# Introduction to git - Part A

## Installation & Setup

# Contents

# 1 Goal

This lab is divided into two parts. Part A must be done at home as preparation, while Part B is done together in the lab. The lab will be done independently on your laptop and graded at the end.
In this lab we will learn the basic principles of version control `git` [1], in particular the tool Sublime Merge and optionally the Git command line tool, which have to be installed and configured on your computer (see Section 2). In addition, an account is created on the Github platform.
Finally, we will learn the basics of Markdown in Section 3 to easily write text files.

It is crucial that the installation and configuration is done carefully to avoid wasting time during part B of the laboratory.

# 2 Installation

The first step is to install Git and/or Sublimemerge. You can choose whether you want to use the command line or the GUI during the lab.

## 2.1 Sublime Merge

Visit the website https://www.sublimemerge.com then download and install the Sublime Merge tool [2].

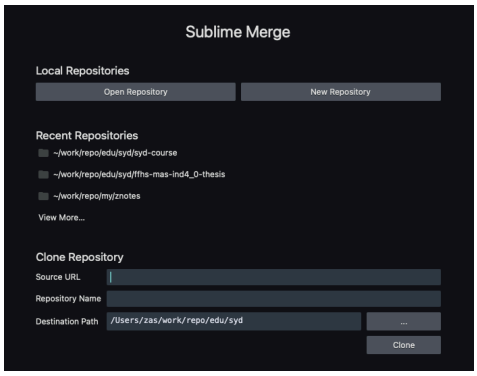



Figure 1 - Sublime Merge GUI

### 2.1.1 Configuration

When cloning a repository, Sublime Merge will automatically ask for your identity and prompt you to log in to your Github account.

### 2.1.2 Overview

The interface of Sublime Merge is presented in the Figure 2:

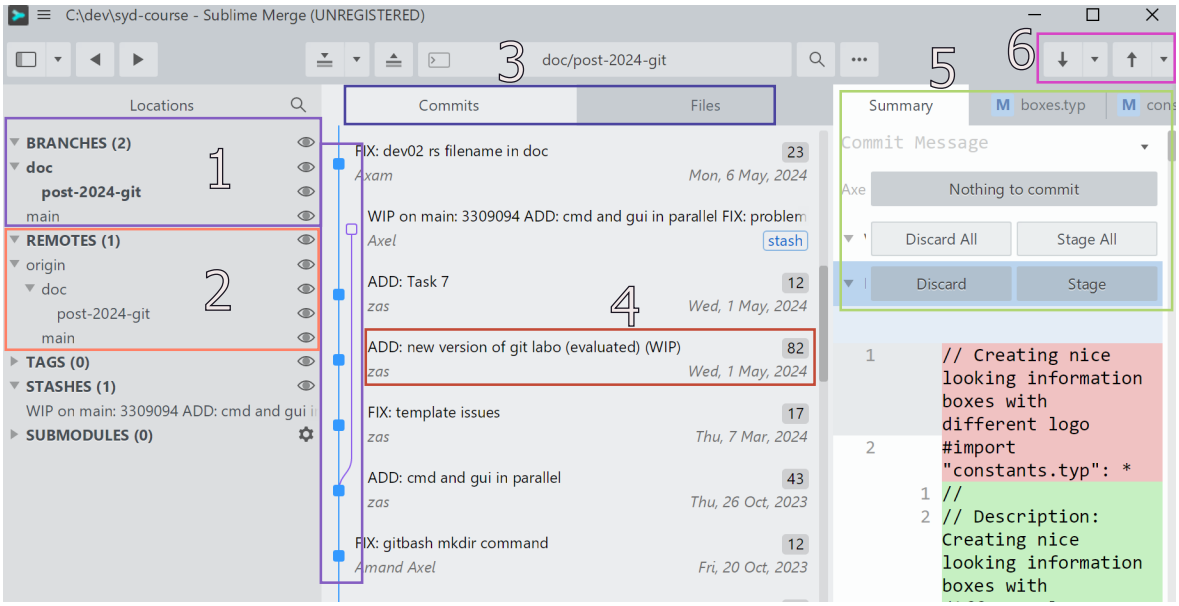



Figure 2 - Sublime Merge GUI

1. **Branches**: list of branches of the repository. You can create, delete and rename branches. They are also displayed in their timeline under the **Commits** tab (point 3).
2. **Remotes**: list of remote repositories, i.e. the servers on which the code is stored and to which you can **push**.
3. **Commits/Files**: tabs to switch between the chronological view of commits and the view of changes for the selected commit.
4. **Commit description**: a commit consists of a message, an author and a date.
5. **Current changes**: the files that have been modified compared to the last commit are listed here. You can select the files you want to **commit** by selecting them and clicking on the **Stage** button. As long as the files have not been **committed**, you can also remove a file from staging by clicking on the **Unstage** button or completely delete a file's changes by pressing **Discard** (⚠️ permanent deletion ⚠️).
6. **Pull / Push**: the two buttons allow you to **pull** - take the latest changes from the remote repository - and **push** - send local changes to the remote repository. It is also possible to **fetch** by clicking on the small arrow next to the **Pull** button, which allows you to see the new commits without modifying the local repository.

## 2.2 `git` - command line

You can download the latest version from the official website https://git-scm.com/ [1]. Git is available for Linux, Mac, and Windows. This lab requires git ≥ 2.27.

Start "Git Bash" on Windows or "Terminal" on MacOS. This is a Unix/Linux-like command editor that allows you to run Git commands in console mode.

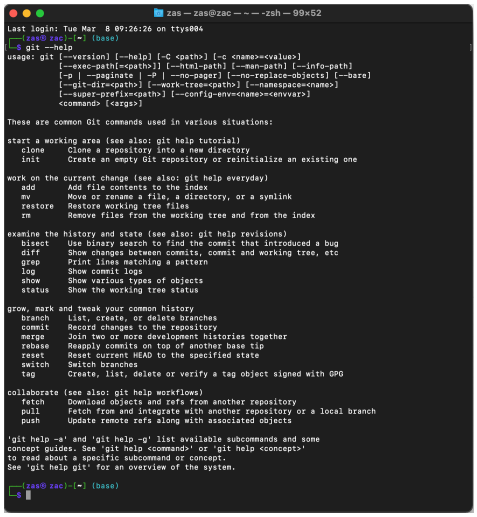



Figure 3 - git Terminal

Note that for all commands in Git Bash, you can get help by inserting `--help` after the command.

```
git --help
```

### 2.2.1 Global configuration

A variety of settings can be configured in Git. It is possible to change the settings globally on your computer (flag `--global`) or only for a specific repository.

We will now perform the minimal configuration. Use the following commands to set your identity in Git globally on the system. Use your name and email address. This information is publicly visible to identify your work (your commits).

```
git config --global user.name "Firstname Lastname"
git config --global user.email first.last@email.ch
```

For example:

```
git config --global user.name "Silvan Zahno"
git config --global user.email silvan.zahno@hevs.ch
```

You can check the configuration with the following command:

```
git config --list
```

You can also check a specific setting:

```
git config user.name
```

## 2.3 Online accounts

### 2.3.1 Github

Visit the website https://github.com then create an account and log in.

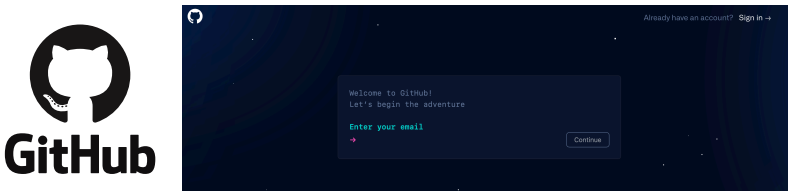



Figure 4 - GitHub Login

## 2.4 Windows Configuration

In order to see also the hidden `.git/` folder as well as file extensions, configure your Windows File Explorer as follows:

File Explorer ⇨ View ⇨ Show ⇨ Activate "**File name extensions**" and "**Hidden items**"

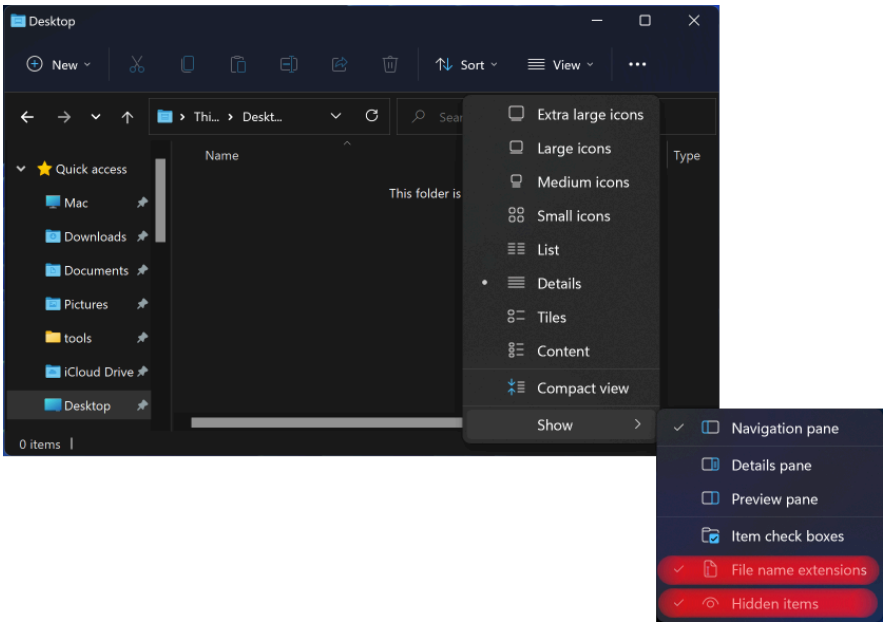



Figure 5 - Windows File Explorer Configuration

# 3 Markdown

Markdown is a lightweight markup language with plain-text formatting syntax. It is designed to be easy to read and write, while also being easily converted into PDF, HTML or other formats. Markdown is commonly used for formatting text on the web, such as in `README.md` files, documentation, forum posts, and messaging.

In order to write Markdown, you need your preferred Text editor supporting the format:

- Sublimetext with the MarkdownLivePreview plugin
- Zed: open markdown file and use `Ctrl/Cmd + Shift + V` to open the preview
- VSCode: open markdown file and use `Ctrl/Cmd + Shift + P => Markdown: Open Preview to the Side`
- Markdown Live Preview: online markdown editor
- ...

For example the intropage of this course is written in Markdown, you can see the source code of the page by clicking on the "Edit this page" button on the top right corner of the page or via the link.

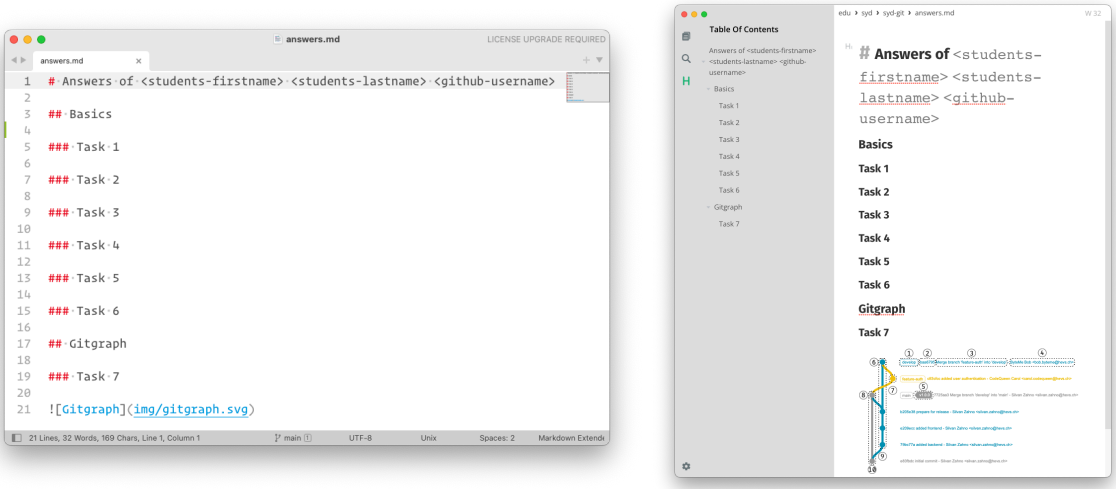



Table 1 - Left: Simple Texteditor (Sublime Text), Right: Marktext

> ⚠ For the lab, you will need to write a documents in Markdown format. Be ready with your editor.

## 3.1 Markdown syntax

Hereafter a short overview about how a markdown file is structured. The syntax is simple and easy to learn. The file has to be saved with the extension `.md`. A more complete syntax list can be found at https://wiki.zahno.dev/multimedia/writing/md/md_github.html.

```
# Title 1

## Title 2

### Title 3

Some simple Text _italic_ **bold**
~~Strikethough~~ `monospaced`

Fomulas $S = \sum_{i=1}^{n} x_{i}^{2}$

- List Item 1
- List Item 2
1. Numbered List Item 1
2. Numbered List Item 2

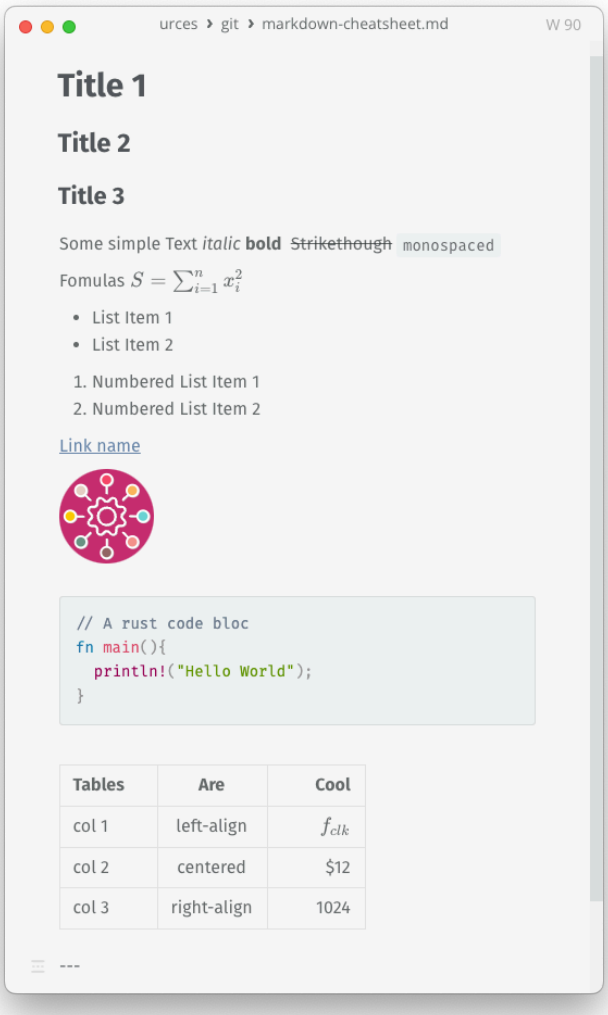
[Link name](https://hevs.ch/synd)

![logo](logo.svg)

```rust
// A rust code bloc
fn main(){
  println!("Hello World");
}
```

| Tables | Are          | Cool      |
| ------ |:------------:| ---------:|
| col 1  | left-align   | $f_{clk}$ |
| col 2  | centered     | $12       |
| col 3  | right-align  | 1024      |

---
```



# 4 Outro

Congratulations You have now installed and configured everything you need to work with Git. You should have:

- [ ] Installed Git and Sublime Merge
- [ ] Configured git with your name and email
- [ ] Created a GitHub account
- [ ] Familiarized yourself with the Sublime Merge graphical user interface (GUI)
- [ ] Familiarized yourself with the Git theory and commands
- [ ] Familiarized yourself with Markdown and its syntax

See the appendix Section A and Section B for a summary of the most important Git commands.

# Bibliography

[1] T. Linus, “Git.” Accessed: Apr. 25, 2023. [Online]. Available: https://git-scm.com/

[2] “Sublime Merge - Git Client from the Makers of Sublime Text.” Accessed: Apr. 25, 2023. [Online]. Available: https://www.sublimemerge.com/

[3] gitlab, “Git Cheatsheet.” 2023.

[4] “GitHub Git Spickzettel.” Accessed: Apr. 25, 2023. [Online]. Available: https://training.github.com/downloads/de/github-git-cheat-sheet/

# 5 Appendix

# A GIT commands

Github git cheatsheet [3], [4]

## AA Review changes and make a commit transaction.

```
git status
```

Lists all new or changed files ready for commit.

```
git diff
```

Displays file changes that have not yet been indexed.

```
git add [file]
```

Indexes the current state of the file for versioning.

```
git diff --staged
```

Shows the differences between the index (“staging area”) and the current file version.

```
git reset [file]
```

Takes the file from the index, but preserves its contents.

```
git commit -m "[descriptive message]"
```

Adds all currently indexed files permanently to the version history.

## AB Synchronize changes

Register an external repository (URL) and swap the repository history.

```
git fetch [remote]
```

Downloads the entire history of an external repository.

```
git merge [remote]/[branch]
```

Integrates the external branch with the current locally checked out branch.

```
git push [remote] [branch]
```

Pushes all commits on the local branch to GitHub.

```
git pull
```

Pulls the history from the external repository and integrates the changes.

# B Most used Git commands

## BA Start a working area

- `clone` - Clone a repository into a new directory
- `init` - Create an empty Git repository or reinitialize an existing one

## BB Work on the current change

- `add` - Add file contents to the index
- `mv` - Move or rename a file, a directory, or a symlink
- `reset` - Reset current HEAD to the specified state
- `rm` - Remove files from the working tree and from the index

## BC Examine the history and state

- `log` - Show commit logs
- `show` - Show various types of objects
- `status` - Show the working tree status

## BD Grow, mark and tweak your common history

- `branch` - List, create, or delete branches
- `checkout` - Switch branches or restore working tree files
- `commit` - Record changes to the repository
- `diff` - Show changes between commits, commit and working tree, etc
- `merge` - Join two or more development histories together
- `rebase` - Reapply commits on top of another base tip
- `tag` - Create, list, delete or verify a tag object signed with GPG

## BE Collaborate

- `fetch` - Download objects and refs from another repository
- `pull` - Fetch from and integrate with another repository or a local branch
- `push` - Update remote refs along with associated objects