Introduction to version control with Git

Day 2: Branching, Merging and collaboration workflows

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September 28, 2025

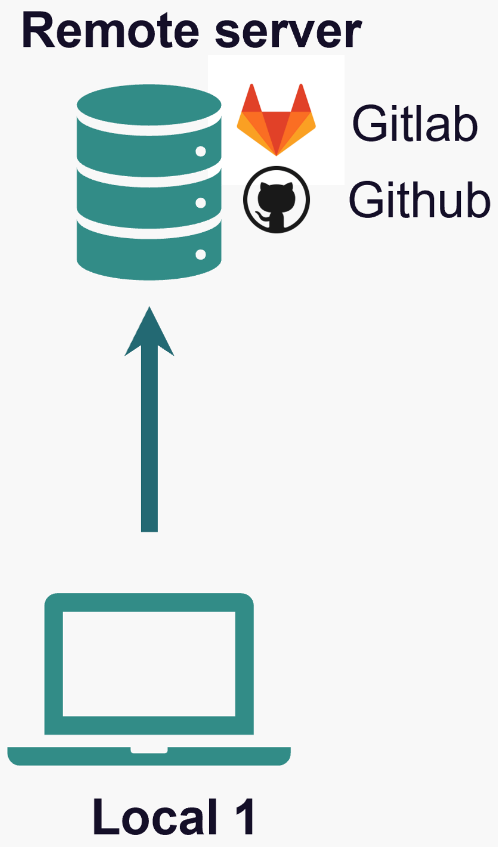
Before we start

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



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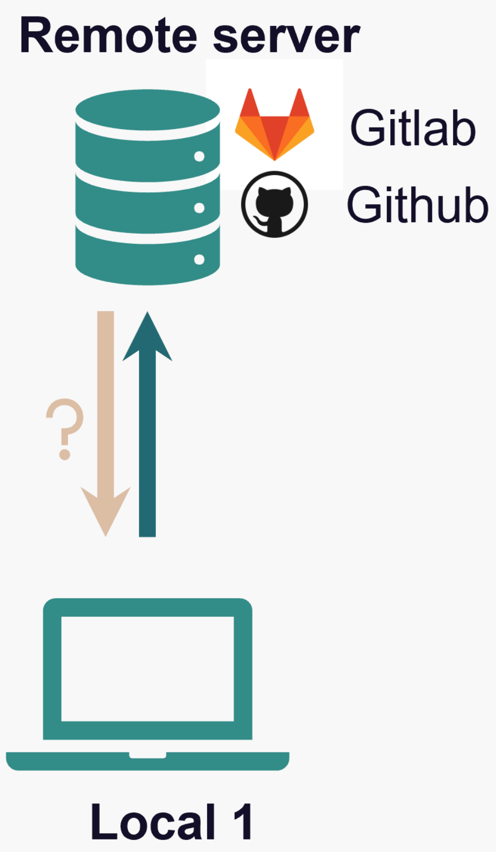
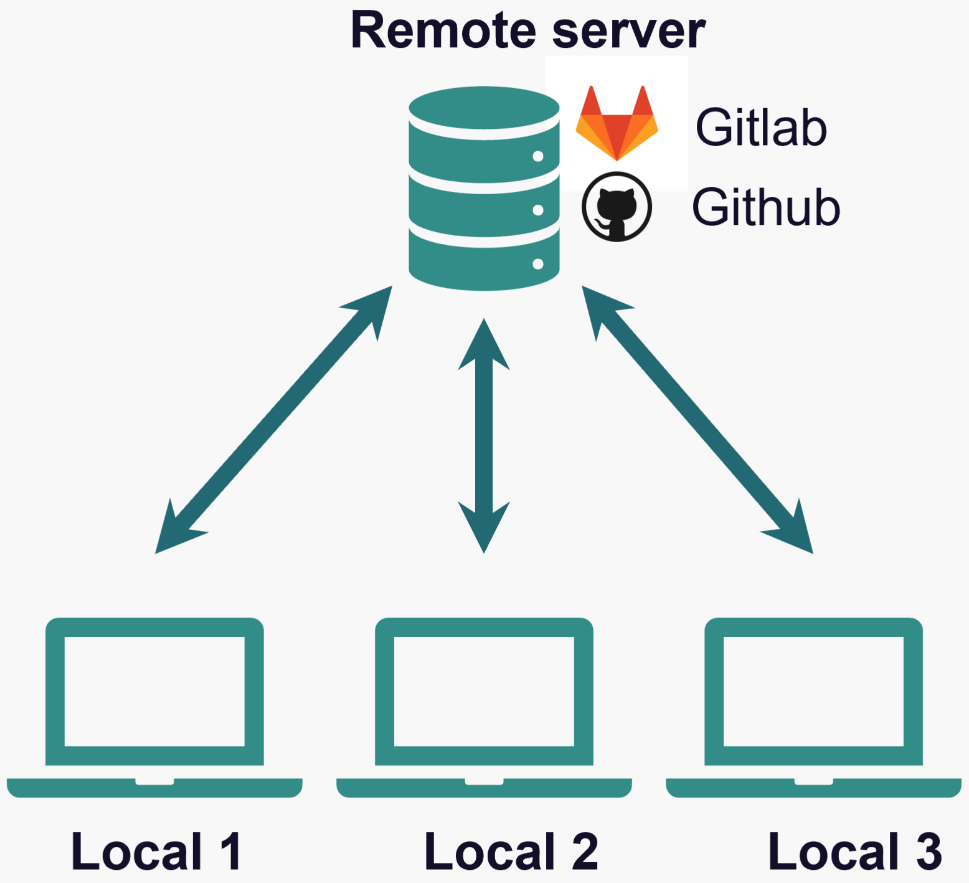


Recap

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

Remote repository
pie.txt

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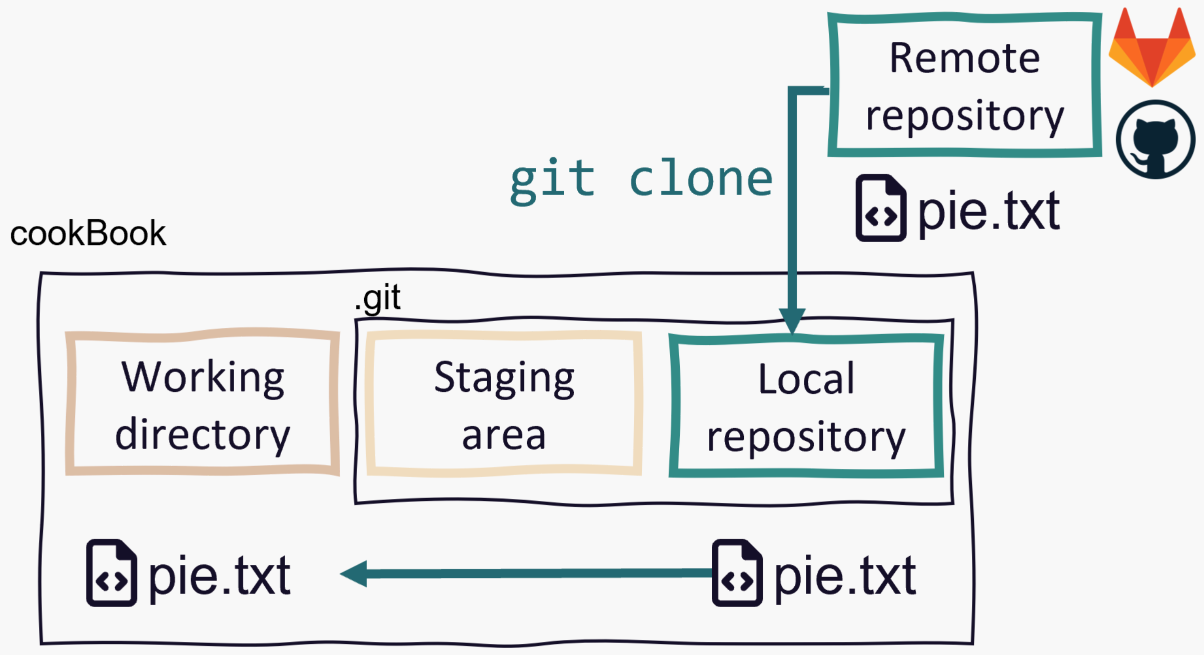
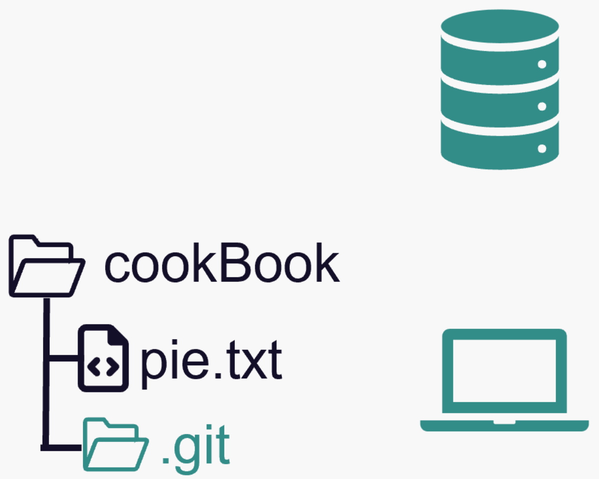


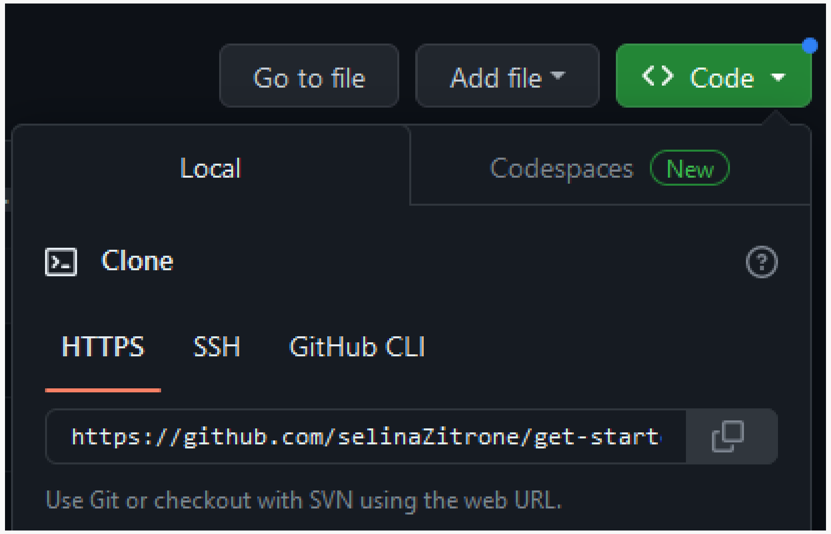


Get a repo from a remote

You can clone

- all of your own repositories (public and private)
- all repositories you are a collaborator on (public and private)
- all public repositories of other people

All you need is the URL of the remote repository



```
https://github.com/selinaZitrone/get-start
```

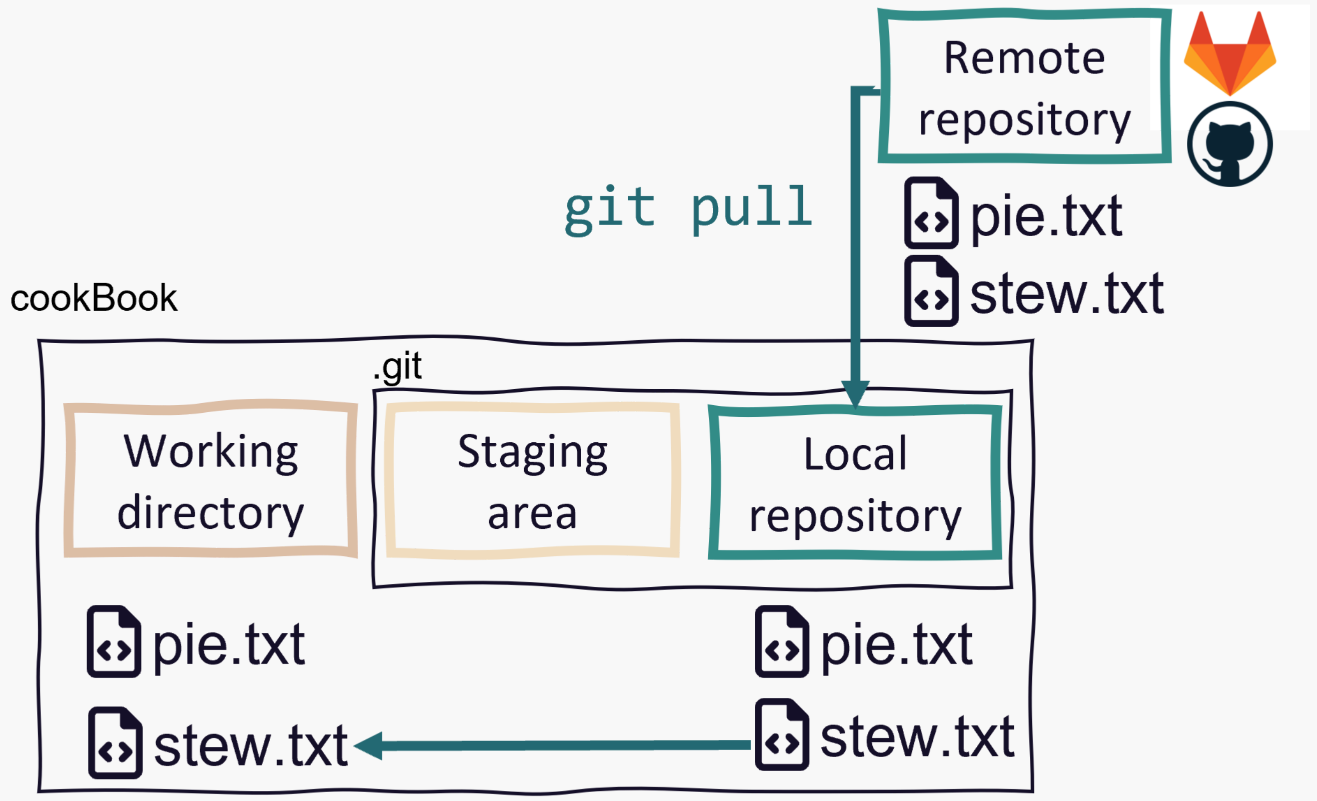
Use Git or checkout with SVN using the web URL.

Now you (5 min)

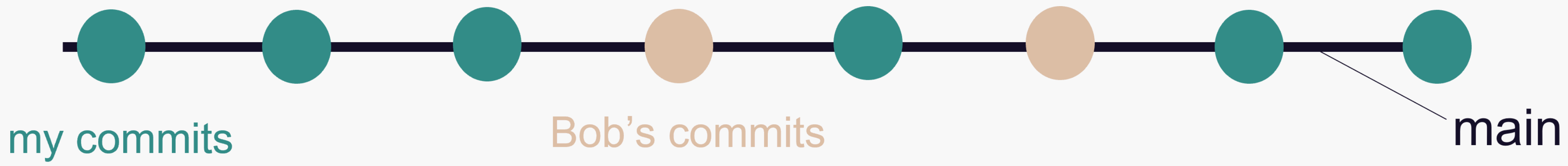
Clone your team mate’s cook Book repo
Details in Task 2 “Clone”

Get changes from the remote

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

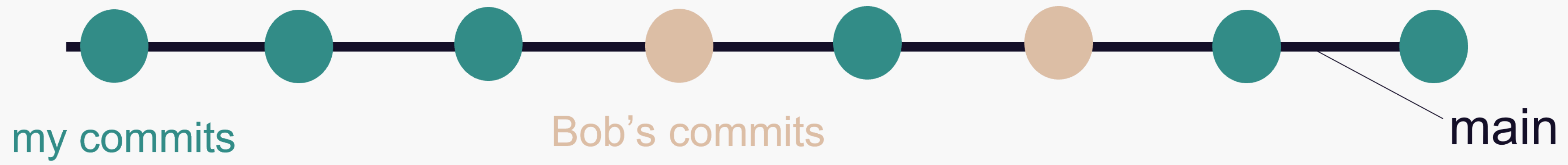


A simple collaboration workflow



- One remote repo on GitHub, multiple local repos (Bob and me)
- 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

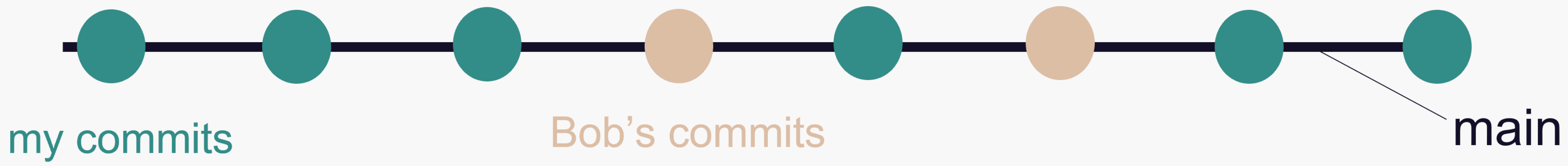
Let’s give it a try

- 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

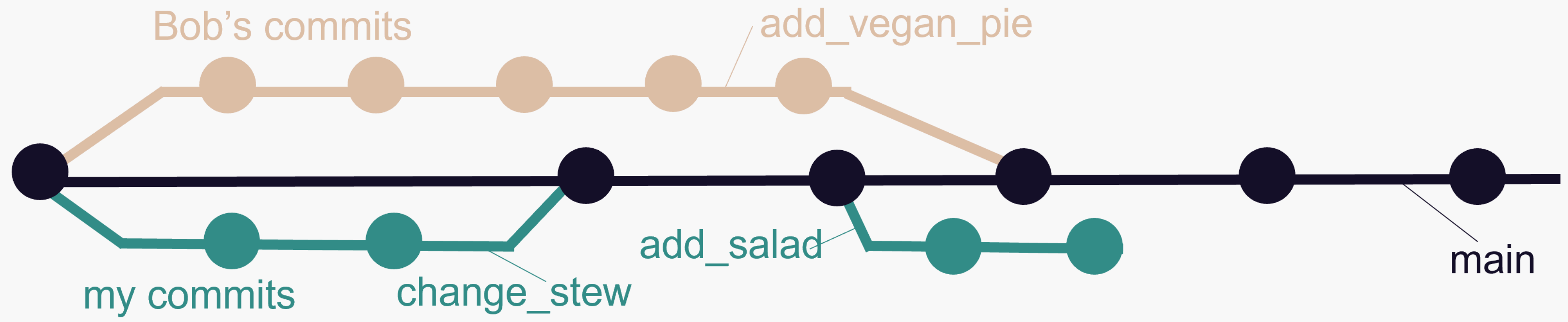
A simple collaboration workflow



This workflow starts to be problematic when

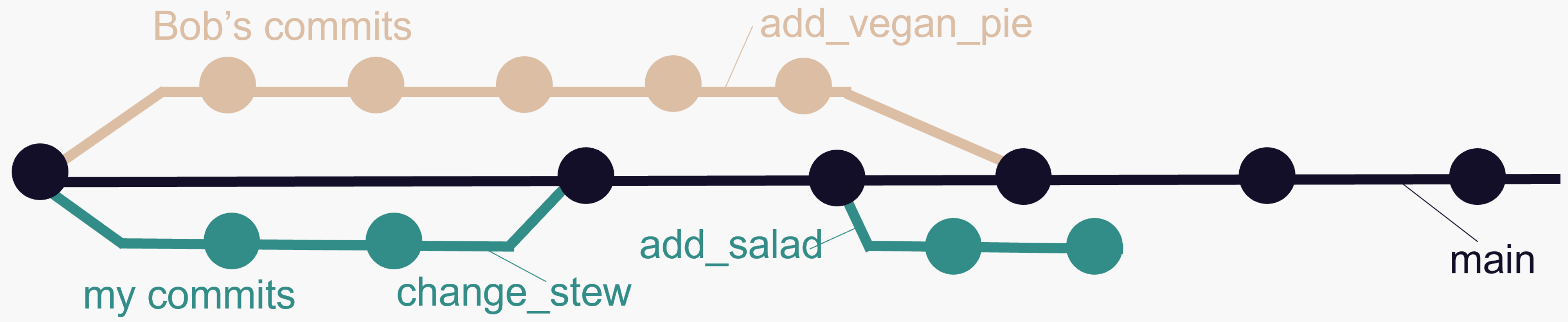
- People push often/forget to pull regularly
  - Potential conflicts on main
- You just want to experiment
  - Everything goes directly to main

A branching-merging workflow



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

A branching-merging workflow

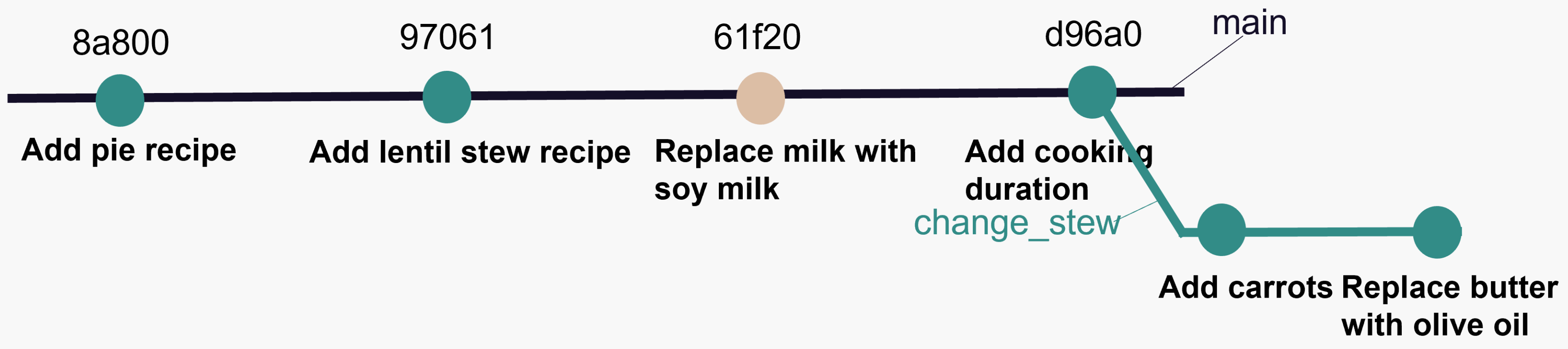


Advantages of this approach

- 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

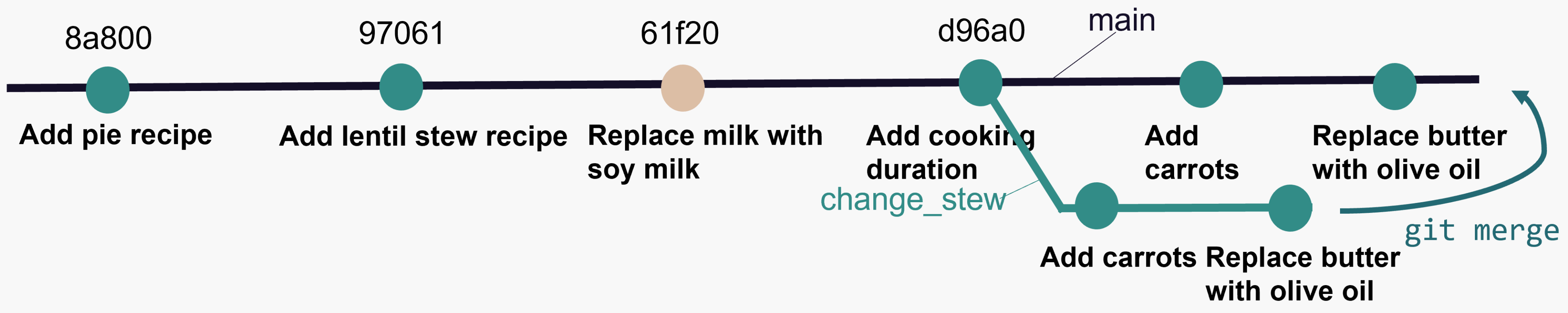
The steps to create and work on a separate branch are easy:



- 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

Merging changes from a branch

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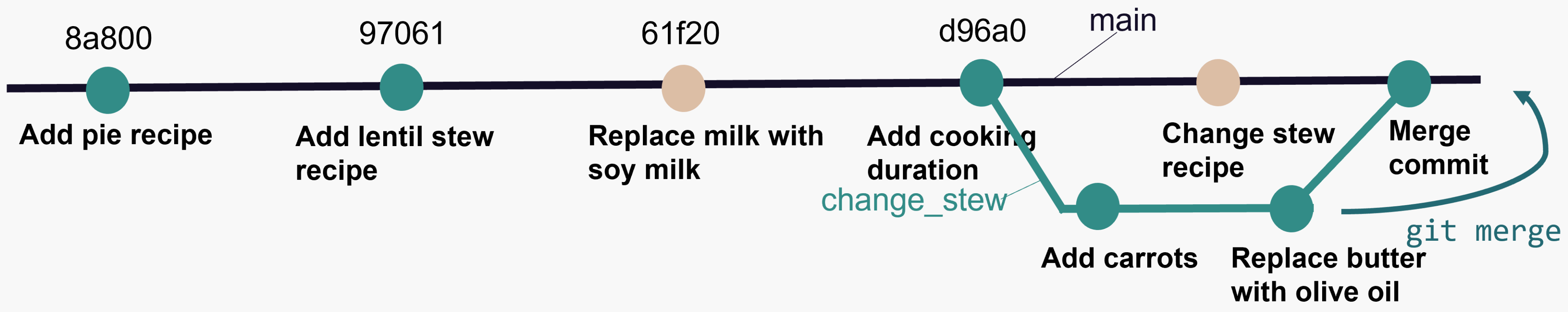

If there was a commit in main, a *merge commit* is introduced.

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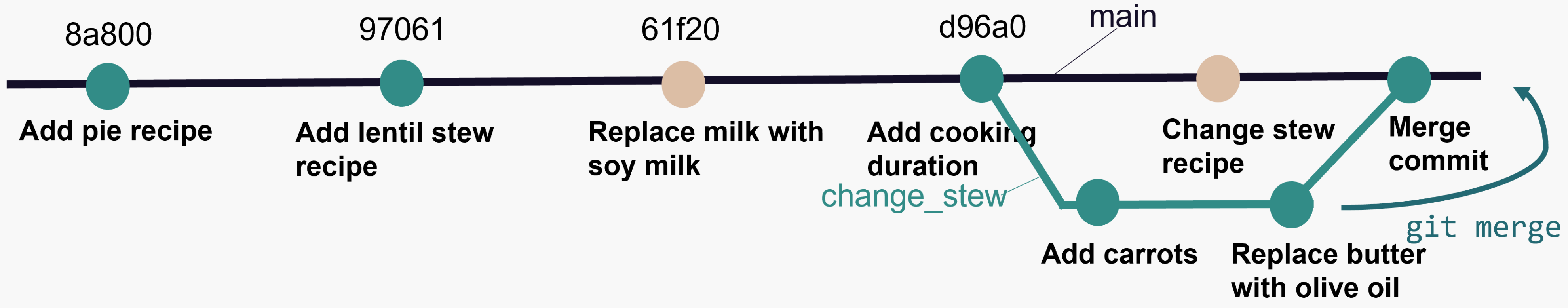


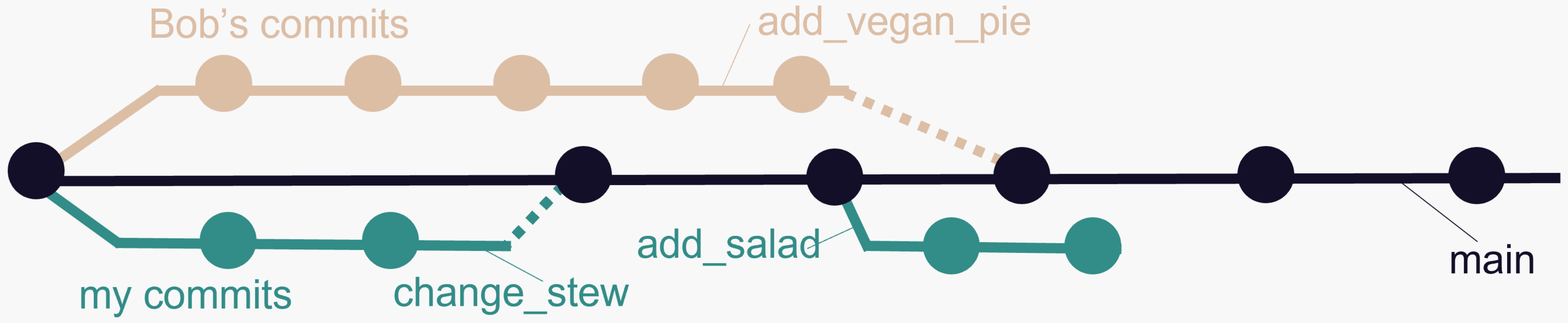
If there was a commit in main, a *merge commit* is introduced.

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



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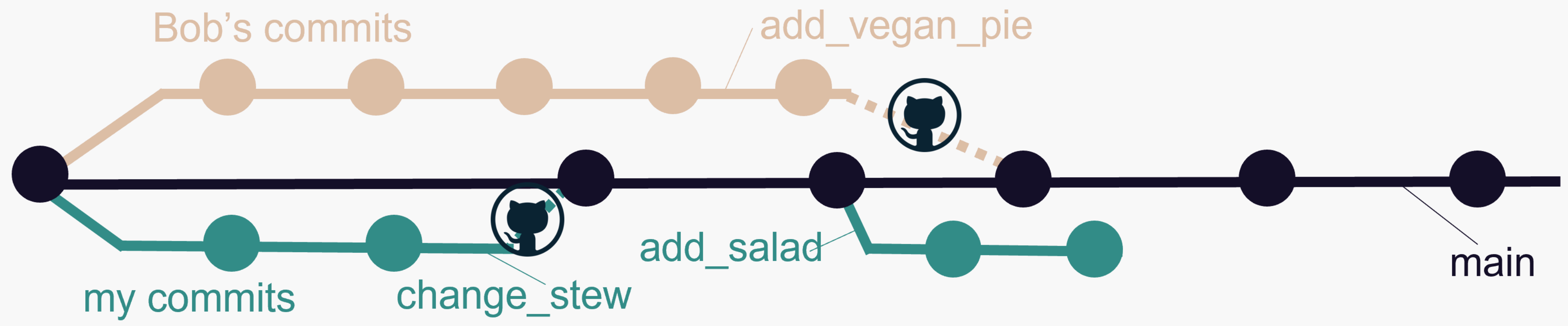
A branching-merging workflow with GitHub



- One remote repo on GitHub, multiple local repos
- Idea: Everyone works on the 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”

Some good practice tips

Git

- Commit often (small changes that can be described in one commit message)
- Write good commit messages (it becomes a habit)
- Push (at least) daily (backup!)
- Use `.gitignore`
- Don’t commit secrets ;)

Publishing

Some essentials that will improve your published repository:

- Add a good README.md file
  - Tell people what your project is about and how to use it
  - Check out the GitHub documentation for formatting options
- Add a LICENSE file
  - Tell others how to use your code
- Add a DOI to your repository (e.g. via Zenodo)

If you are interested, browse some nice GitHub repositories for inspiration (e.g. Computational notebooks guide)

What now?

- Git can seem complicated at first, but you will get used to it
- Make it a habit to use Git, start with your own projects
- Improve your workflow step by step
- Practice makes perfect

Check out the resources page and the different How-tos for more info and practice.

Thanks for your attention

Questions?