was a commit on a common file in main, a *merge commit* is introduced.

# Merging changes from a branch

To bring changes to the main branch you need to **merge** them.

- Mostly merging happens without problems, but...
- ... if the same line was edited on separate branches...
- ... there will be a merge conflict 🧑‍🔧

Merge conflicts need to be solved manually. You need to chose which of the conflicting versions you want to keep.