

Getting started with AI

Basic Skills & Tools

Steffen Bollmann

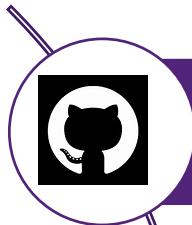
Research Fellow

School of Information Technology and Electrical Engineering

... building AI models is easy? Right?



... building AI models is easy? Right?

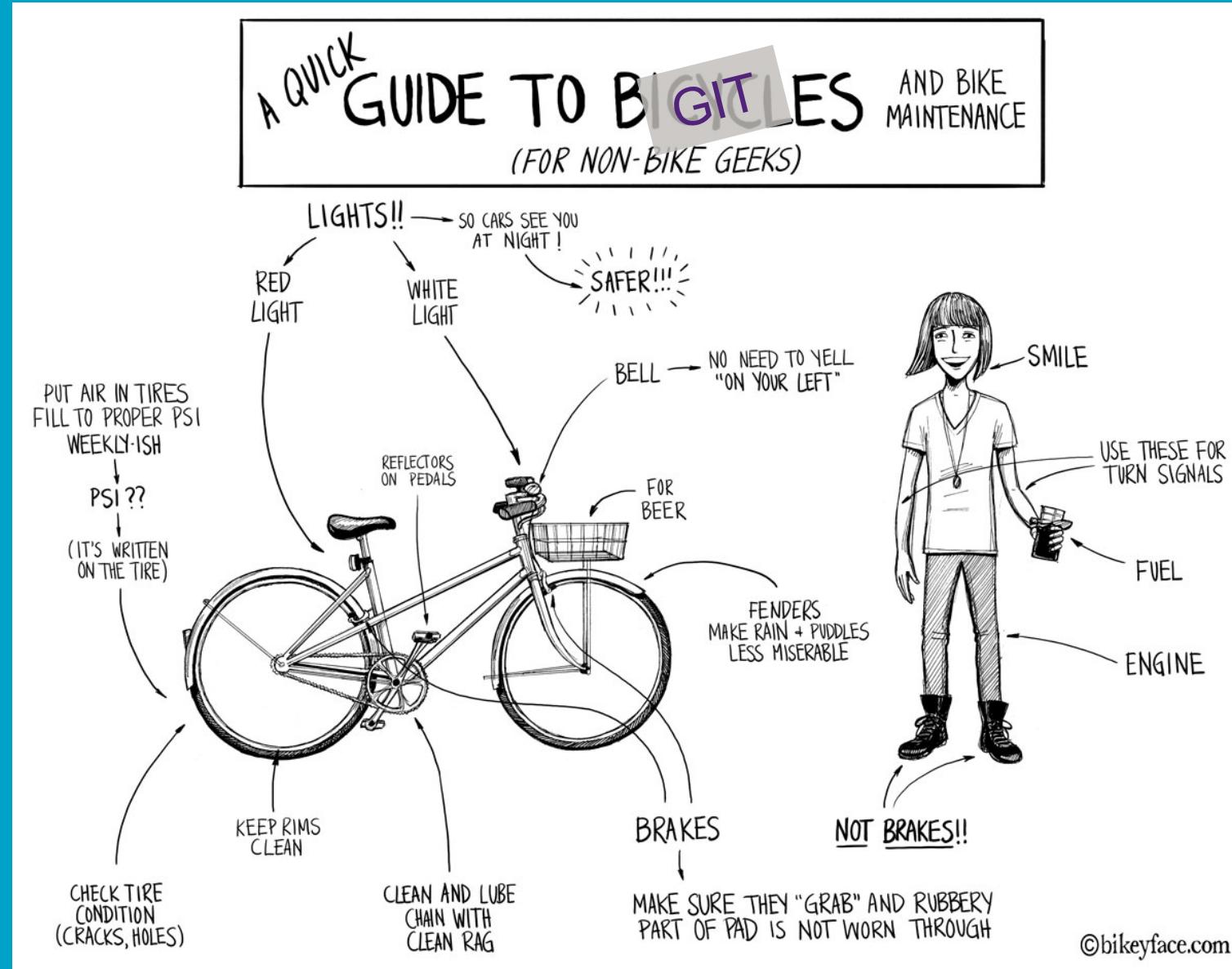


Code under version control -> **basics in git**

Most git tutorials you find online:



CREATE CHANGE



1) Using code from
github.com

2) Version Control
for your project

Use Cases

3) Adding someone
to your project

4) Contributing to
a project

1) Using code from
github.com

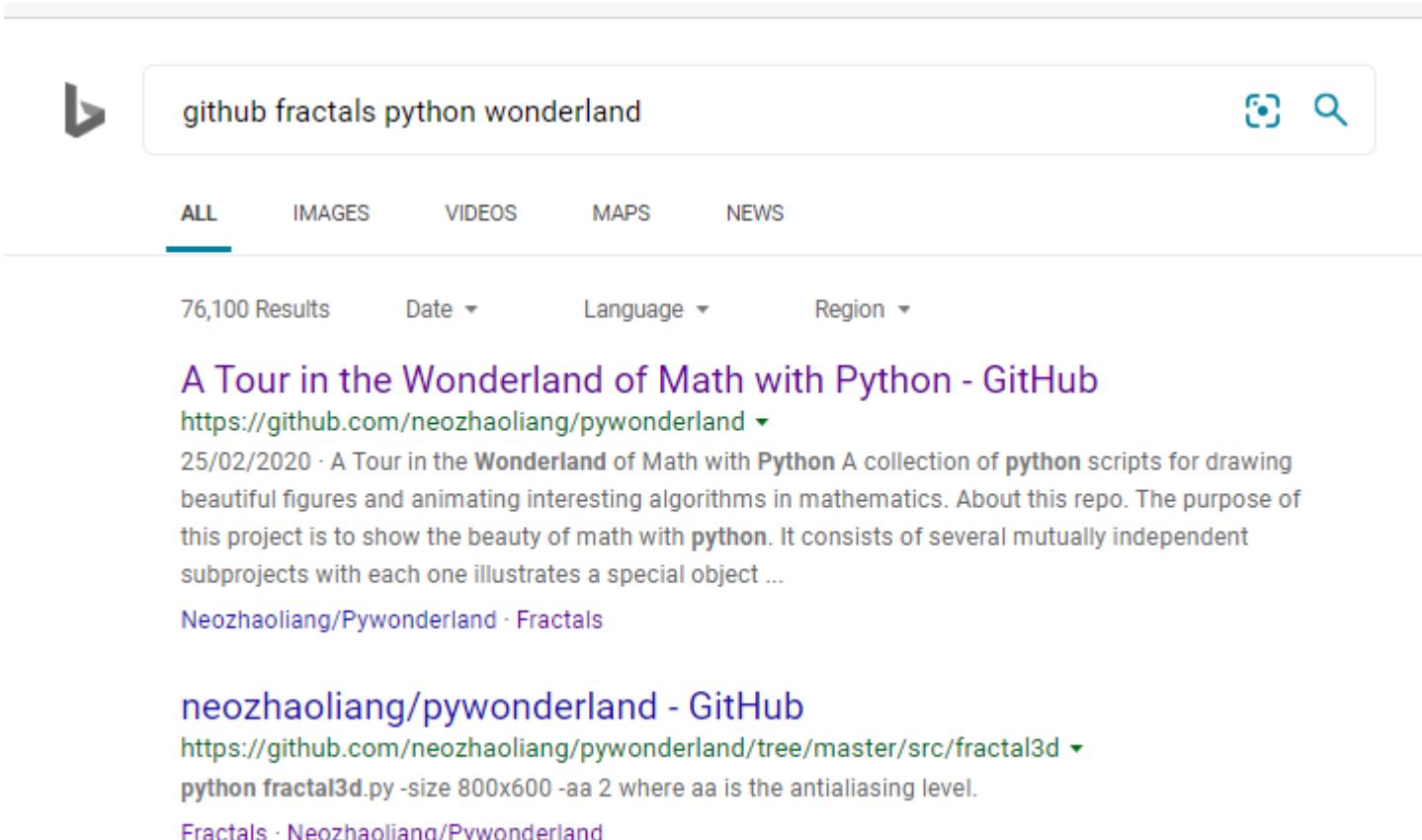
2) Version Control
for your project

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a project

Example: Fractals in python



github fractals python wonderland

ALL IMAGES VIDEOS MAPS NEWS

76,100 Results Date Language Region

A Tour in the Wonderland of Math with Python - GitHub
<https://github.com/neozhaoliang/pywonderland> ▾
25/02/2020 · A Tour in the Wonderland of Math with Python A collection of python scripts for drawing beautiful figures and animating interesting algorithms in mathematics. About this repo. The purpose of this project is to show the beauty of math with python. It consists of several mutually independent subprojects with each one illustrates a special object ...
Neozhaoliang/Pywonderland · Fractals

neozhaoliang/pywonderland - GitHub
<https://github.com/neozhaoliang/pywonderland/tree/master/src/fractal3d> ▾
python fractal3d.py -size 800x600 -aa 2 where aa is the antialiasing level.
Fractals · Neozhaoliang/Pywonderland



neozhaoliang / pywonderland

Watch

154

Star

3.8k

Fork

335

Code

Issues 0

Pull requests 0

Actions

Security 0

Insights

A tour in the wonderland of math with python.

fractals penrose-tilings polytopes hopf-fibration reaction-diffusion coxeter-groups hopcroft domino-shuffling-algorithm

coupling-from-the-past uniform-spanning-tree todd-coxeter uniform-tilings hyperbolic-tilings hyperbolic-honeycombs

396 commits

1 branch

0 packages

0 releases

5 contributors

MIT

Branch: master

New pull request

Find file

Clone or download



neozhaoliang update galley image



Latest commit 4437564 19 hours ago



src

add code for drawing vertices on coxeter planes

yesterday



.deepsource.toml

Add .deepsource.toml

6 months ago



.gitignore

add examples for hyperbolic honeycomb code

5 months ago



.travis.yml

remove python3.5 test in travis.yaml

last month



120-cell.png

some minor changes

7 months ago



LICENSE

delete history commits and upload new files

3 years ago



README.md

add upper half plane model

5 days ago



gallery.png

update galley image

19 hours ago



install_dependencies.sh

add upper half plane model

5 days ago



requirements.txt

add upper half plane model

5 days ago



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.gitignore	add examples for hyperbolic honeycomb code	5 months ago
.travis.yml	remove python3.5 test in travis.yaml	last month
120-cell.png	some minor changes	7 months ago
LICENSE	delete history commits and upload new files	3 years ago
README.md	add upper half plane model	5 days ago
gallery.png	update galley image	19 hours ago
install_dependencies.sh	add upper half plane model	5 days ago
requirements.txt	add upper half plane model	5 days ago



neozhaoliang / pywonderland

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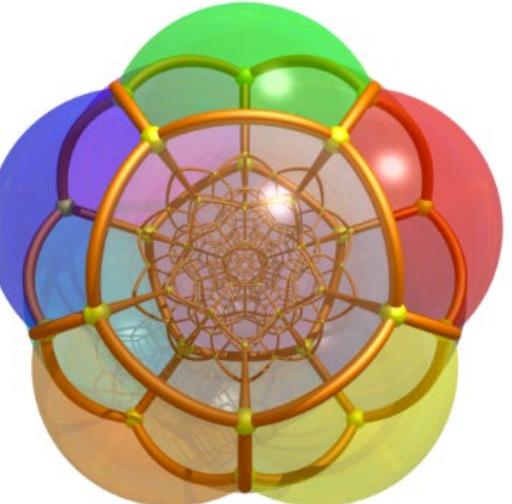


requirements.txt

add upper half plane model

5 days ago

pywonderland

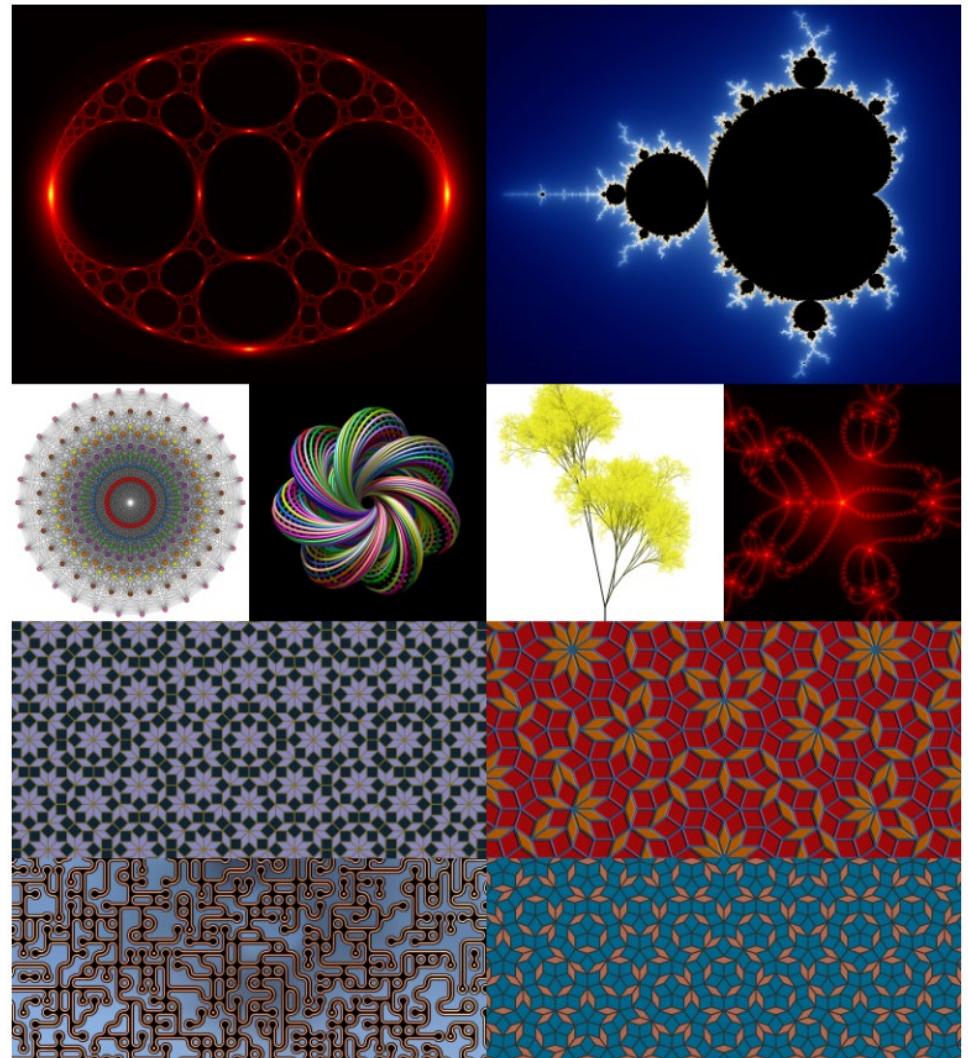


README.md

A Tour in the Wonderland of Math with Python

A collection of python scripts for drawing beautiful figures and animating interesting algorithms in mathematics.

build passing license MIT python 3.5 | 3.6



Intermezzo I

How to install git
(and create a nice development environment for Python)

Ingredients for a Python IDE

- Integrated Development Environment: Visual Studio Code
- Python via miniconda
- Git



Note: Most IDEs (pycharm, matlab, RStudio) already have a git interface

Install git (e.g. from <https://gitforwindows.org/>)



Install miniconda

Miniconda

Miniconda is a free minimal installer for conda. It is a small, bootstrap version of Anaconda that includes only conda, Python, the packages they depend on, and a small number of other useful packages, including pip, zlib and a few others. Use the [conda install command](#) to install 720+ additional conda packages from the Anaconda repository.

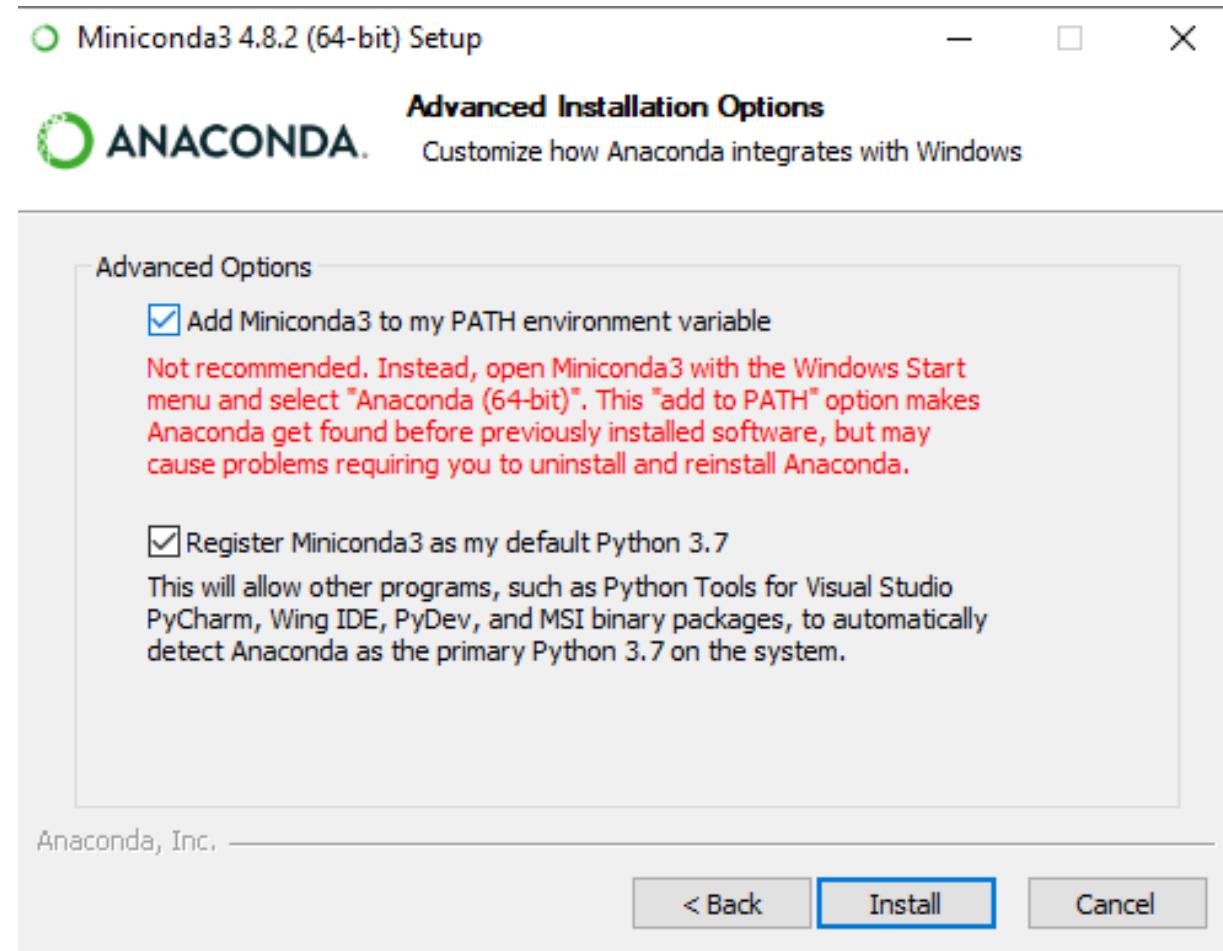
See if Miniconda is right for you.

Windows installers

Windows

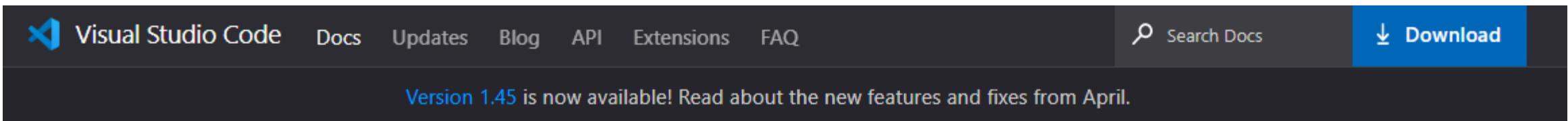
Python version	Name	Size	SHA256 hash
Python 3.7	Miniconda3 Windows 64-bit	51.6 MiB	1701955cd637d1dad5a84958fd470649b79de973d1570541eb52857664b5056c
	Miniconda3 Windows 32-bit	52.2 MiB	ca74cb6eb0731db2b972c0fb512e29661a84c3f01ac6133121b4372eb1c41f46
Python 2.7	Miniconda2 Windows 64-bit	50.9 MiB	8647c54058f11842c37854edeff4d20bc1fbdad8b88d9d34d76fda1630e64846
	Miniconda2 Windows 32-bit	48.7 MiB	0d106228d6a4610b599df965dd6d9bb659329a17e3d693e3274b20291a7c6f94

Add to system path

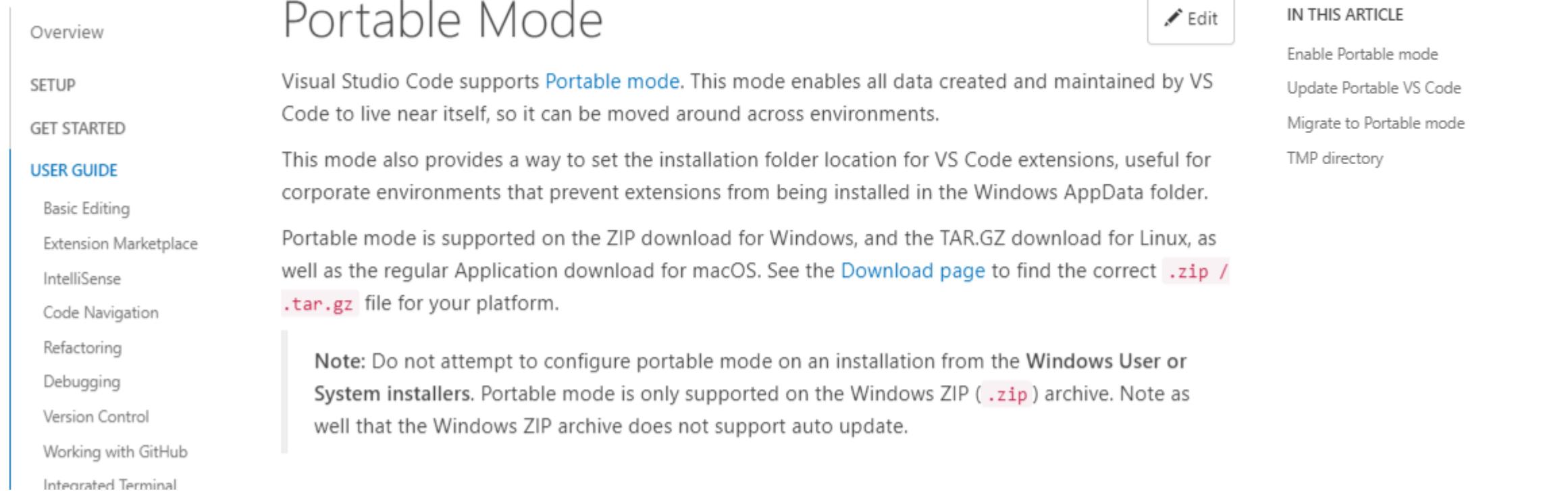


Install Visual Studio Code (portable version if no admin privileges)

<https://code.visualstudio.com/docs/editor/portable>



The screenshot shows the official Visual Studio Code website. The top navigation bar includes links for Visual Studio Code, Docs, Updates, Blog, API, Extensions, and FAQ. To the right is a search bar labeled "Search Docs" and a blue "Download" button. A prominent banner at the bottom of the header area announces "Version 1.45 is now available! Read about the new features and fixes from April."



The screenshot displays the "Portable Mode" documentation page. On the left, a sidebar lists various topics under "USER GUIDE": Overview, SETUP, GET STARTED, Basic Editing, Extension Marketplace, IntelliSense, Code Navigation, Refactoring, Debugging, Version Control, Working with GitHub, and Integrated Terminal. The main content area has a large title "Portable Mode". To the right of the title is a "Edit" button. Below the title, a paragraph explains that Visual Studio Code supports Portable mode, which enables data to be moved between environments. Another paragraph discusses how Portable mode can be used in corporate environments. A note at the bottom states that Portable mode is supported on Windows ZIP and Linux TAR.GZ downloads, and provides instructions for finding the correct file type based on platform. A note also cautions against attempting to configure portable mode on installations from Windows User or System installers.

Overview
SETUP
GET STARTED
USER GUIDE
Basic Editing
Extension Marketplace
IntelliSense
Code Navigation
Refactoring
Debugging
Version Control
Working with GitHub
Integrated Terminal

Portable Mode

[Edit](#)

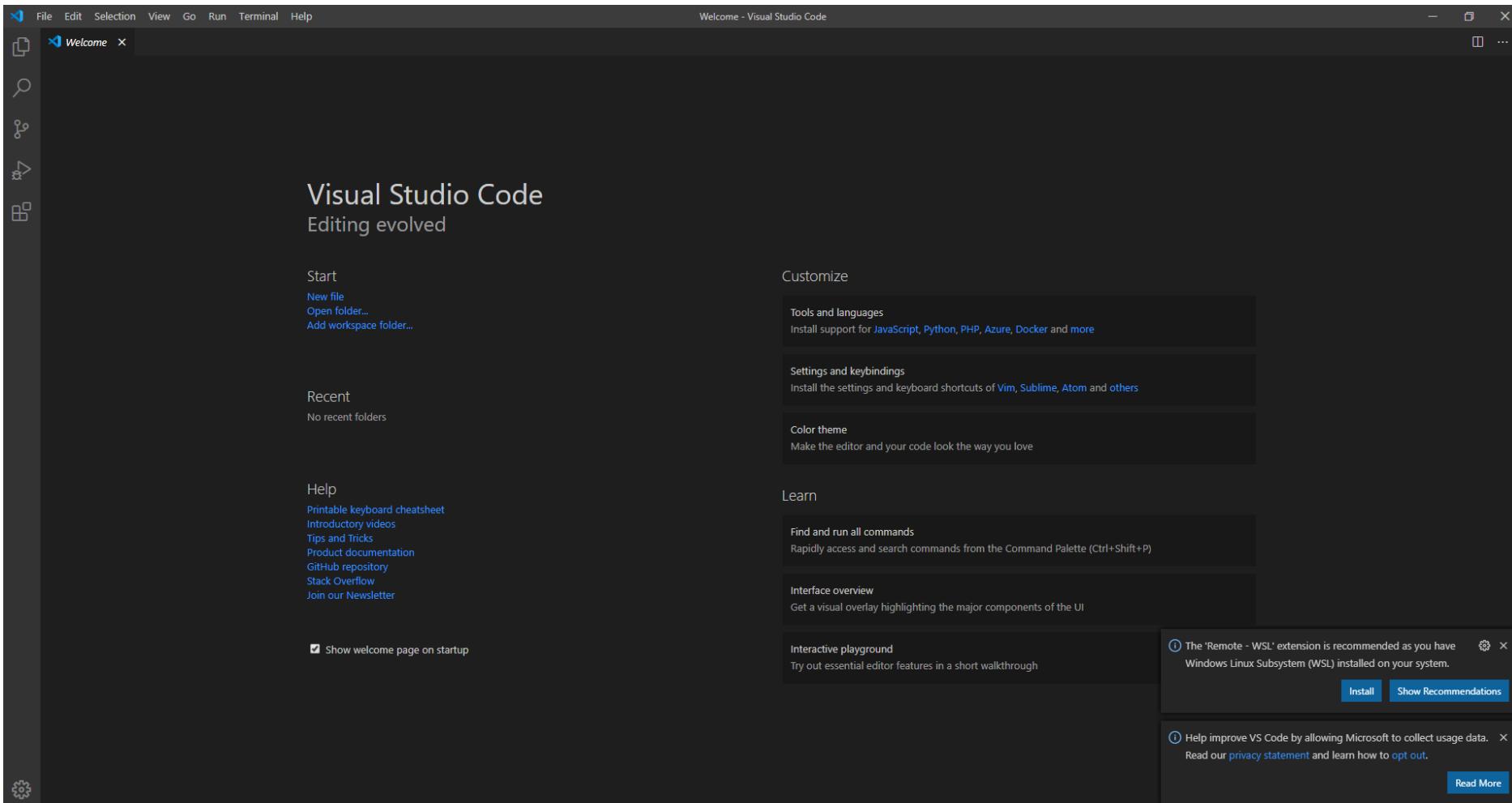
Visual Studio Code supports [Portable mode](#). This mode enables all data created and maintained by VS Code to live near itself, so it can be moved around across environments.

This mode also provides a way to set the installation folder location for VS Code extensions, useful for corporate environments that prevent extensions from being installed in the Windows AppData folder.

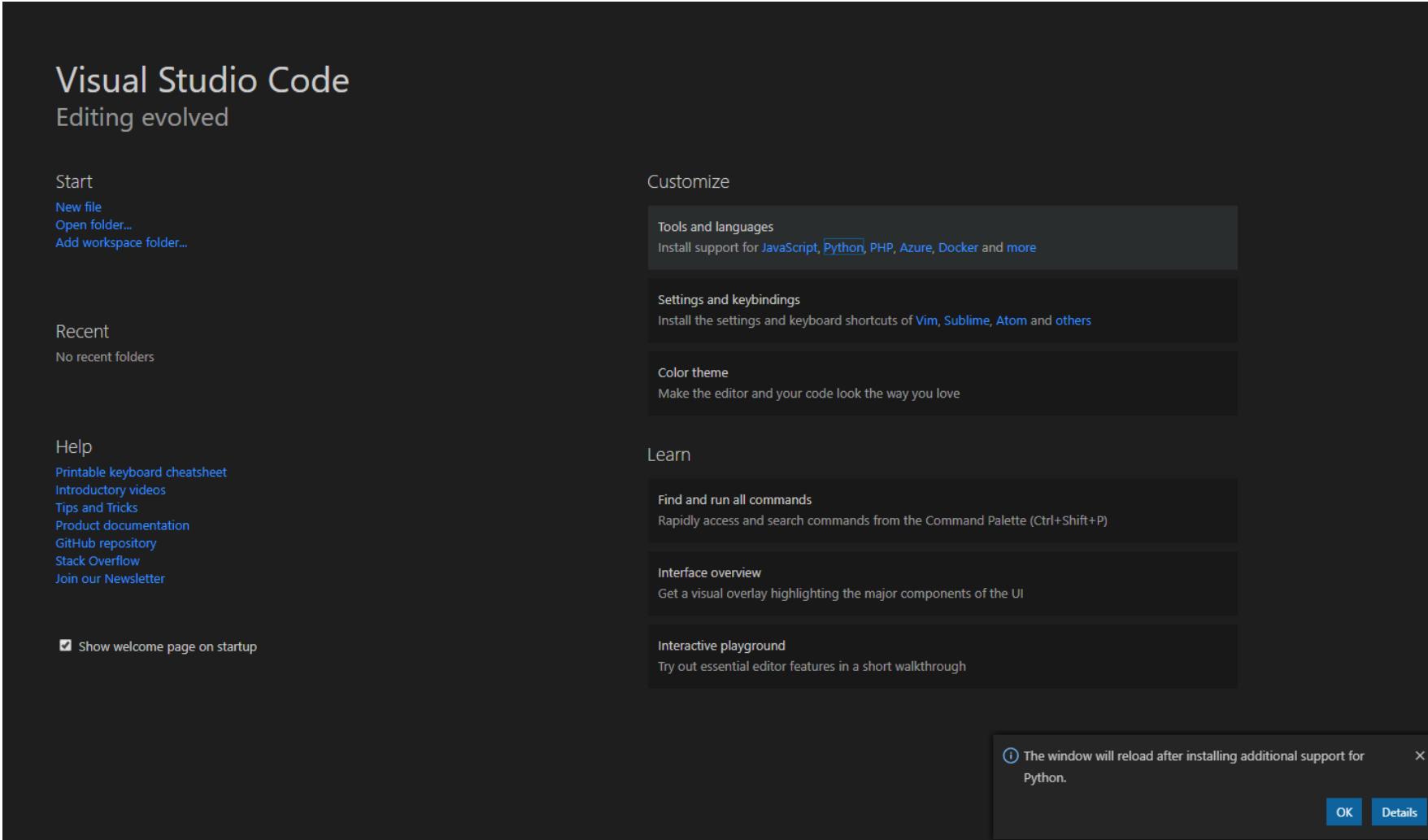
Portable mode is supported on the ZIP download for Windows, and the TAR.GZ download for Linux, as well as the regular Application download for macOS. See the [Download page](#) to find the correct `.zip` / `.tar.gz` file for your platform.

Note: Do not attempt to configure portable mode on an installation from the Windows User or System installers. Portable mode is only supported on the Windows ZIP (`.zip`) archive. Note as well that the Windows ZIP archive does not support auto update.

Open Visual Studio Code



Enable Python Connection



The screenshot shows the Visual Studio Code interface with a dark theme. On the left, there's a sidebar with sections for "Start", "Recent", and "Help". Under "Start", options like "New file", "Open folder...", and "Add workspace folder..." are listed. Under "Recent", it says "No recent folders". Under "Help", links to "Printable keyboard cheatsheet", "Introductory videos", "Tips and Tricks", "Product documentation", "GitHub repository", "Stack Overflow", and "Join our Newsletter" are provided. A checkbox at the bottom left is checked, labeled "Show welcome page on startup". The main area is titled "Customize" and contains three sections: "Tools and languages" (with a note to install support for JavaScript, Python, PHP, Azure, Docker, and more), "Settings and keybindings" (noting support for Vim, Sublime, Atom, and others), and "Color theme" (describing how it makes the editor and code look). Below this is a "Learn" section with "Find and run all commands", "Interface overview", and "Interactive playground". A modal dialog at the bottom right informs the user that the window will reload after installing additional support for Python, with "OK" and "Details" buttons.

Visual Studio Code
Editing evolved

Start

- New file
- Open folder...
- Add workspace folder...

Recent

No recent folders

Help

- Printable keyboard cheatsheet
- Introductory videos
- Tips and Tricks
- Product documentation
- GitHub repository
- Stack Overflow
- Join our Newsletter

Show welcome page on startup

Customize

Tools and languages

Install support for [JavaScript](#), [Python](#), [PHP](#), [Azure](#), [Docker](#) and [more](#)

Settings and keybindings

Install the settings and keyboard shortcuts of [Vim](#), [Sublime](#), [Atom](#) and [others](#)

Color theme

Make the editor and your code look the way you love

Learn

Find and run all commands

Rapidly access and search commands from the Command Palette (Ctrl+Shift+P)

Interface overview

Get a visual overlay highlighting the major components of the UI

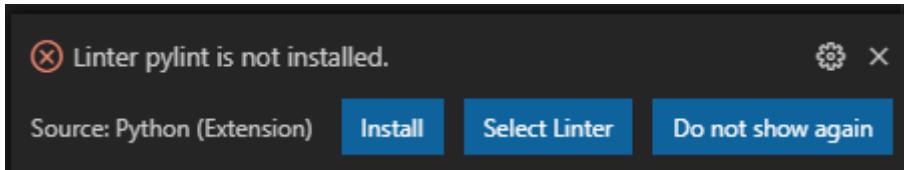
Interactive playground

Try out essential editor features in a short walkthrough

ⓘ The window will reload after installing additional support for Python.

OK Details

Add libraries



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\uqsboll2\projects\fractal> conda activate base
PS C:\Users\uqsboll2\projects\fractal> & conda install --name base pylint -y
Collecting package metadata (current_repodata.json): done
Solving environment: done

## Package Plan ##

environment location: C:\Users\uqsboll2\Miniconda3

added / updated specs:
- pylint
```

Add more libraries

```
PS C:\Users\uqsboll2\projects\fractal> python -m fractal julia -0.644 --size=300x200 --depth=25 --zoom=0.6 --show
Traceback (most recent call last):
  File "C:\Users\uqsboll2\Miniconda3\lib\runtime.py", line 193, in _run_module_as_main
    "__main__", mod_spec)
  File "C:\Users\uqsboll2\Miniconda3\lib\runtime.py", line 85, in _run_code
    exec(code, run_globals)
  File "C:\Users\uqsboll2\projects\fractal\fractal.py", line 11, in <module>
    import pylab, argparse, collections, inspect, functools
ModuleNotFoundError: No module named 'pylab'
PS C:\Users\uqsboll2\projects\fractal> conda install pylab
```

Run program

Missing package

Try to get it (failed)

After some googling: pylab is part of matplotlib

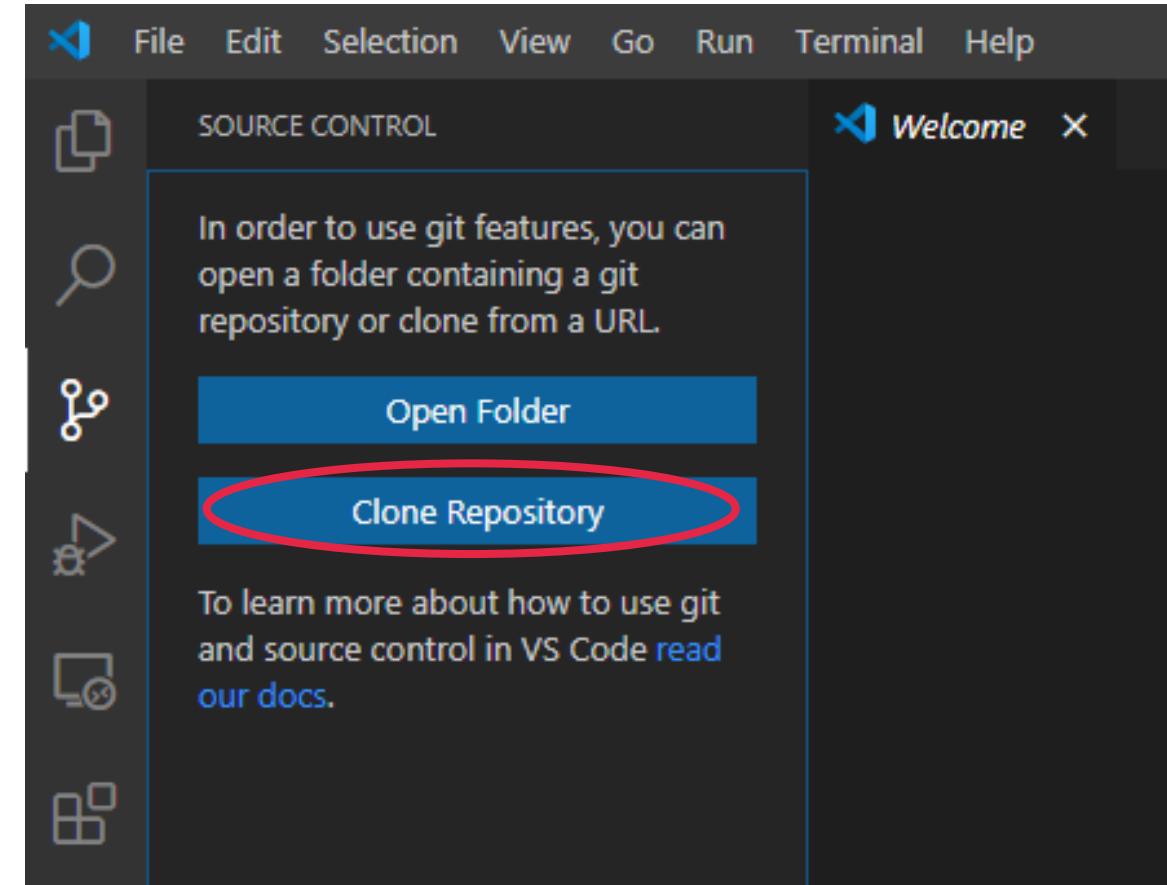
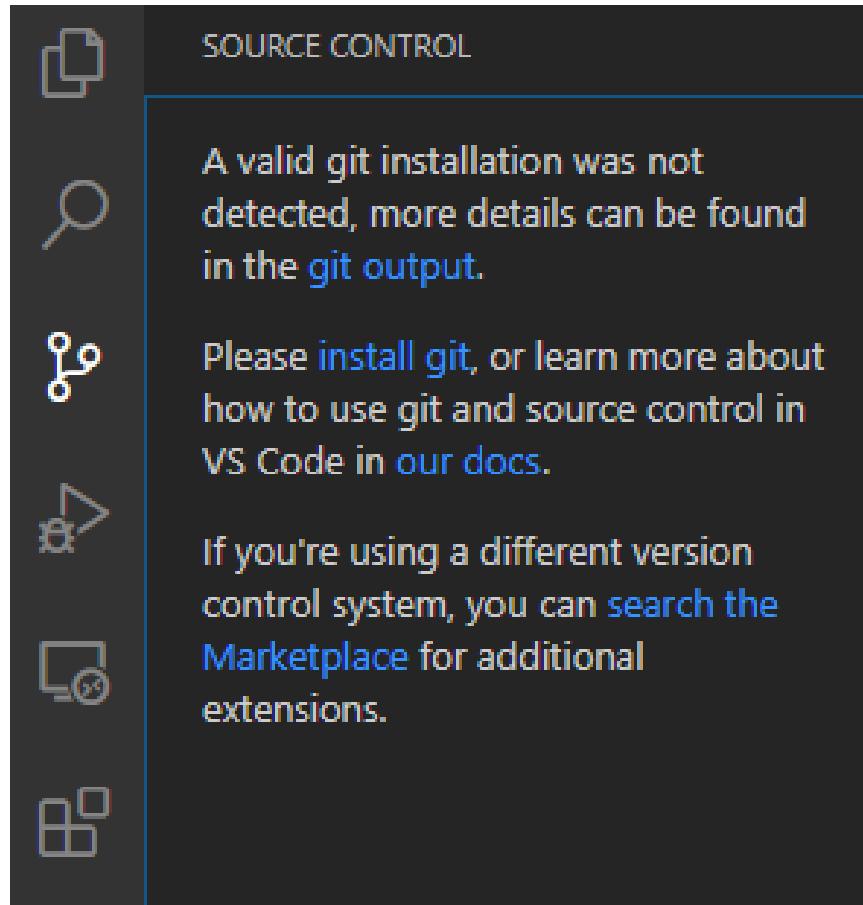
```
PS C:\Users\uqsboll2\projects\fractal> conda install matplotlib
Collecting package metadata (current_repodata.json): done
Solving environment: done

## Package Plan ##

environment location: C:\Users\uqsboll2\Miniconda3
```

Install matplotlib via conda

Using git in Visual Studio Code



Visual Studio Code will tell you if you forgot to install git



neozhaoliang / pywonderland

Watch

154

Star

3.8k

Fork

335

Code

Issues 0

Pull requests 0

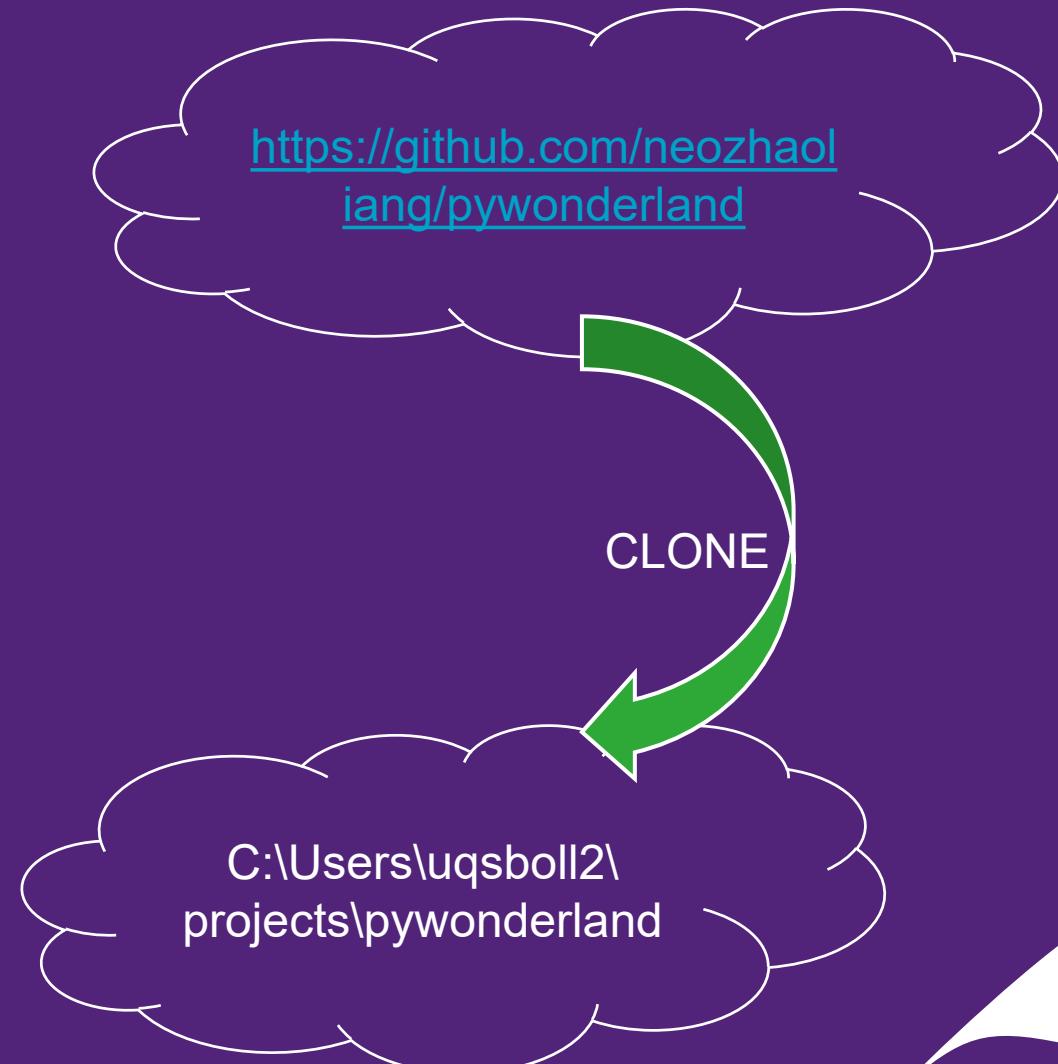
Actions

Security 0

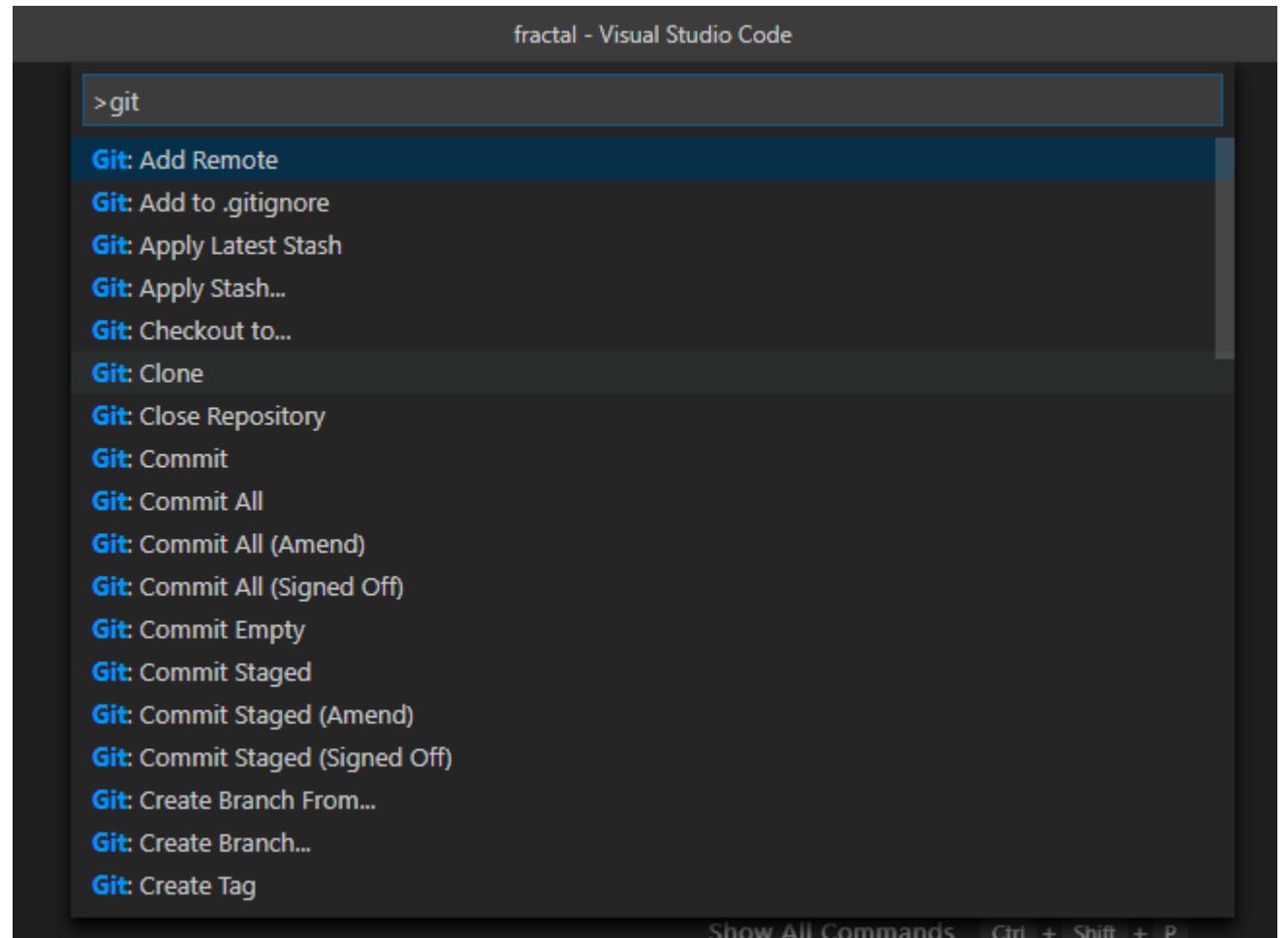
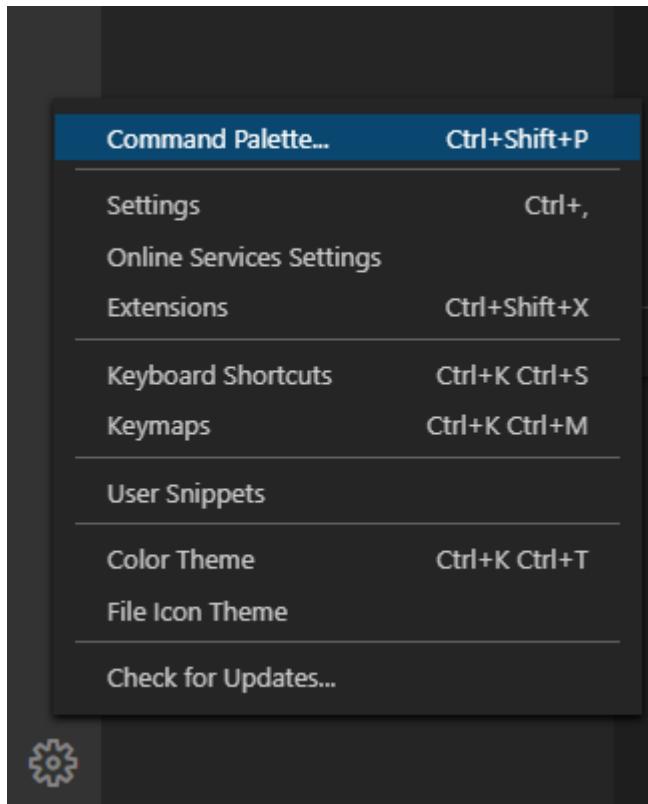
Insights

Clone Repository

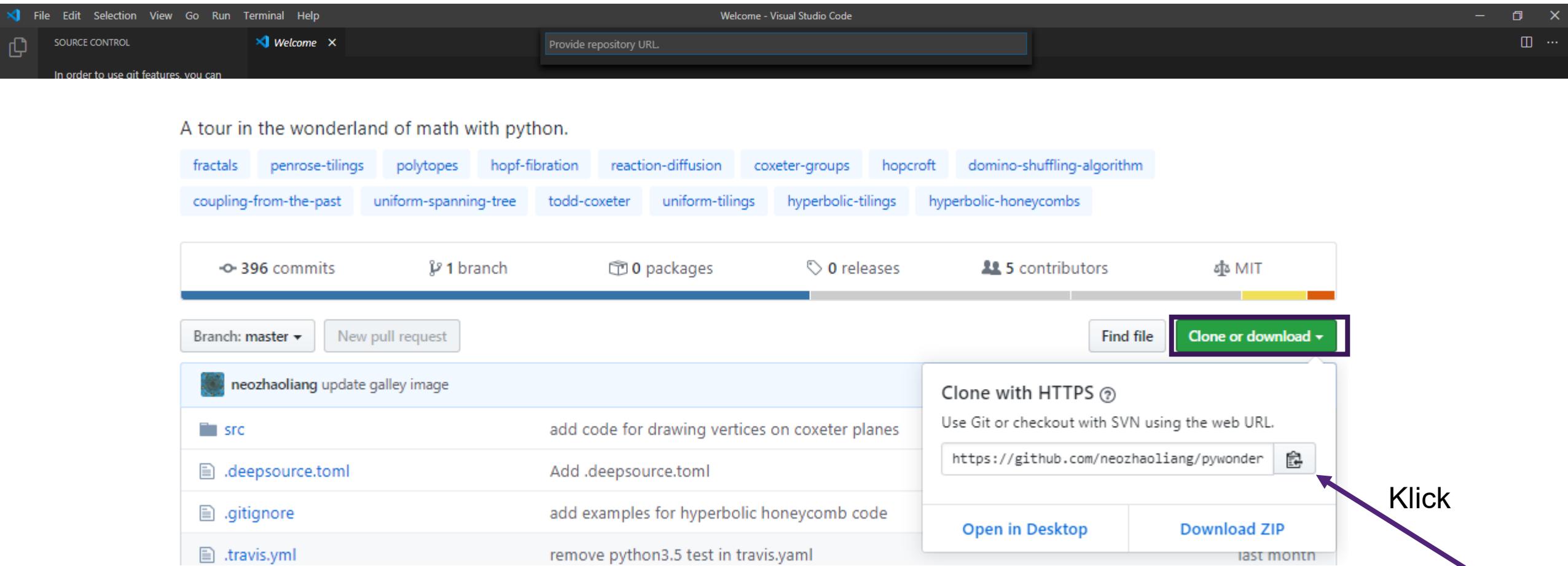
make a copy of a repository from a central server to your own computer (for the first time)



Git Clone via command palette



Repository URL



A tour in the wonderland of math with python.

fractals penrose-tilings polytopes hopf-fibration reaction-diffusion coxeter-groups hopcroft domino-shuffling-algorithm

coupling-from-the-past uniform-spanning-tree todd-coxeter uniform-tilings hyperbolic-tilings hyperbolic-honeycombs

396 commits 1 branch 0 packages 0 releases 5 contributors MIT

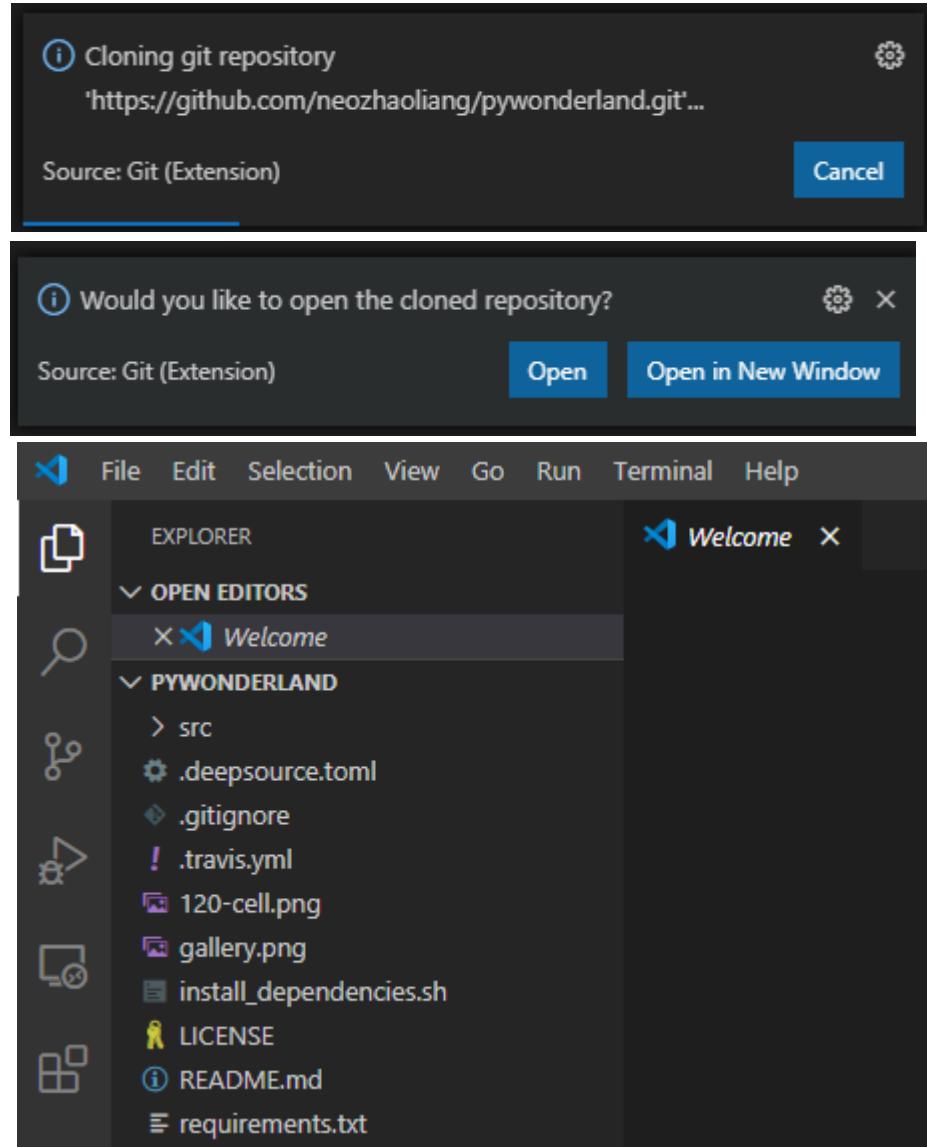
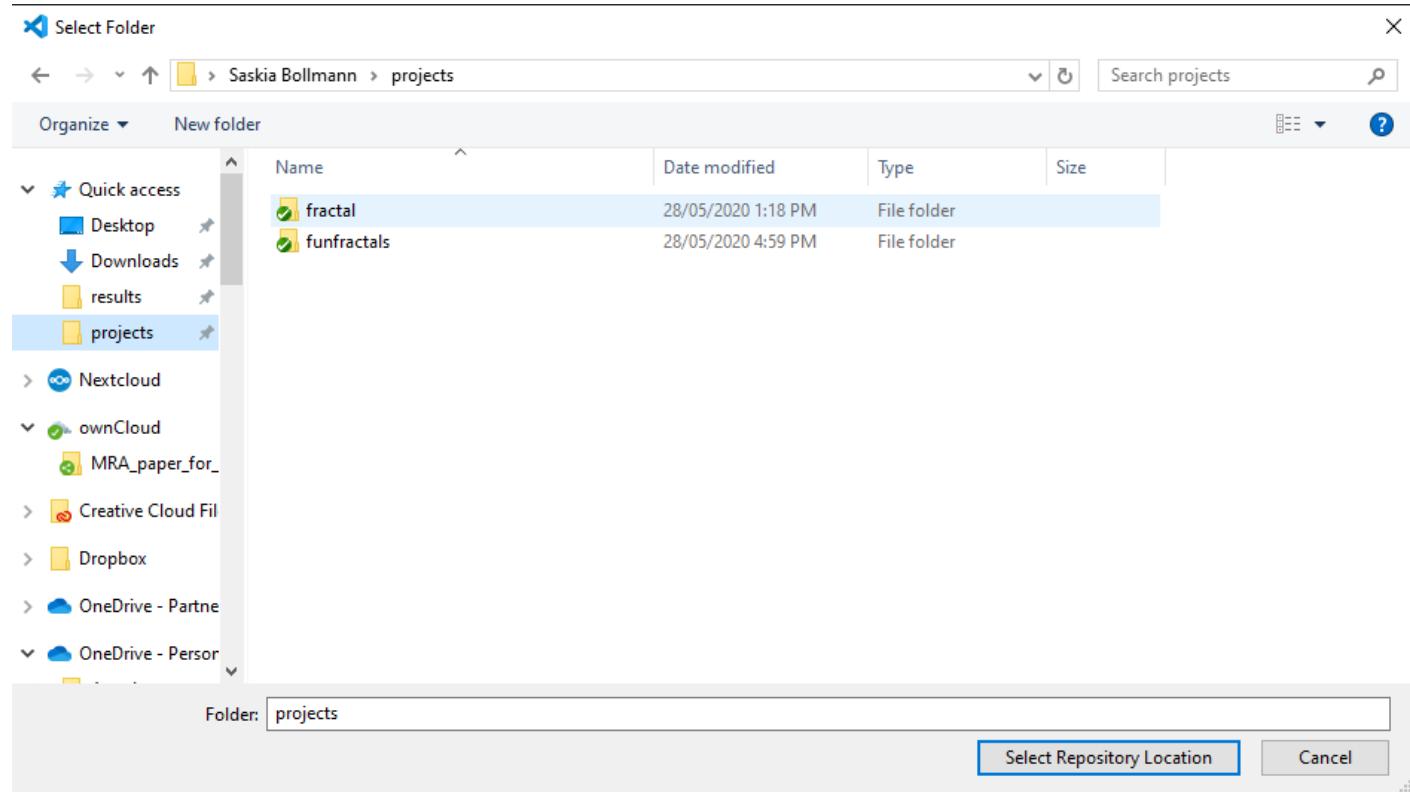
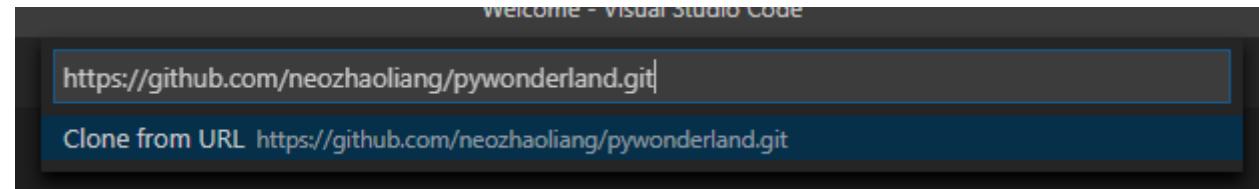
Branch: master New pull request Find file Clone or download

neozhaoliang update galley image
src add code for drawing vertices on coxeter planes
.deepsource.toml Add .deepsource.toml
.gitignore add examples for hyperbolic honeycomb code
.travis.yml remove python3.5 test in travis.yaml

Clone with HTTPS <https://github.com/neozhaoliang/pywonder> 

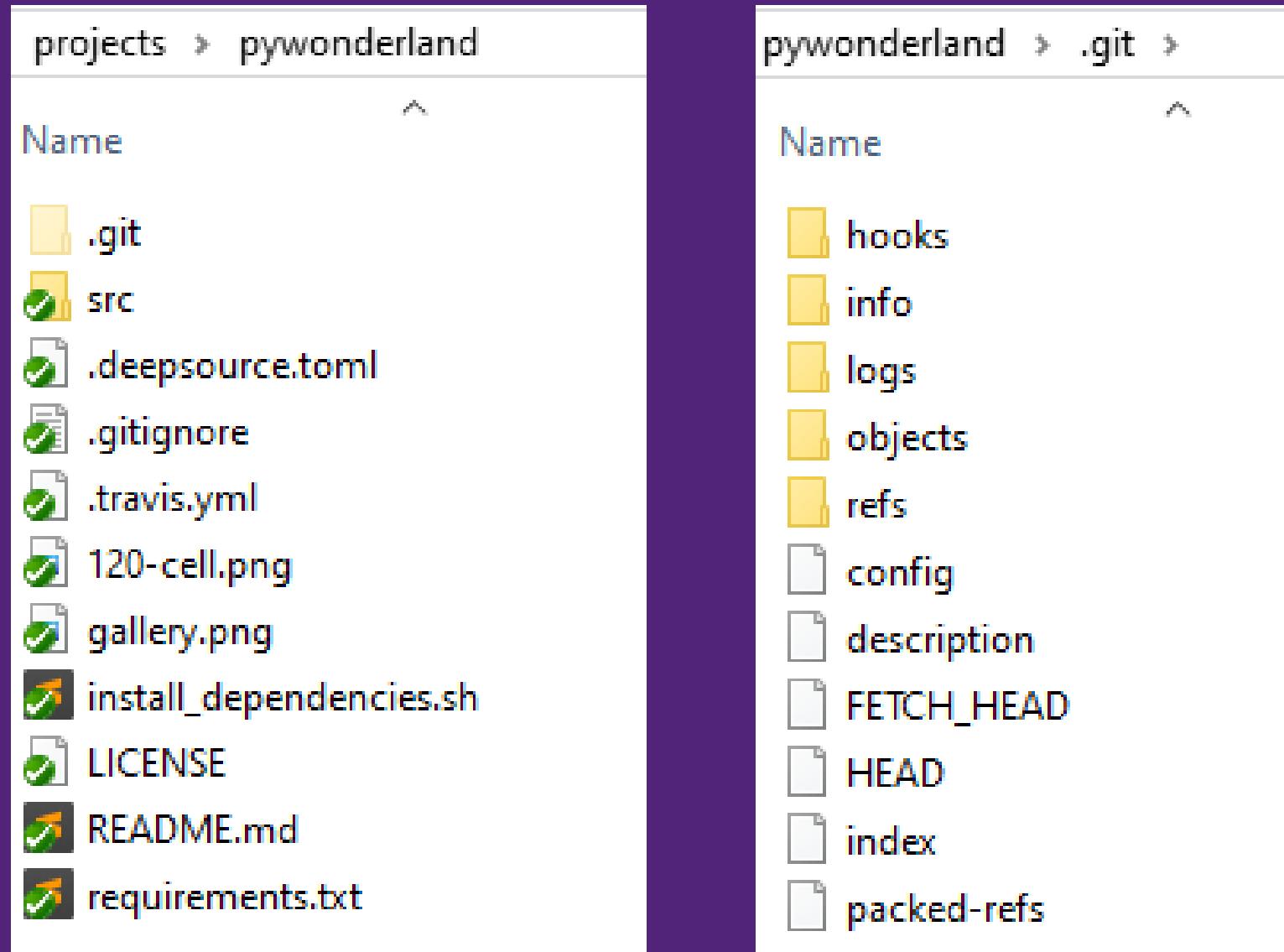
Open in Desktop Download ZIP last month

Klick

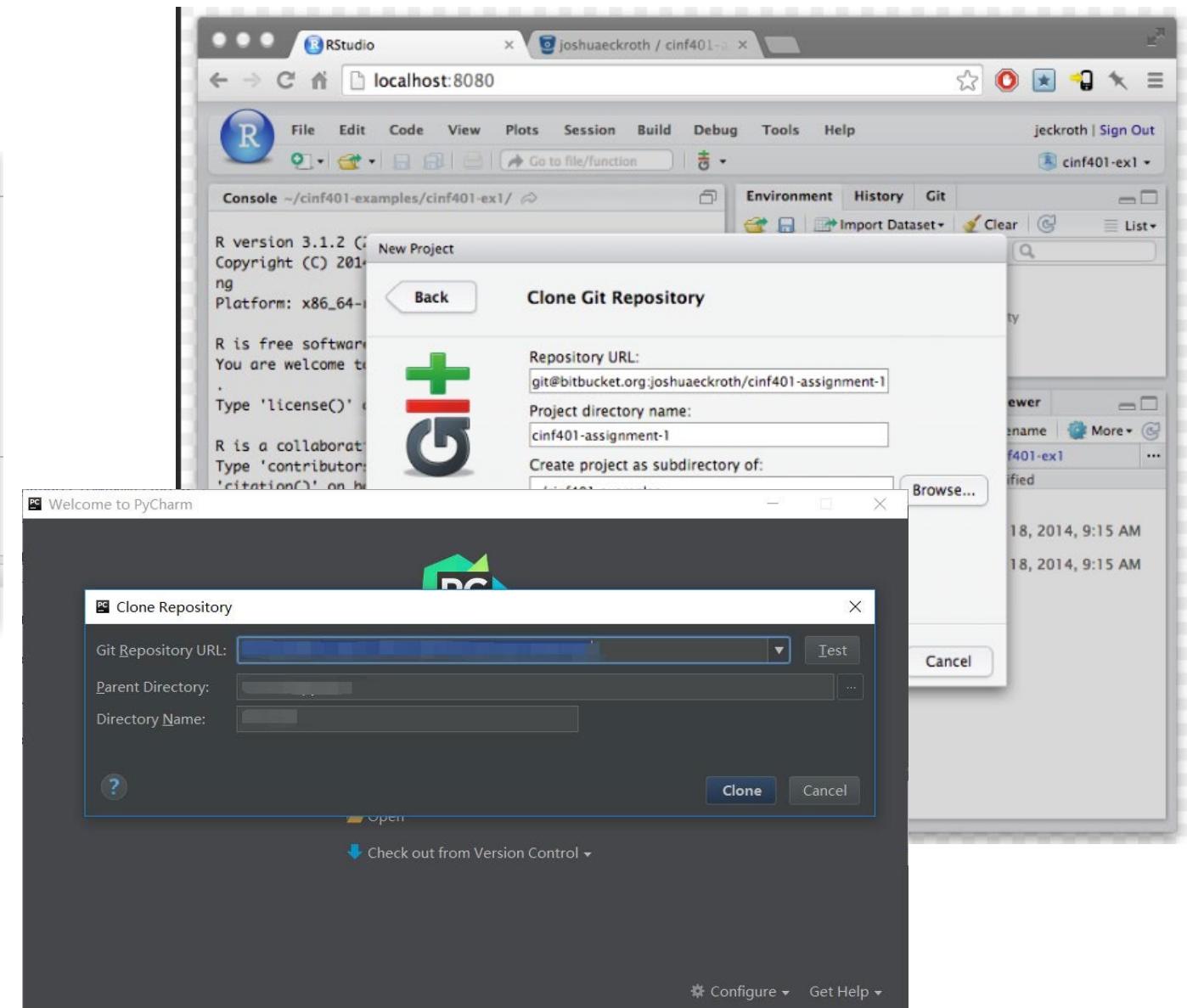
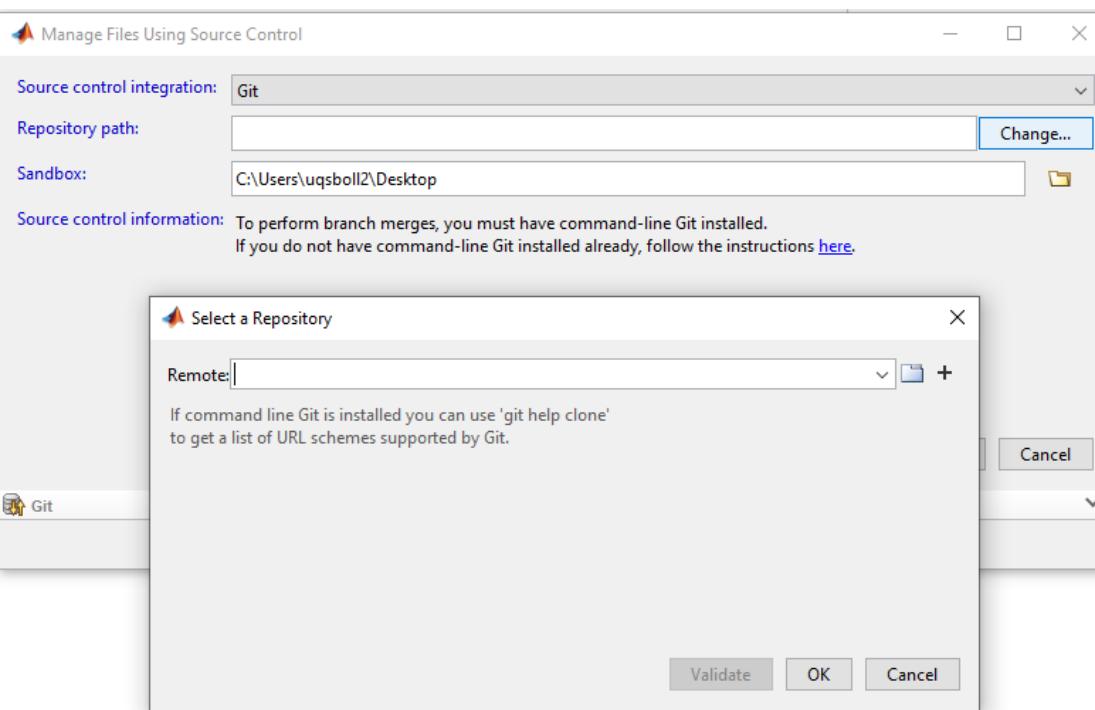


Repository

Virtual storage of project files including history



Git in other IDEs



396 commits

1 branch

0 packages

0 releases

5 contributors

MIT



Branch: master ▾

New pull request

Find file

Clone or download ▾

neozhaoliang update galley image

✓ Latest commit 4437564 18 hours ago

src add code for drawing vertices on coxeter planes yesterday

.deepsource.toml Add .deepsource.toml 6 months ago

.gitignore add examples for hyperbolic honeycomb code 5 months ago

.travis.yml remove python3.5 test in travis.yaml last month

120-cell.png some minor changes 7 months ago

LICENSE delete history commits and upload new files 3 years ago

README.md add upper half plane model 5 days ago

gallery.png update galley image 18 hours ago

install_dependencies.sh add upper half plane > Saskia Bollmann > projects > pywonderland

requirements.txt add upper half plane ss

Remote

```
ls
```

er_for_Jon

oud Files

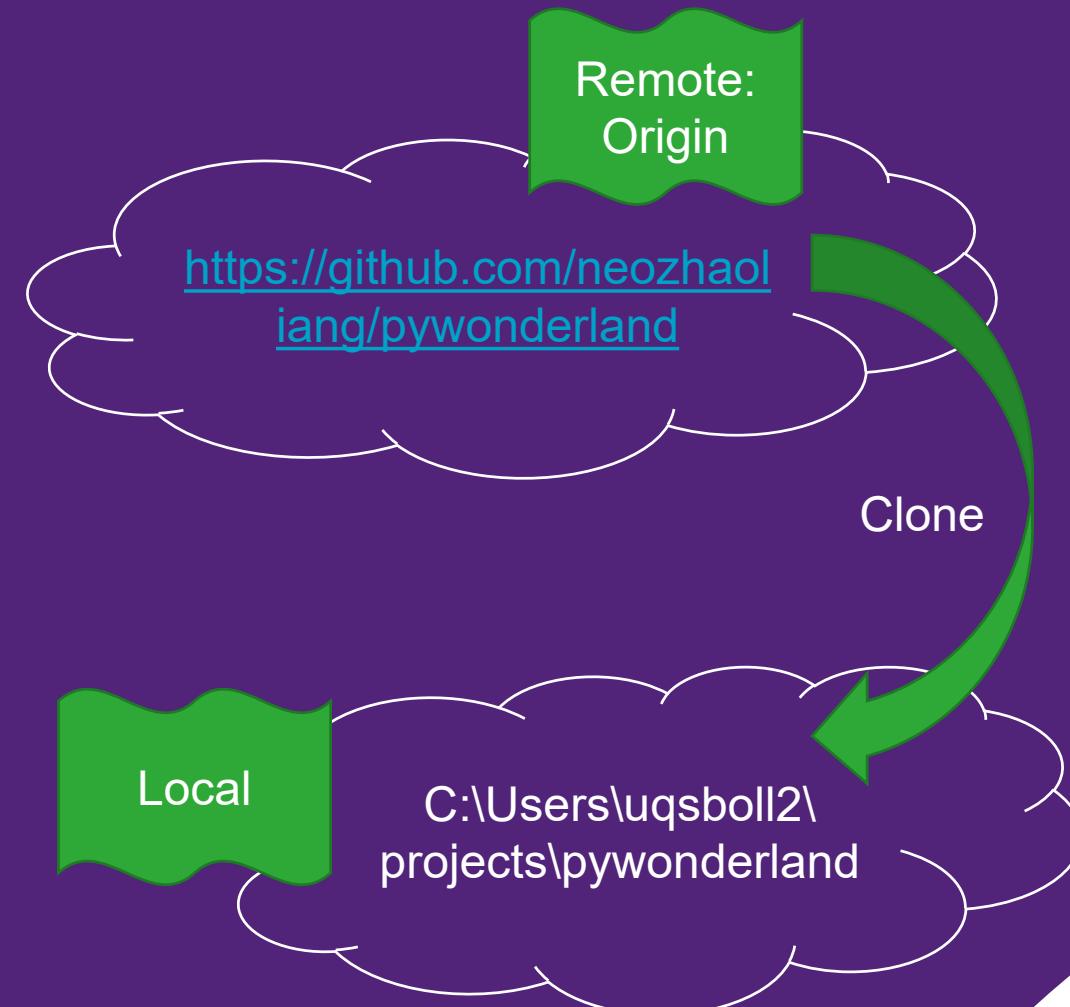
Name	Date modified	Type
.git	28/05/2020 8:05 PM	File folder
src	28/05/2020 8:04 PM	File folder
.deepsource.toml	28/05/2020 8:04 PM	TOML File
.gitignore	28/05/2020 8:04 PM	Text Document
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120-cell.png	28/05/2020 8:04 PM	PNG File
gallery.png	28/05/2020 8:04 PM	PNG File
install_dependencies.sh	28/05/2020 8:04 PM	SH File
LICENSE	28/05/2020 8:04 PM	File
README.md	28/05/2020 8:04 PM	MD File
requirements.txt	28/05/2020 8:04 PM	TXT File

Local
Repository

Remote

Definition: A repository stored on another computer

Origin = the name for the remote repository where we cloned from



What is a “Commit”?

Committing a change means to create a snapshot of the project's current status. Commit often! Assign a clear message of your intention.



✓ more comments and clean the code

master

neozhaoliang committed 2 days ago

1 parent a649c6b commit db78eb1c525e0680d700cfb67370fc48278accae

Showing 1 changed file with 8 additions and 5 deletions.

Unified Split

src/polytopes/polytopes/helpers.py

```
@@ -34,11 +34,10 @@ def get_init_point(M, d):
34    34
35    35      def proj3d(v):
36    36      """
37      - Stereographic projection of a 4d vector with pole at (0, 0, 0, 1).
37      + Stereographic projection a 4d vector to 3d.
38    38      """

```

Commits on Feb 9, 2020

add many more polychora examples

 neozhaoliang committed on Feb 10 



11ca01b



Commits on Feb 11, 2019

add wang tiling animation

 neozhaoliang committed on Feb 11, 2019 



4637b14



Commits on Feb 3, 2019

remove unused import in gifmaze code

 neozhaoliang committed on Feb 3, 2019 



c8d1f26



Commits on Dec 4, 2018

rewrite gifmaze project, added new features: 1. can draw grid lines 2...

...

 neozhaoliang committed on Dec 4, 2018



ef89878



Commits on Nov 20, 2018

better code formatting

 neozhaoliang committed on Nov 21, 2018



f52d599



fix some errors in hilbert curve

 neozhaoliang committed on Nov 20, 2018



caf4834



fix the color discontinuity problem in hilbert curves

 neozhaoliang committed on Nov 20, 2018



c2da2d6



add hilbert curve animation

 neozhaoliang committed on Nov 20, 2018



c91d46e



Summary

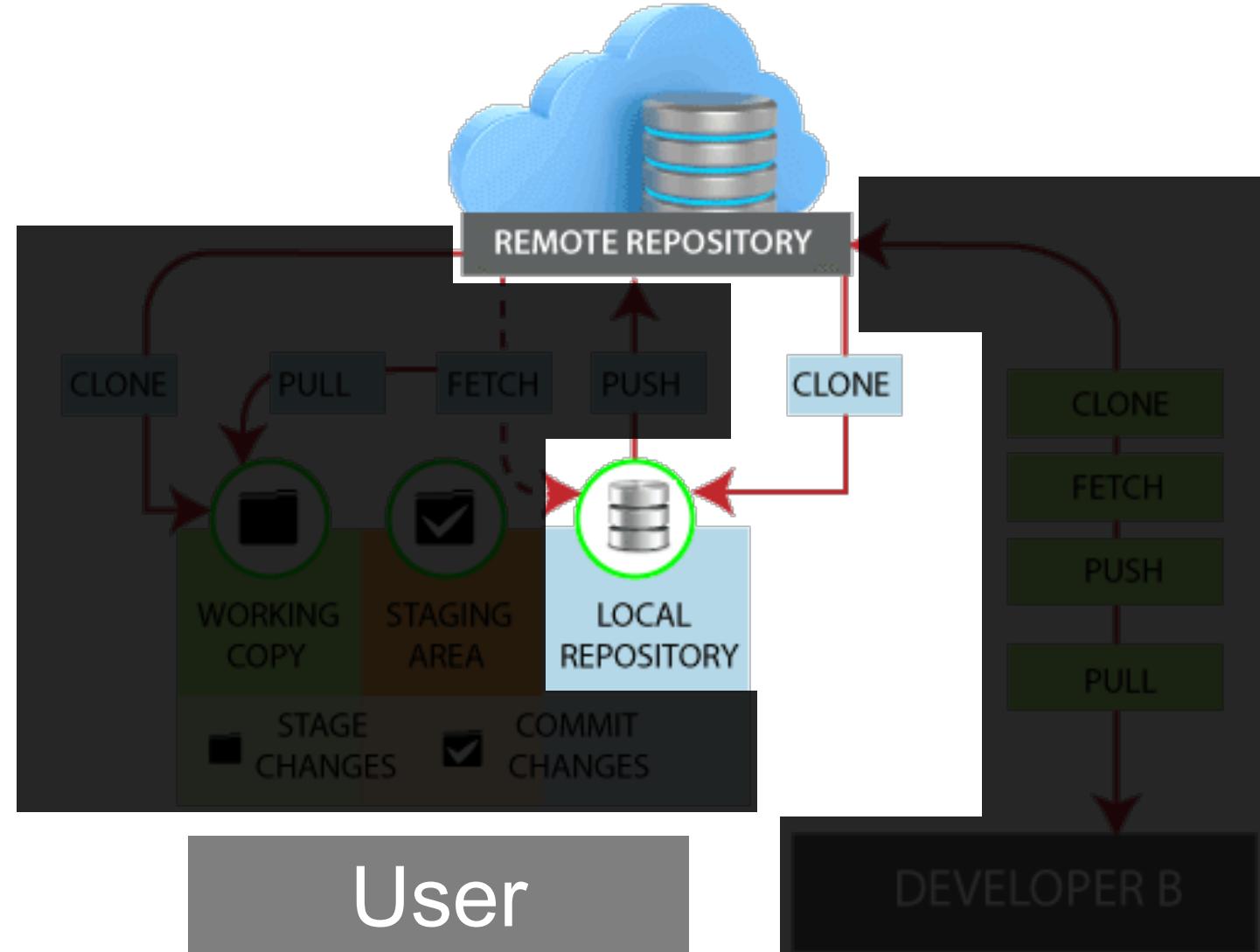
Repository

- Readme
- Commits
- History

Remote vs Local

Git commands

- Clone



<https://www.javatpoint.com/git-remote>

1) Using code from
github.com

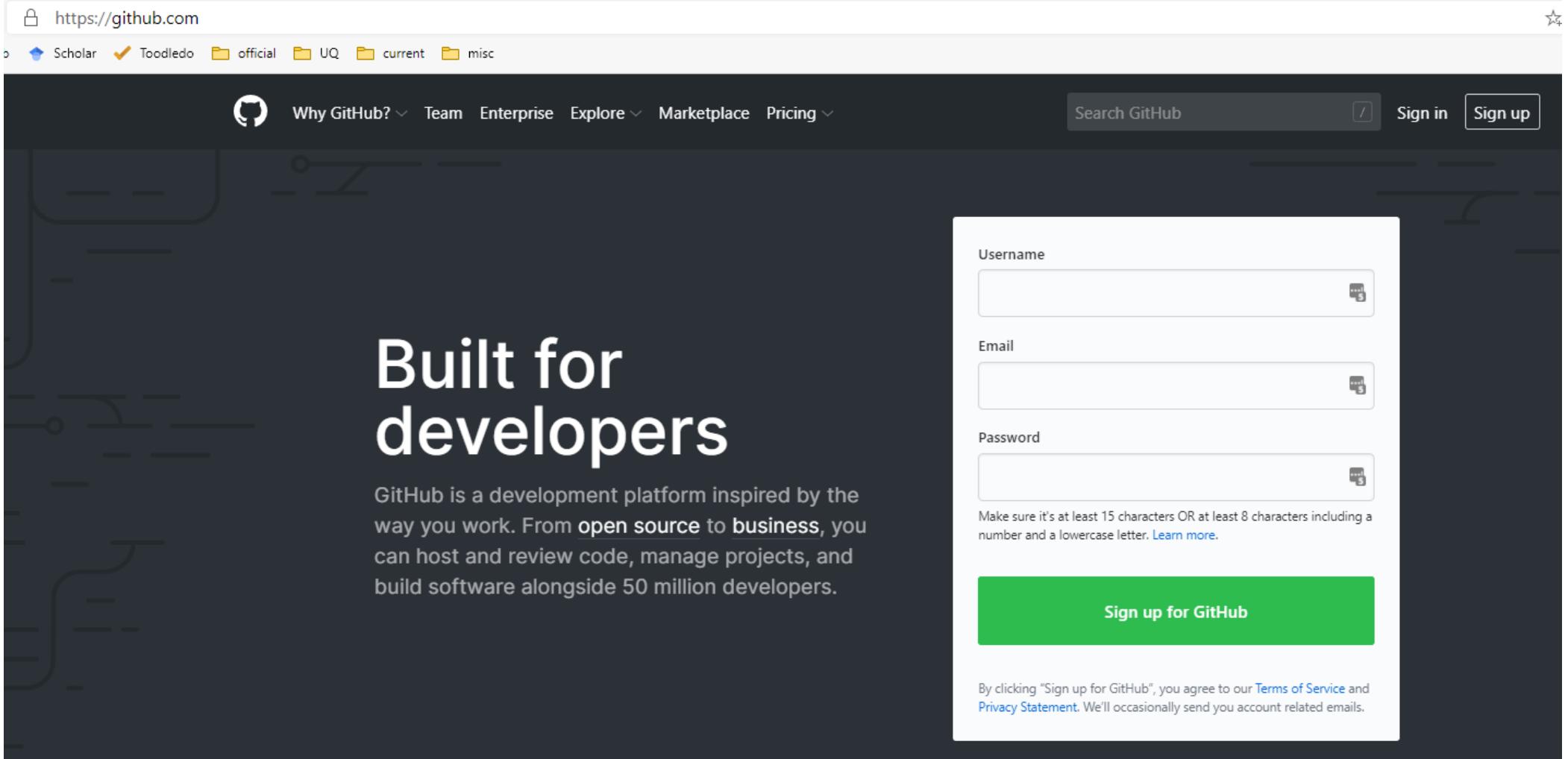
2) Version Control
for your project

Use Cases

3) Adding someone
to your project

4) Contributing to
a project

Go to <https://github.com/> & sign up



The screenshot shows the GitHub homepage with a dark background featuring a circuit board pattern. On the left, the text "Built for developers" is displayed in large white font. 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, there is a navigation bar with links like "Why GitHub?", "Team", "Enterprise", "Explore", "Marketplace", and "Pricing". A search bar and "Sign in" and "Sign up" buttons are also present. The main content area has a large "Sign up for GitHub" button at the bottom right of a registration form.

https://github.com/

Scholar Toodledo official UQ current misc

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

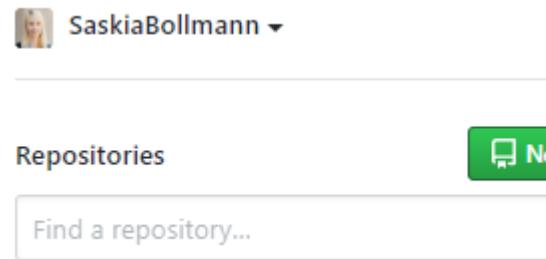
Password

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

By clicking "Sign up for GitHub", you agree to our [Terms of Service](#) and [Privacy Statement](#). We'll occasionally send you account related emails.

Create a new repository



A screenshot of a user interface for managing repositories. At the top left is a profile picture of a woman and the name "SaskiaBollmann". Below this is a horizontal line. Underneath the line, the word "Repositories" is followed by a green button with a white "New" icon and the word "New". Below the button is a search bar containing the placeholder text "Find a repository...". A purple arrow points from the top right towards the "New" button.

Create a new repository

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 * 

Great repository names are short and descriptive. [ohbm-git-example-sbollmann is available.](#) [View about upgraded-robot?](#)

Description (optional)
Example for the 2020 OHBM Brainhack git presentation.

 Public
Anyone can see this repository. You choose who can commit.

 Private
You choose who can see and commit to this repository.

Skip this step if you're importing an existing repository.

Initialize this repository with a README
This will let you immediately clone the repository to your computer.

Add .gitignore: None Add a license: None 

Create repository

Create a new repository

Quick setup — if you've done this kind of thing before

 Set up in Desktop

or  

git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.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 "# ohbm-git-example-sbollmann" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
git push -u origin master
```



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

```
git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
git push -u origin master
```

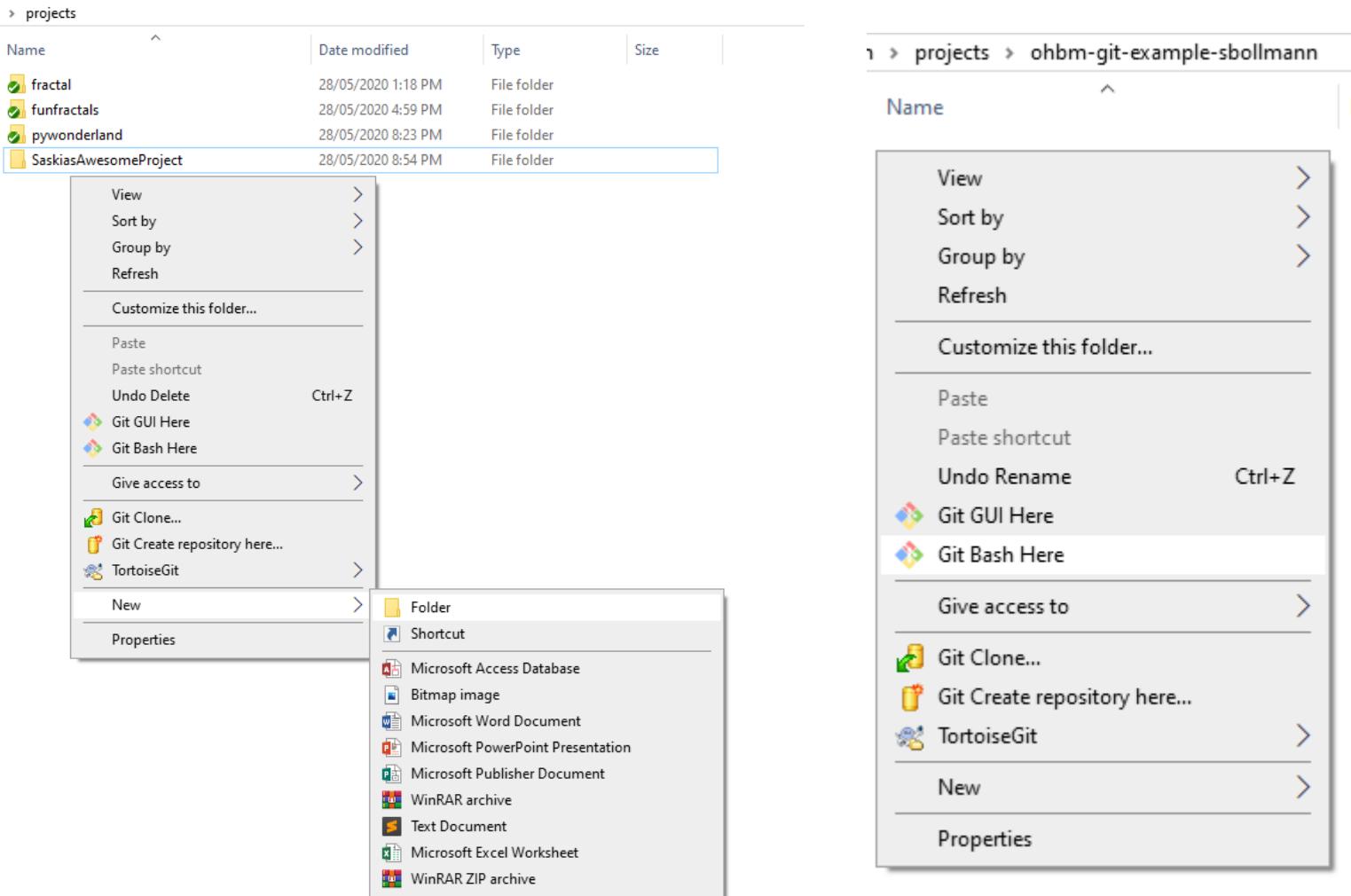


...or import code from another repository

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

 Import code

Create local folder and open git bash



Create README.md

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

```
echo "# ohbm-git-example-sbollmann" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
git push -u origin master
```

```
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann
$ echo "# ohbm-git-example-sbollmann" >> README.md
```

```
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann
$ ls
README.md
```

```
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann
$ cat README.md
# ohbm-git-example-sbollmann
```

Initialize new git repo locally

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

```
echo "# ohbm-git-example-sbollmann" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
git push -u origin master
```

```
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann
$ git init
Initialized empty Git repository in C:/Users/uqsboll2/projects/ohbm-git-example-sbollmann/.git/
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)

    README.md

nothing added to commit but untracked files present (use "git add" to track)
```

Add file to repository

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

```
echo "# ohbm-git-example-sbollmann" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
git push -u origin master
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git add README.md
warning: LF will be replaced by CRLF in README.md.
The file will have its original line endings in your working directory

uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)

            new file:   README.md
```

Commit changes

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

```
echo "# ohbm-git-example-sbollmann" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
git push -u origin master
```

```
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git commit -m "First commit."
[master (root-commit) 7cfb378] First commit.
 1 file changed, 1 insertion(+)
 create mode 100644 README.md
```

```
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git status
On branch master
nothing to commit, working tree clean
```

Add remote: origin

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

```
echo "# ohbm-git-example-sbollmann" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
git push -u origin master
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann
.git

uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git status
On branch master
nothing to commit, working tree clean

uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git remote
origin

uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git remote -v
origin  git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git (fetch)
origin  git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git (push)
```

Push changes to remote

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

```
echo "# ohbm-git-example-sbollmann" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
git push -u origin master
```

```
uqsboll12@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git push -u origin master
git@github.com: Permission denied (publickey).
fatal: Could not read from remote repository.
```

Please make sure you have the correct access rights
and the repository exists.



CREATE CHANGE

Intermezzo III

Creating and adding SSH keys to github.com

Creating new ssh key

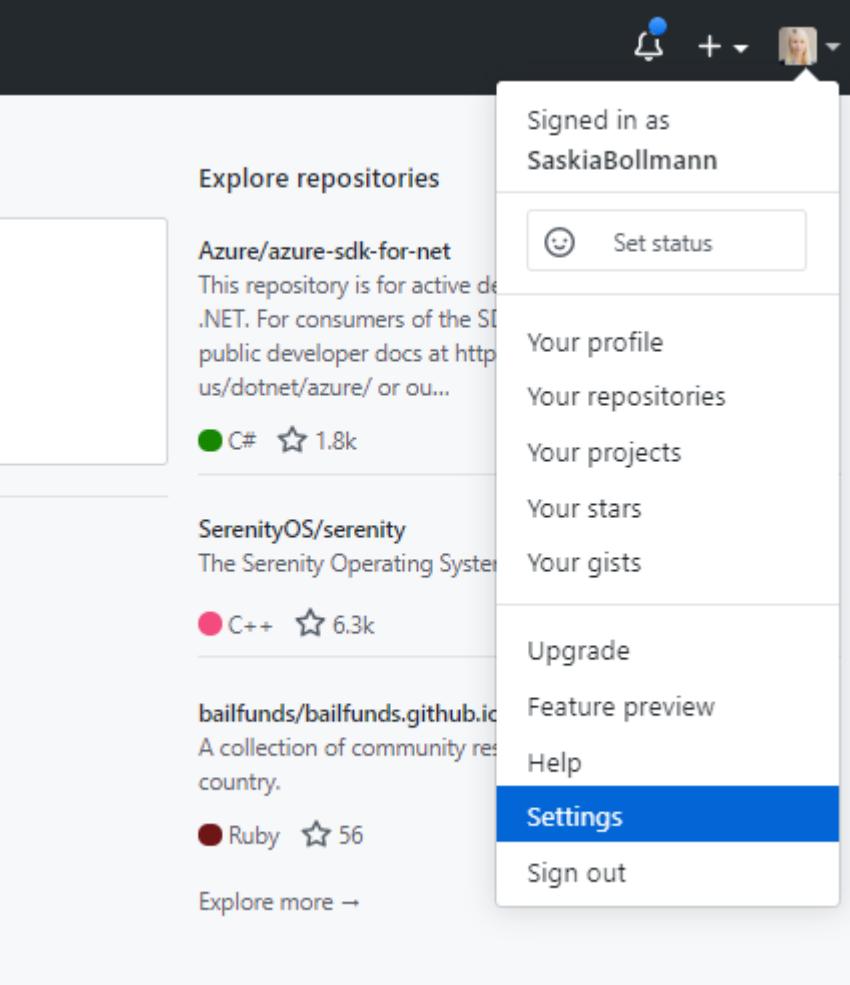
<https://help.github.com/en/github/authenticating-to-github/generating-a-new-ssh-key-and-adding-it-to-the-ssh-agent>

```
uqsbo112@CAI-BINNARI MINGW64 ~/projects
$ ssh-keygen -t rsa -b 4096 -C "saskia.bollmann@cai.uq.edu.au"
Generating public/private rsa key pair.
Enter file in which to save the key (/c/Users/uqsbo112/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /c/Users/uqsbo112/.ssh/id_rsa.
Your public key has been saved in /c/Users/uqsbo112/.ssh/id_rsa.pub.
```

```
$ ssh-add ~/.ssh/id_rsa
Identity added: /c/Users/uqsbo112/.ssh/id_rsa (saskia.bollmann@cai.uq.edu.au)
```

```
uqsbo112@CAI-BINNARI MINGW64 ~/projects
$ clip < ~/.ssh/id_rsa.pub
```

Add public(!) key to github



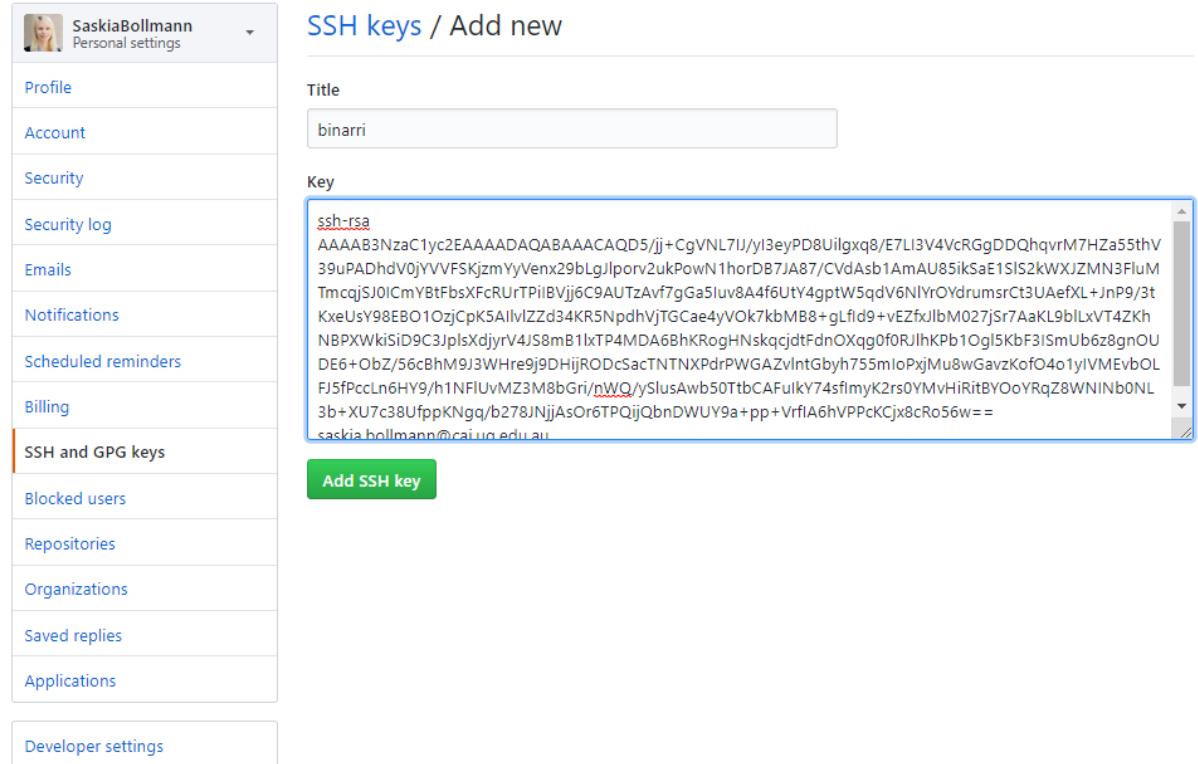
The screenshot shows a GitHub user profile for "SaskiaBollmann". The "Settings" menu is open, highlighting the "SSH and GPG keys" option. The user has 1.8k stars and 6.3k forks across their repositories.

- Signed in as SaskiaBollmann
- Profile
- Account
- Security
- Security log
- Emails
- Notifications
- Scheduled reminders
- Billing
- SSH and GPG keys**
- Blocked users
- Repositories
- Organizations
- Saved replies
- Applications
- Developer settings

Explore repositories

- Azure/azure-sdk-for-net: This repository is for active development of the Azure .NET SDK. For consumers of the SDK, please see the public developer docs at <http://us.dotnet/azure/> or ou...
- SerenityOS/serenity: The Serenity Operating System
- bailfunds/bailfunds.github.io: A collection of community resources for bail funds around the world.
- Ruby/ruby: Ruby is a dynamic, open source programming language interpreted on various platforms.

Explore more →



The screenshot shows the "SSH keys / Add new" page for "SaskiaBollmann". A new SSH key is being added with the title "binari". The key itself is a long string of characters starting with "ssh-rsa" and ending with "saskia.bollmann@rai.ug.edu.au".

SSH keys / Add new

Title: binari

Key:

```
ssh-rsa
AAAAB3NzaC1yc2EAAAQABAAQAD5/jj+CgVNL7I/yI3eyPD8Uilgxq8/E7LI3V4VcRGgDDQhqrM7HzA55thV
39uPADhdv0jVVFSKjzmYyVenx29bLgJlpov2uKPowN1horD87JA87/CVdAsb1AmAU85ikSaE1SlS2kWXJZMN3FluM
TmcqjSJ0lCmYBtFbsXFcRUrTPiiBVjj6C9AUTzAvf7gGa5Iuv8A4f6UY4gptW5qdV6NlYrOYdrumsrCt3UAefXL+JnP/3t
KxeUsY98EBO1OzjCpK5AlvlZzd34KR5NpdhvjTGcae4yVok7kbMB8+gLfd9+vEZfxJlbM027jsr7AaKL9blIxVT4Kh
NBPXWkiSiD9C3JlsXdjyrV4IS8mb1lxTP4MDA6BhKRogHNSkqqcjdtfnOXqgf0RJlhKpb1Og15KbF3ISmUb6z8gnOU
DE6+ObZ/56cbhM9j3WHre9j9DHijRODCsacTNNTXPdrPWGAZvIntGbyh755mioPxjMu8wGavzKofO4o1yIVMEvbOL
FJ5fPccLn6HY9/h1NFIUvMZ3M8bGri/WQ/ySlusAwb50TtbCAFulky74sfimyK2rs0YMyHiRitBYOoYRqZ8WNINb0NL
3b+XU7c38UfpfKNqq/b278NjjAsOr6TPQijQbnDWUY9a+pp+VrfIA6hVPPcKCjx8cRo56w==
saskia.bollmann@rai.ug.edu.au
```

Add SSH key

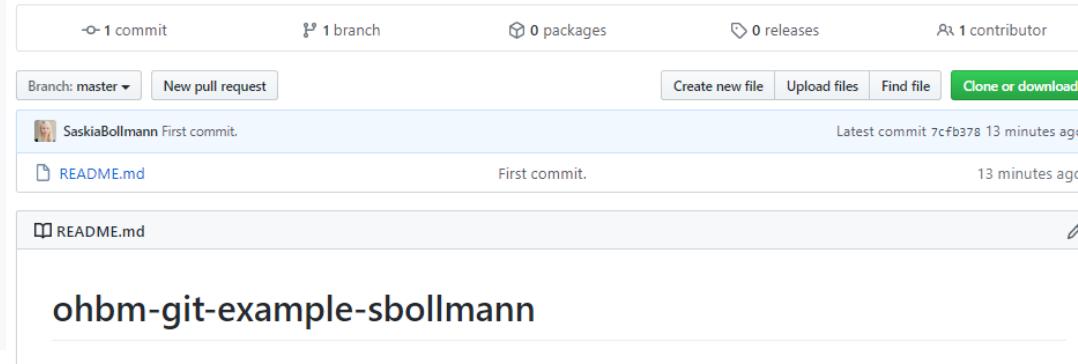
Push changes to remote

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

```
echo "# ohbm-git-example-sbollmann" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
git push -u origin master
```

Example for the 2020 OHBM Brainhack git presentation.

Manage topics



The screenshot shows a GitHub repository page for 'ohbm-git-example-sbollmann'. At the top, there are summary statistics: 1 commit, 1 branch, 0 packages, 0 releases, and 1 contributor. Below this, a button for 'New pull request' is visible. The main content area displays a single commit by 'SaskiaBollmann' with the message 'First commit.' and a timestamp of '13 minutes ago'. The commit hash is '7cfb378'. At the bottom of the page, the repository name 'ohbm-git-example-sbollmann' is displayed.

```
uqsboll2@CAI-BINNARI MINGW64 ~/projects/ohbm-git-example-sbollmann (master)
$ git push -u origin master
Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Writing objects: 100% (3/3), 251 bytes | 251.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0)
To github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
 * [new branch]      master -> master
Branch 'master' set up to track remote branch 'master' from 'origin'.
```

Push changes to remote

Example for the 2020 OHBM Brainhack git presentation.

[Edit](#)[Manage topics](#)[1 commit](#)[1 branch](#)[0 packages](#)[0 releases](#)[1 contributor](#)

Branch: master ▾

[New pull request](#)[Create new file](#)[Upload files](#)[Find file](#)[Clone or download ▾](#)

SaskiaBollmann First commit.

Latest commit 7cfb378 13 minutes ago

[README.md](#)

First commit.

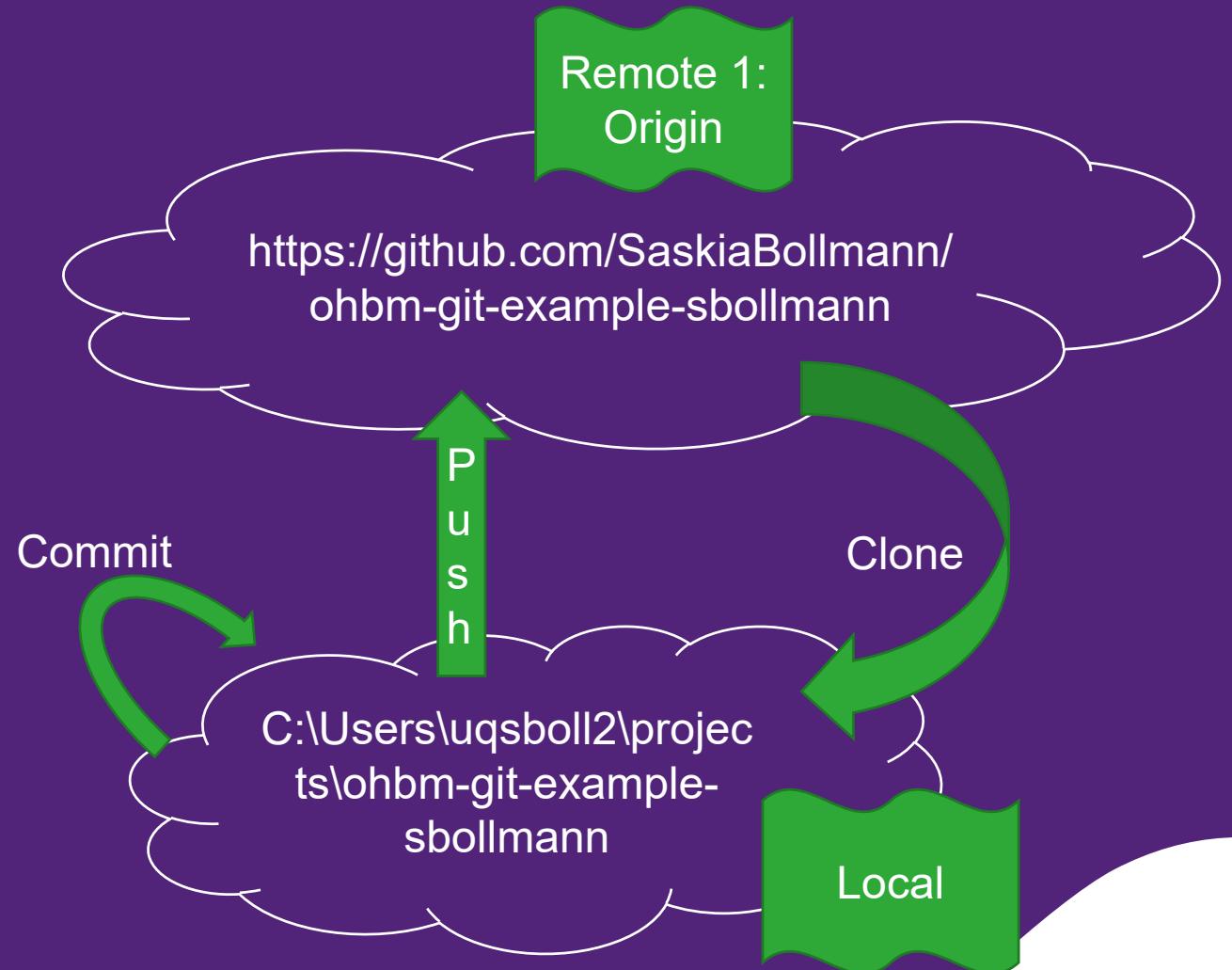
13 minutes ago

[README.md](#)**ohbm-git-example-sbollmann**

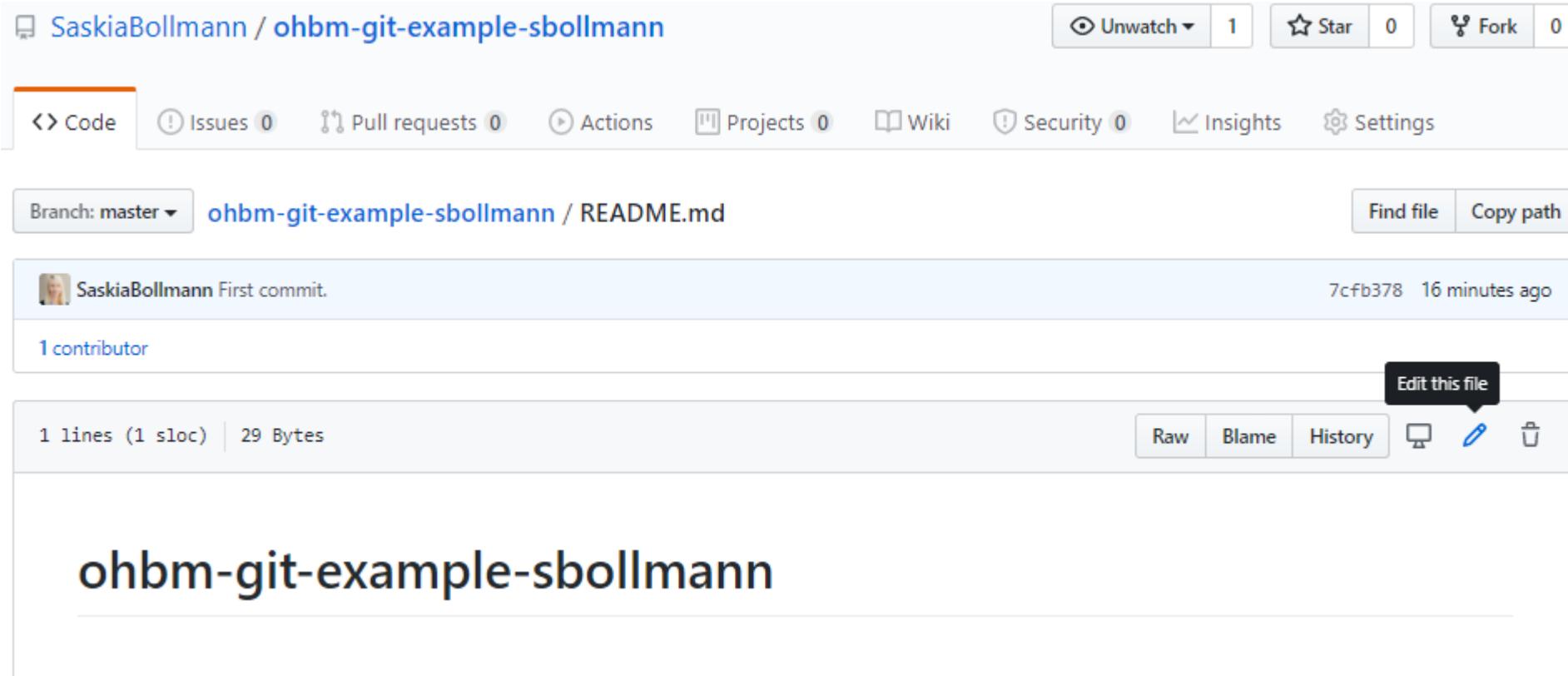
Commit and Push

Commit = recording
the status locally

Push = uploading all
history to a Remote



Making changes online



SaskiaBollmann / ohbm-git-example-sbollmann

Unwatch 1 Star 0 Fork 0

Code Issues 0 Pull requests 0 Actions Projects 0 Wiki Security 0 Insights Settings

Branch: master ohbm-git-example-sbollmann / README.md Find file Copy path

SaskiaBollmann First commit. 7cfb378 16 minutes ago

1 contributor

1 lines (1 sloc) 29 Bytes Raw Blame History

ohbm-git-example-sbollmann

A screenshot of a GitHub repository page. The repository is named "ohbm-git-example-sbollmann" and the branch is "master". The README.md file is displayed. A single commit from "SaskiaBollmann" is shown, with the commit message "First commit." and the SHA "7cfb378" timestamped "16 minutes ago". The commit has 1 contributor. Below the commit, it shows "1 lines (1 sloc)" and "29 Bytes". There are links for "Raw", "Blame", and "History". On the right side of the commit, there is a "Edit this file" button with a speech bubble pointing to it. At the bottom of the page, the repository name "ohbm-git-example-sbollmann" is repeated.

Using Markdown

GitHub Guides

Video Guides GitHub Help GitHub.com 🔍



Markdown is a lightweight and easy-to-use syntax for styling all forms of writing on the GitHub platform.

What you will learn:

- How the Markdown format makes styled collaborative editing easy
- How Markdown differs from traditional formatting approaches
- How to use Markdown to format text
- How to leverage GitHub's automatic Markdown rendering
- How to apply GitHub's unique Markdown extensions

Examples

[Text](#) [Lists](#) [Images](#) [Headers & Quotes](#) [Code](#) [Extras](#)

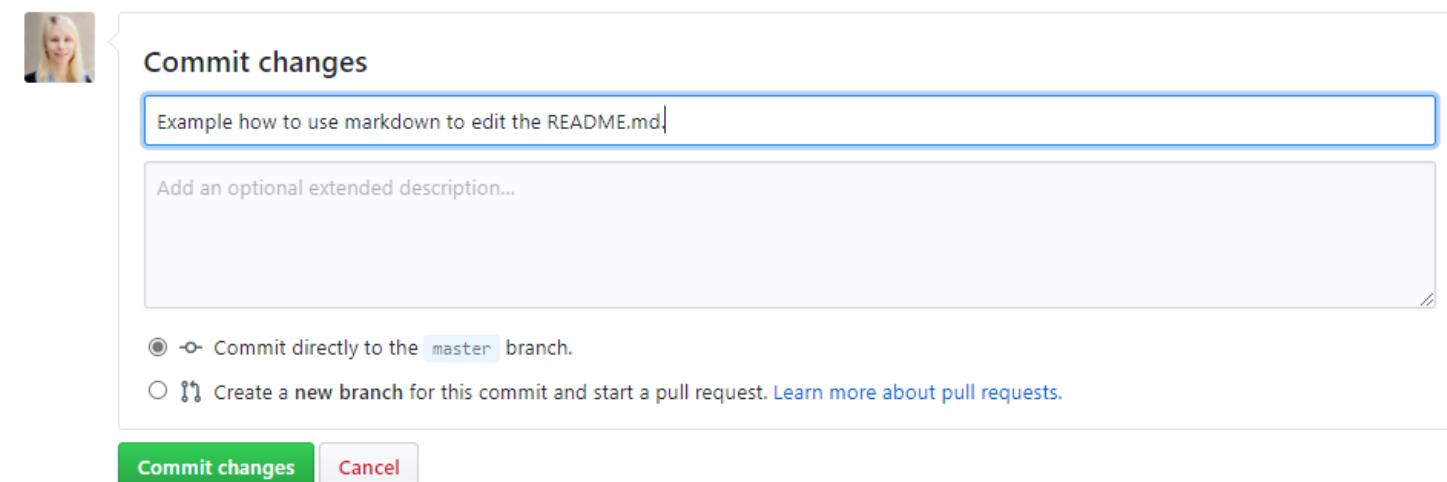
It's very easy to make some words **bold** and other words *italic* with Markdown. You can even [link to Google!](<http://google.com>)

It's very easy to make some words **bold** and other words *italic* with Markdown. You can even [link to Google!](#)

Writing the README.md



1 # ohbm-git-example-sbollmann
2
3 It's very easy to make some words **bold** and other words *italic* with Markdown. You can even [link to Google!](http://google.com)



Commit changes

Example how to use markdown to edit the README.md.

Add an optional extended description...

Commit directly to the `master` branch.

Create a new branch for this commit and start a pull request. [Learn more about pull requests.](#)

Commit changes **Cancel**

Writing the README.md

Branch: master ▾ ohbm-git-example-sbollmann / README.md Find file Copy path

 SaskiaBollmann Example how to use markdown to edit the README.md. 9823e83 now

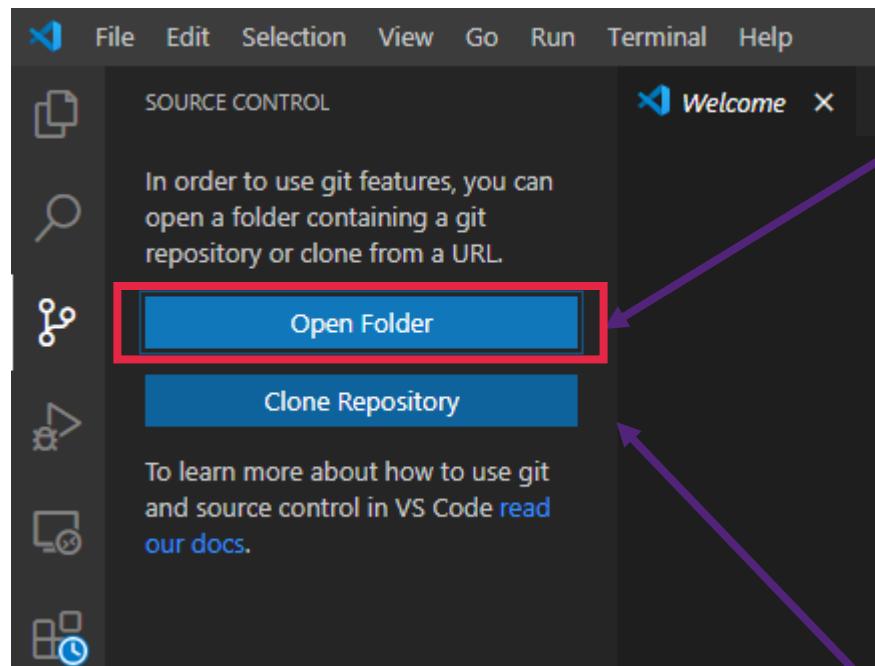
1 contributor

3 lines (2 sloc) | 163 Bytes Raw Blame History Code Edit File

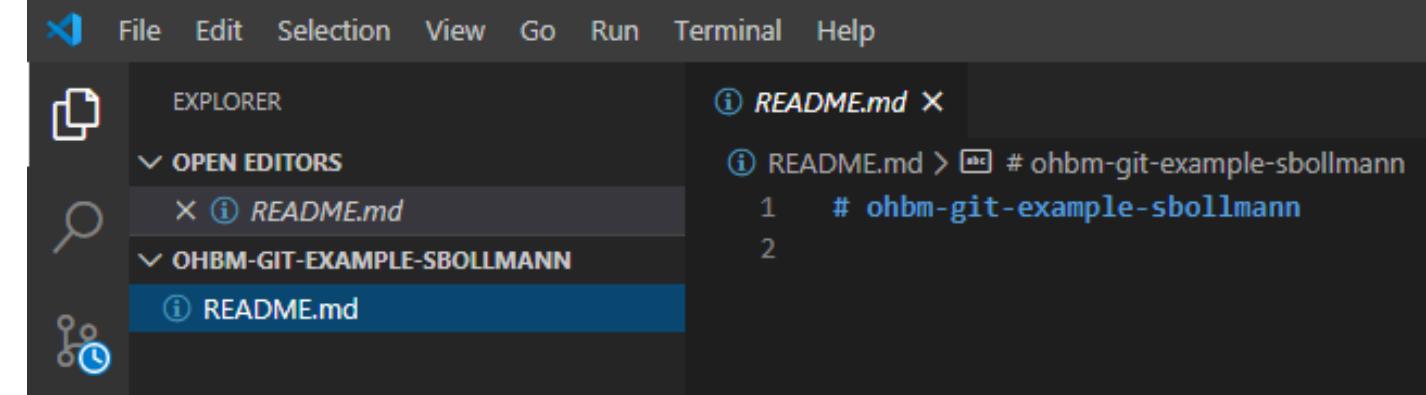
ohbm-git-example-sbollmann

It's very easy to make some words **bold** and other words *italic* with Markdown. You can even [link to Google!](#)

Working in visual studio code



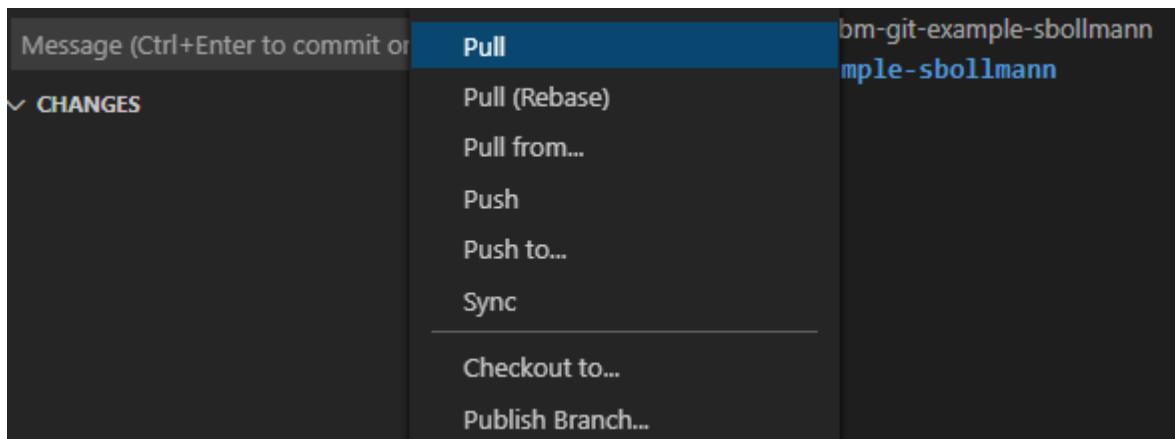
Repository exists locally



The screenshot shows the Visual Studio Code interface with the "EXPLORER" view open. It lists a local repository named "OHBM-GIT-EXAMPLE-SBOLLMANN". Inside this repository, there are two files: "README.md" and another "README.md" file under the "OPEN EDITORS" section. The file under "OPEN EDITORS" is currently selected.

Repository exists online

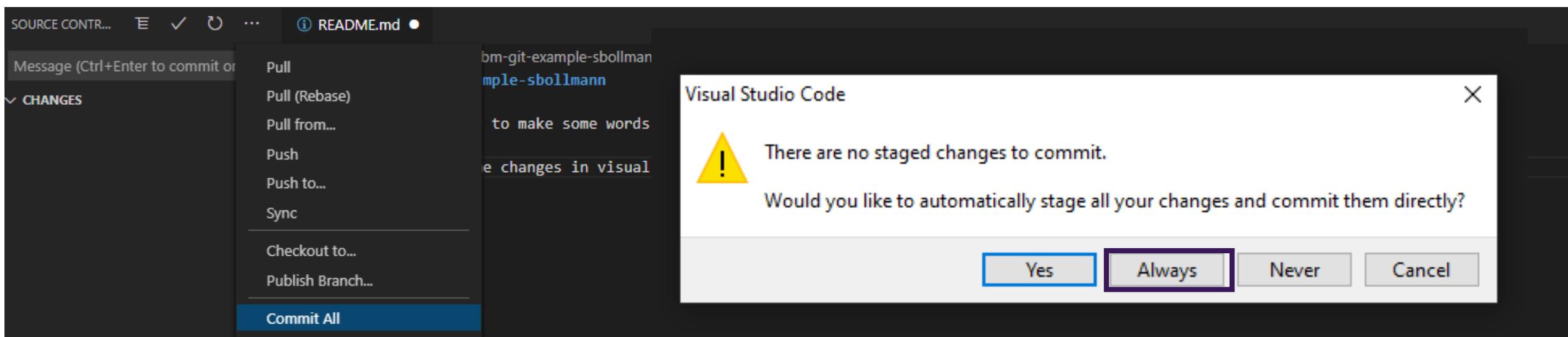
Pull to update local repository



```
① README.md X
① README.md > abc # ohbm-git-example-sbollmann
1   # ohbm-git-example-sbollmann
2
3   It's very easy to make some words **bold** and other words *italic* with Markdown. You can even [link to Google!](http://google.com)
4
```

Making local changes

```
① README.md •  
① README.md > abc # ohbm-git-example-sbollmann  
1  # ohbm-git-example-sbollmann  
2  
3  It's very easy to make some words **bold** and other words *italic* with Markdown. You can even [link to Google!](http://google.com)  
4  
5 | Let's make some changes in visual studio code.
```



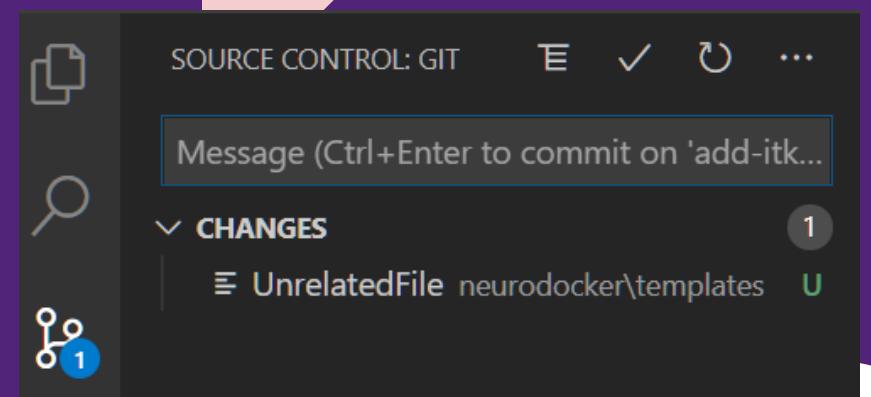
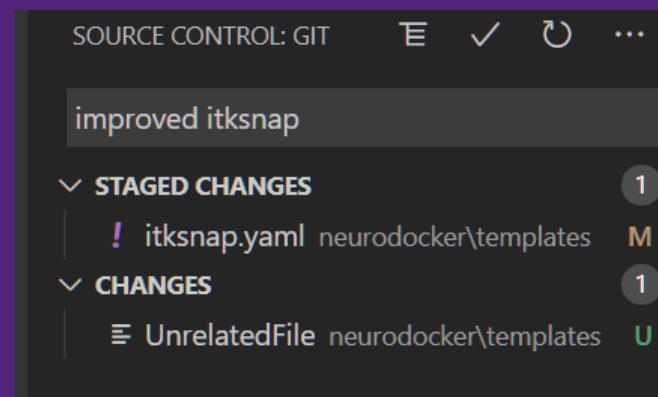
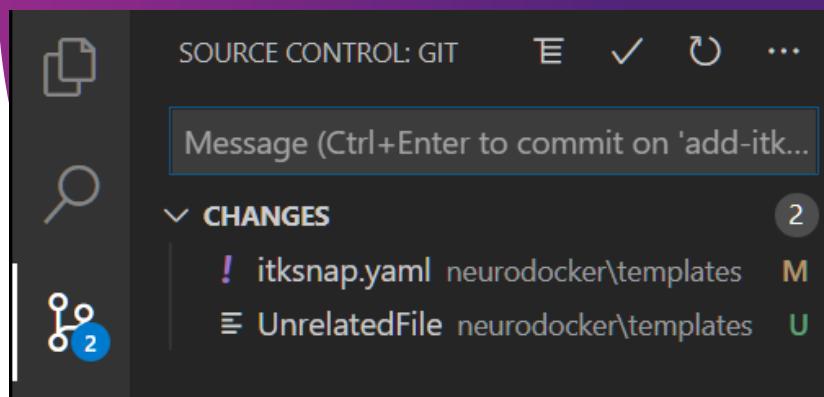


Staging Area

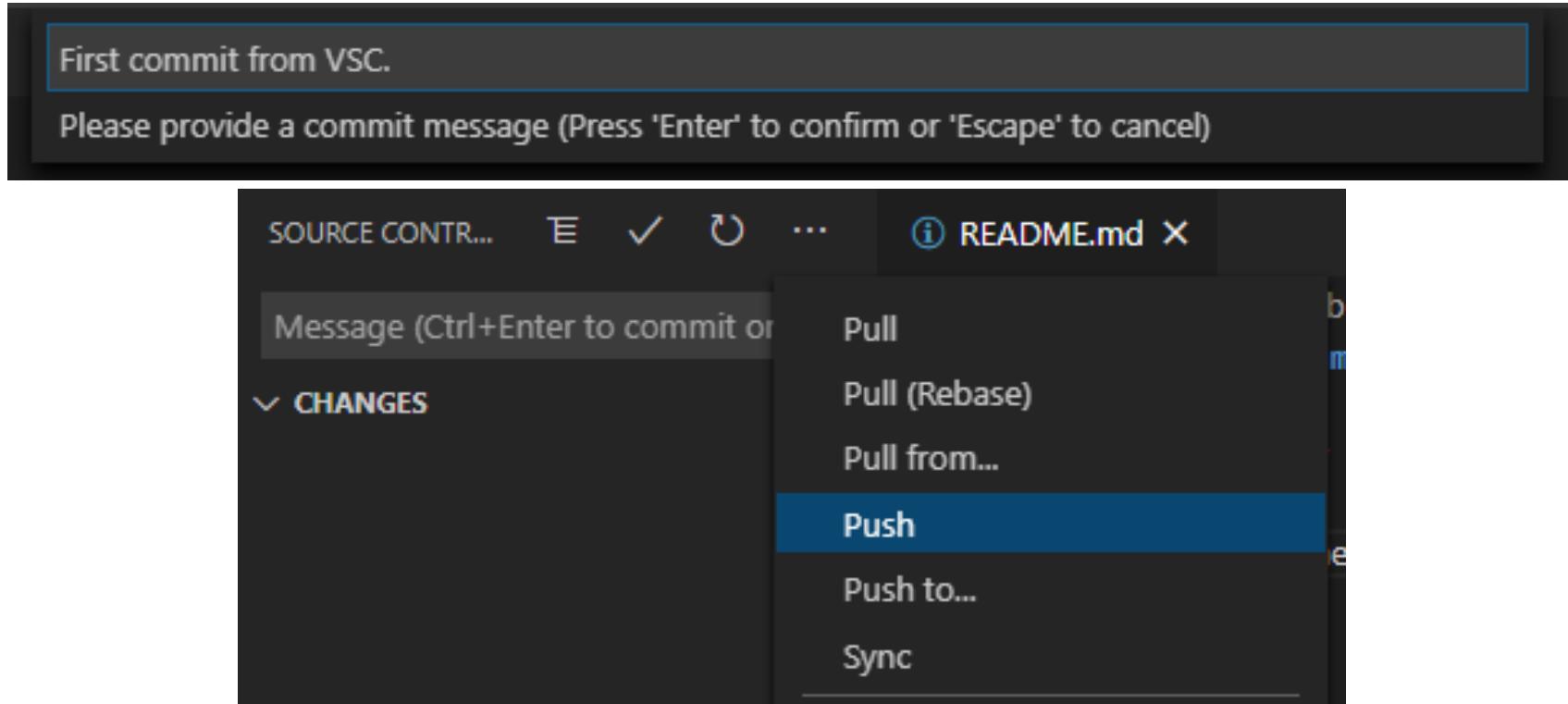
Changes in Folder

Staging Area (files to
be used for the next
commit)

Repository



Commit and Push



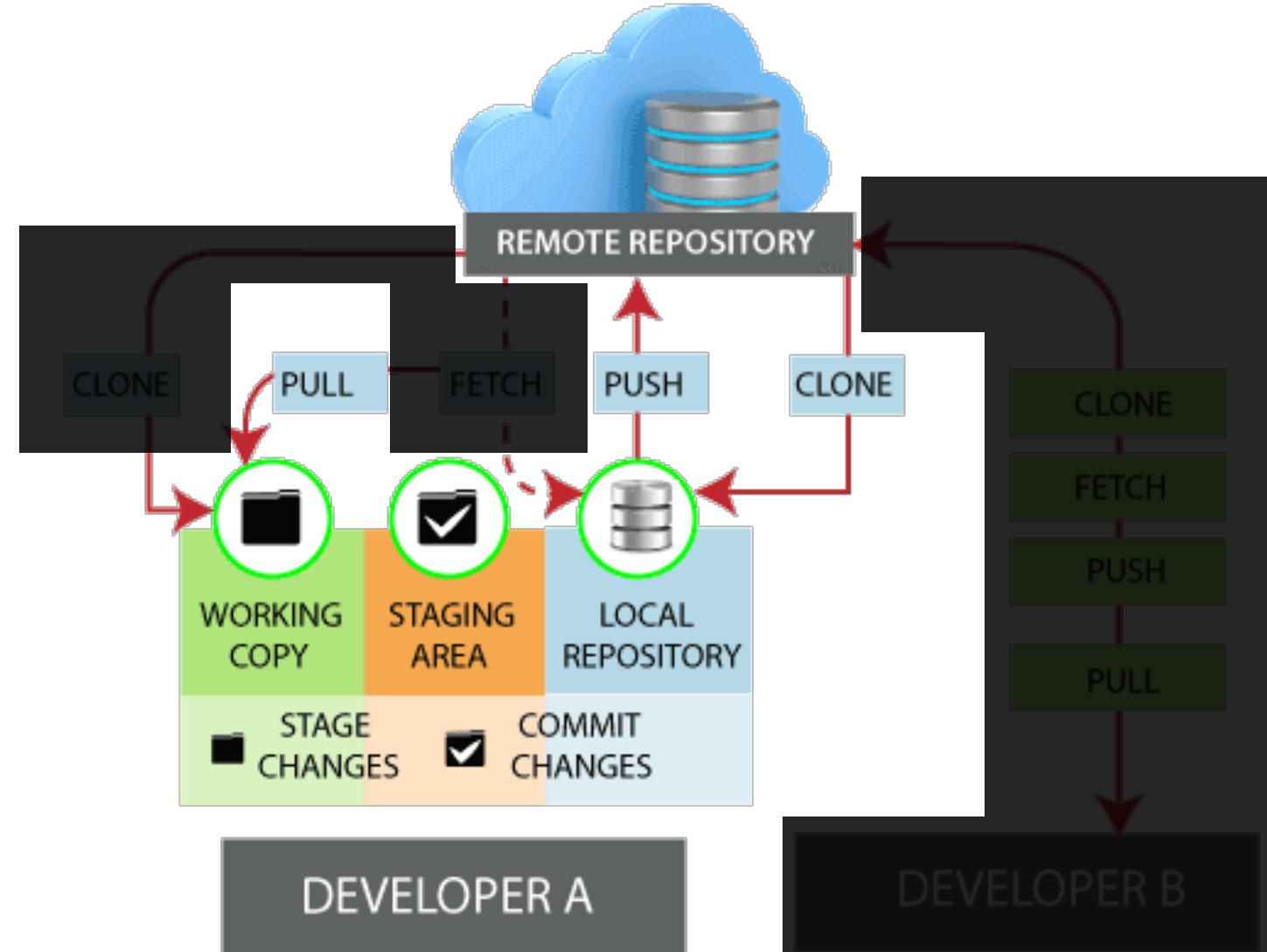
```
> git push origin master:master
To github.com:SaskiaBollmann/ohbm-git-example-sbollmann.git
  9823e83..8fa93bf  master -> master
```

Summary

Staging Area and Working Copy

Git commands

- git status
- git commit –am “Hello”
- git push
- git pull

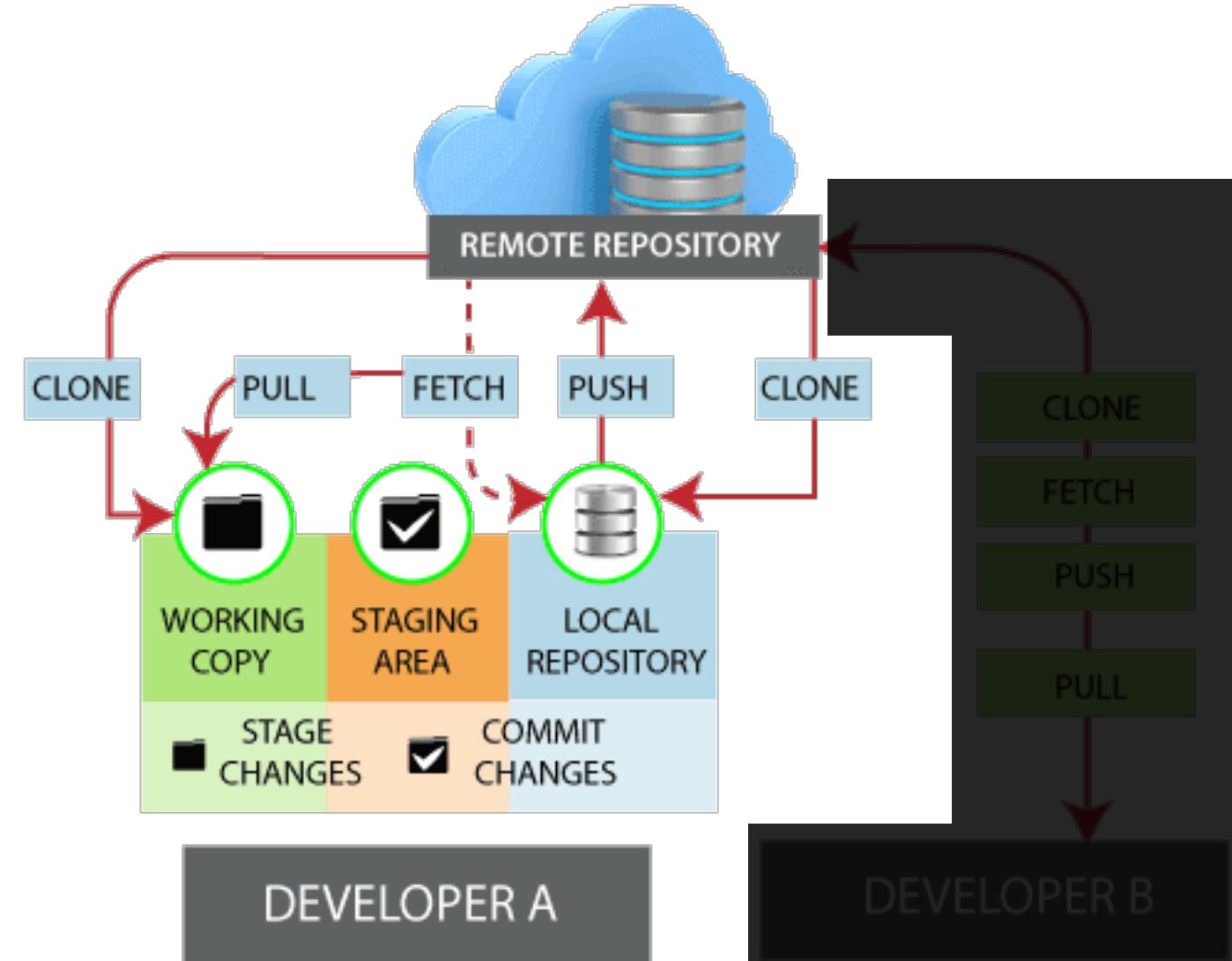


<https://www.javatpoint.com/git-remote>

Summary

Git commands

- git fetch = update a local repository to the state of a remote
- git pull = git fetch + merge
→ incorporate changes from a remote repository into the current branch



<https://www.javatpoint.com/git-remote>

Never commit large files to git!

SaskiasAwesomeProject

Name	
code	→ git → advanced topic: Continuous Integration = running tests
data	→ datalad (git-annex)
literature	→ zotero
results	→ osf.io

1) Using code from
github.com

2) Version Control
for your project

Use Cases

3) Adding someone
to your project

4) Contributing to
a project

Adding a collaborator

SaskiaBollmann / ohbm-git-example-sbollmann

Unwatch 1 Star 0 Fork 0

Code Issues 0 Pull requests 0 Actions Projects 0 Wiki Security 0 Insights Settings

Who has access

PUBLIC REPOSITORY  This repository is public and visible to anyone. Manage

DIRECT ACCESS  0 collaborators have access to this repository. Only you can contribute to this repository.

Manage access

You haven't invited any collaborators yet

Invite a collaborator

Options

Manage access

Security & analysis

Branches

Webhooks

Notifications

Integrations

Deploy keys

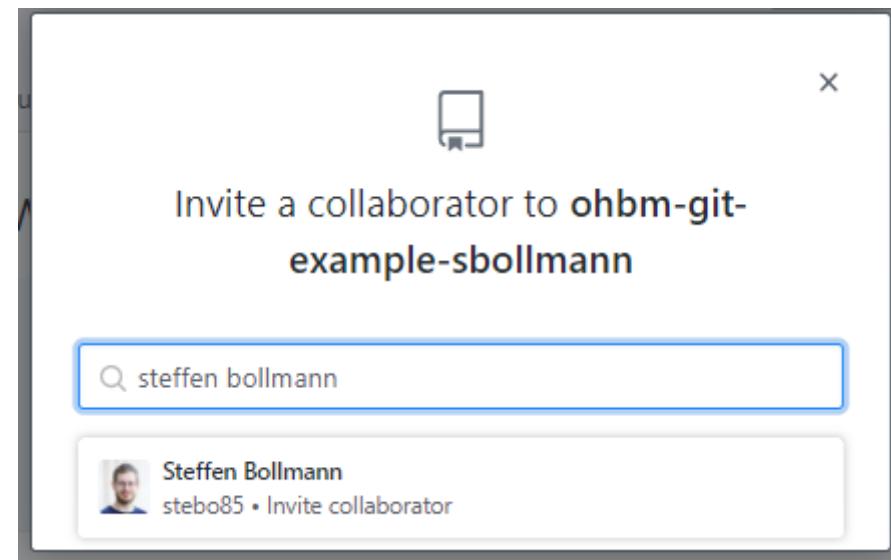
Secrets

Actions

Moderation

Interaction limits

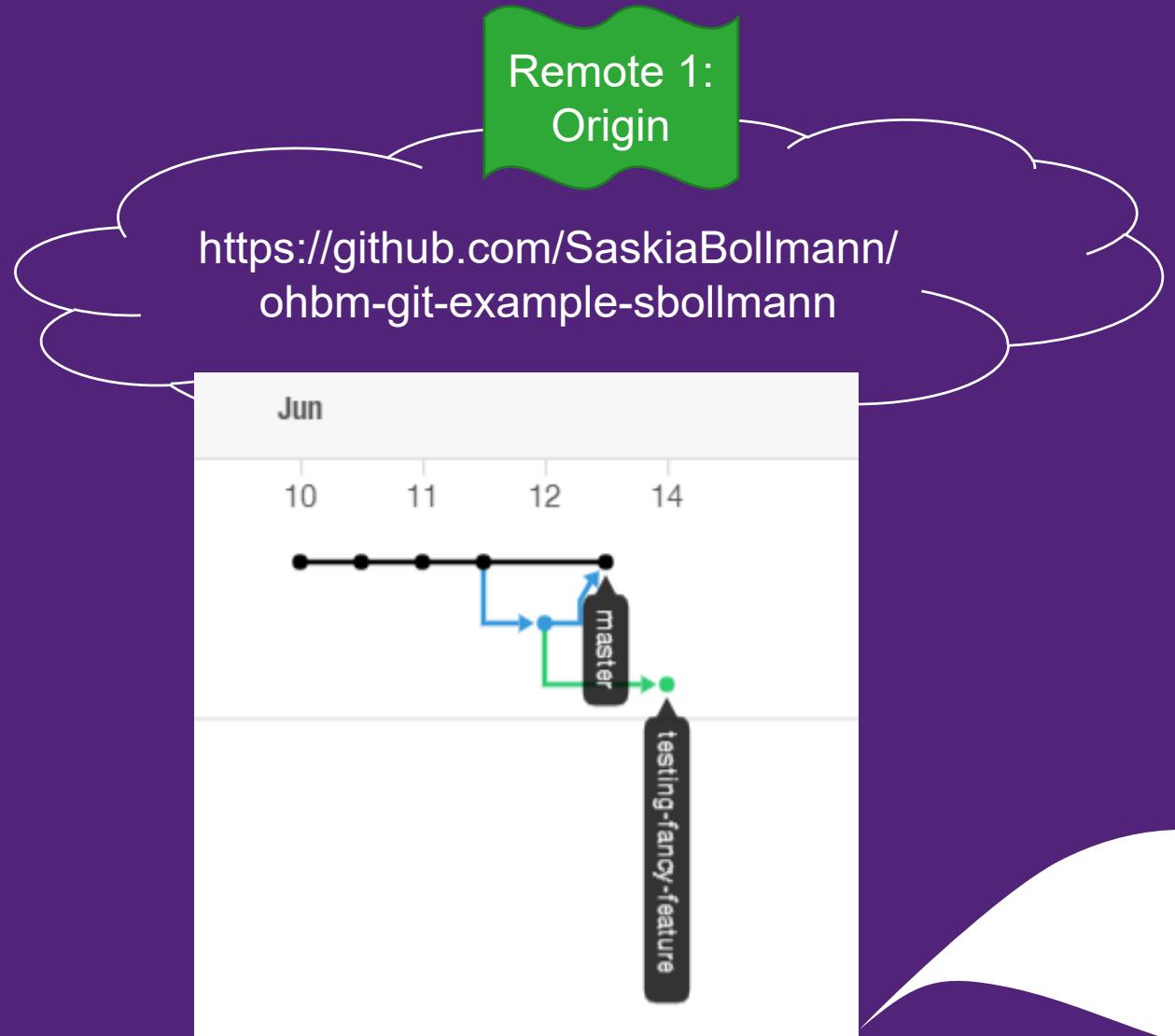
Adding a collaborator



What is a branch?

Master = main branch
-> stable code

all other branches =
testing or bug fixes





Code

Issues

Pull requests

Actions

Projects

Wiki

Security

Insights

Pulse

Contributors

Community

Traffic

Commits

Code frequency

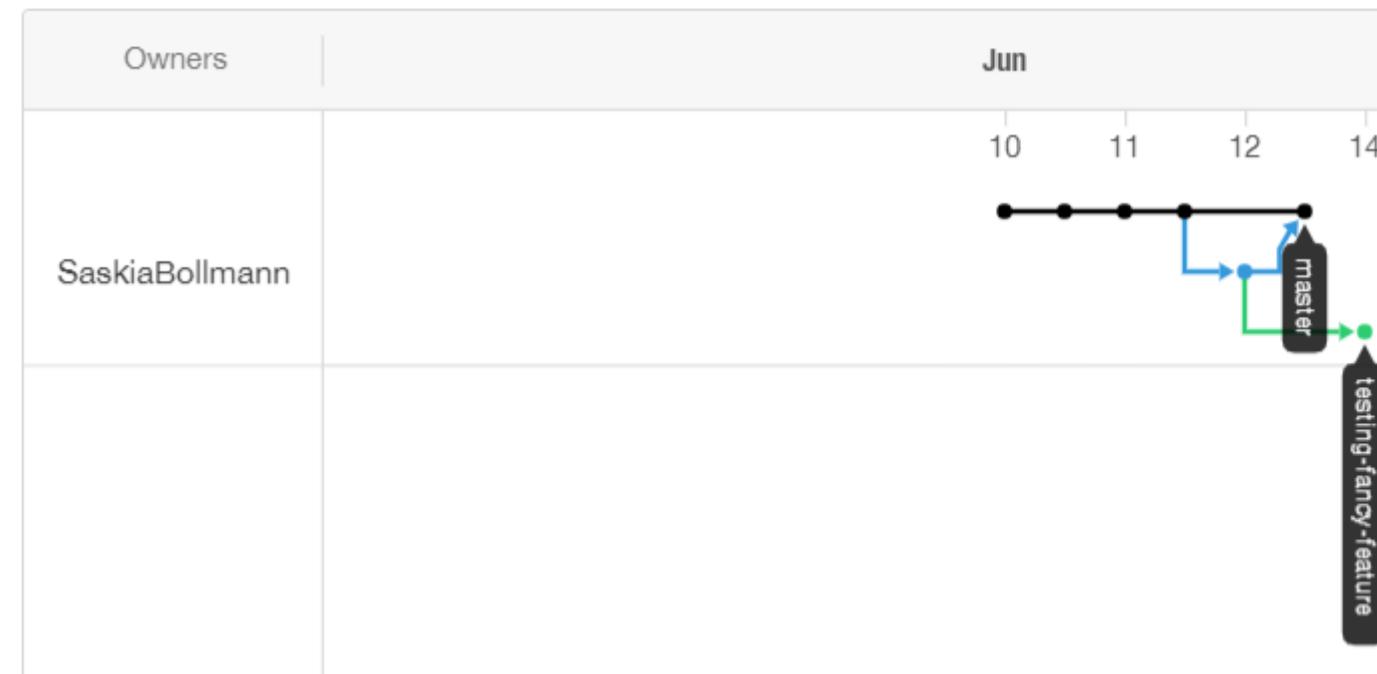
Dependency graph

Network

Forks

Network graph

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



Switching to new branch

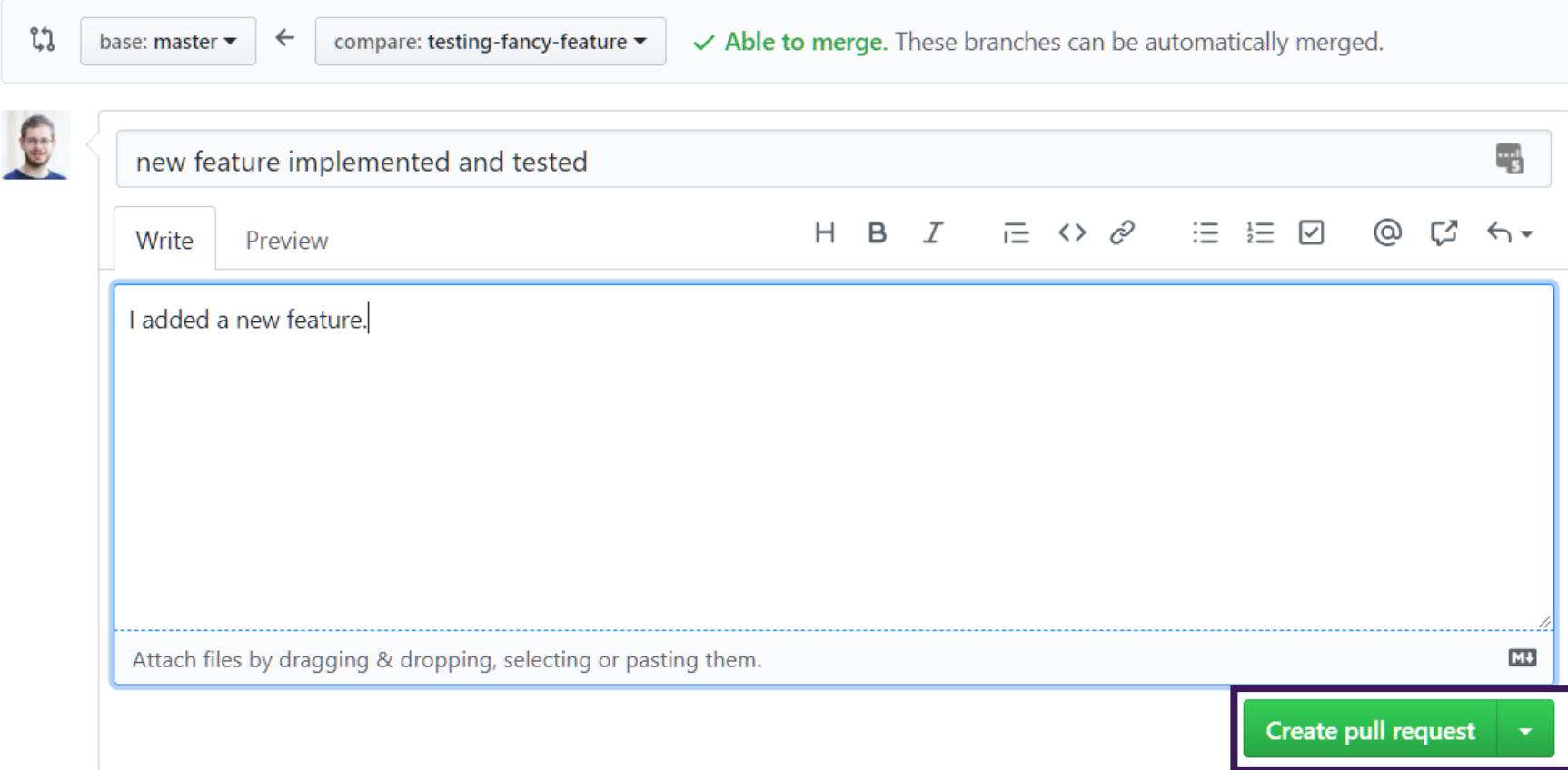
```
(base) uqsbollm@cai-wks3:~/ohbm-git-example-sbollmann$ git pull
From github.com:SaskiaBollmann/ohbm-git-example-sbollmann
 * [new branch]      testing-fancy-feature -> origin/testing-fancy-feature
Already up-to-date.
```

```
(base) uqsbollm@cai-wks3:~/ohbm-git-example-sbollmann$ git checkout testing-fancy-feature
Branch testing-fancy-feature set up to track remote branch testing-fancy-feature
from origin.
Switched to a new branch 'testing-fancy-feature'
```

Ready to merge?

Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also [compare across forks](#).



base: master ▾ ← compare: testing-fancy-feature ▾ ✓ Able to merge. These branches can be automatically merged.

new feature implemented and tested

Write Preview

I added a new feature.

Attach files by dragging & dropping, selecting or pasting them.

Create pull request ▾

1) Using code from
github.com

2) Version Control
for your project

Use Cases

3) Adding someone
to your project

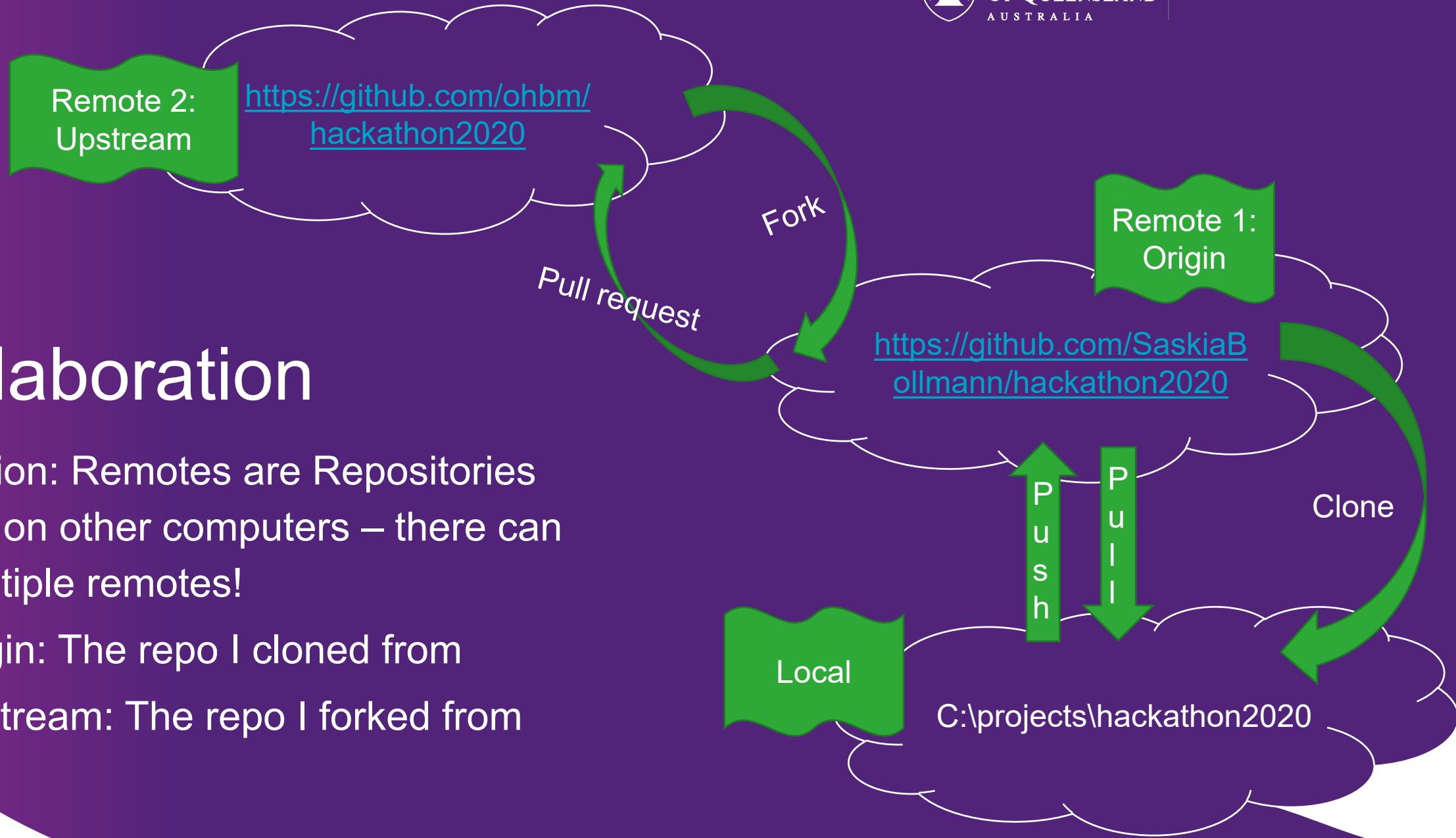
4) Contributing to
a project



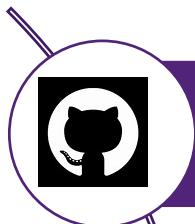
Collaboration

Definition: Remotes are Repositories stored on other computers – there can be multiple remotes!

- > Origin: The repo I cloned from
- > Upstream: The repo I forked from



... building AI models is easy? Right?

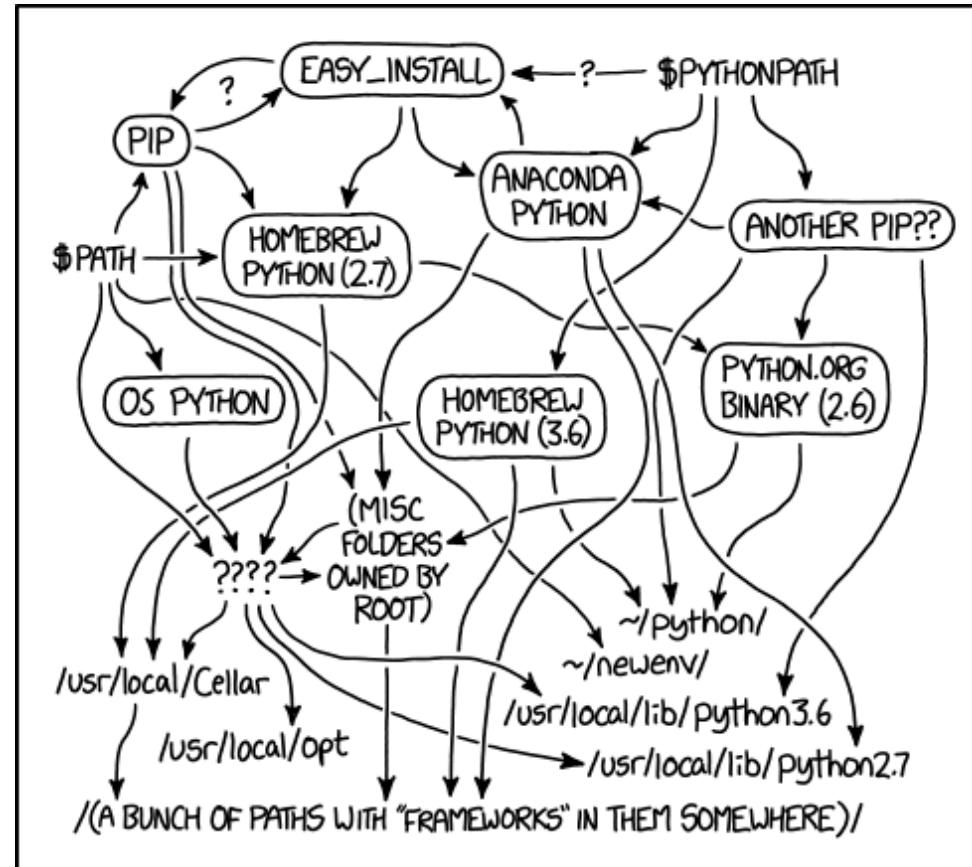


Code under version control -> **basics in git**



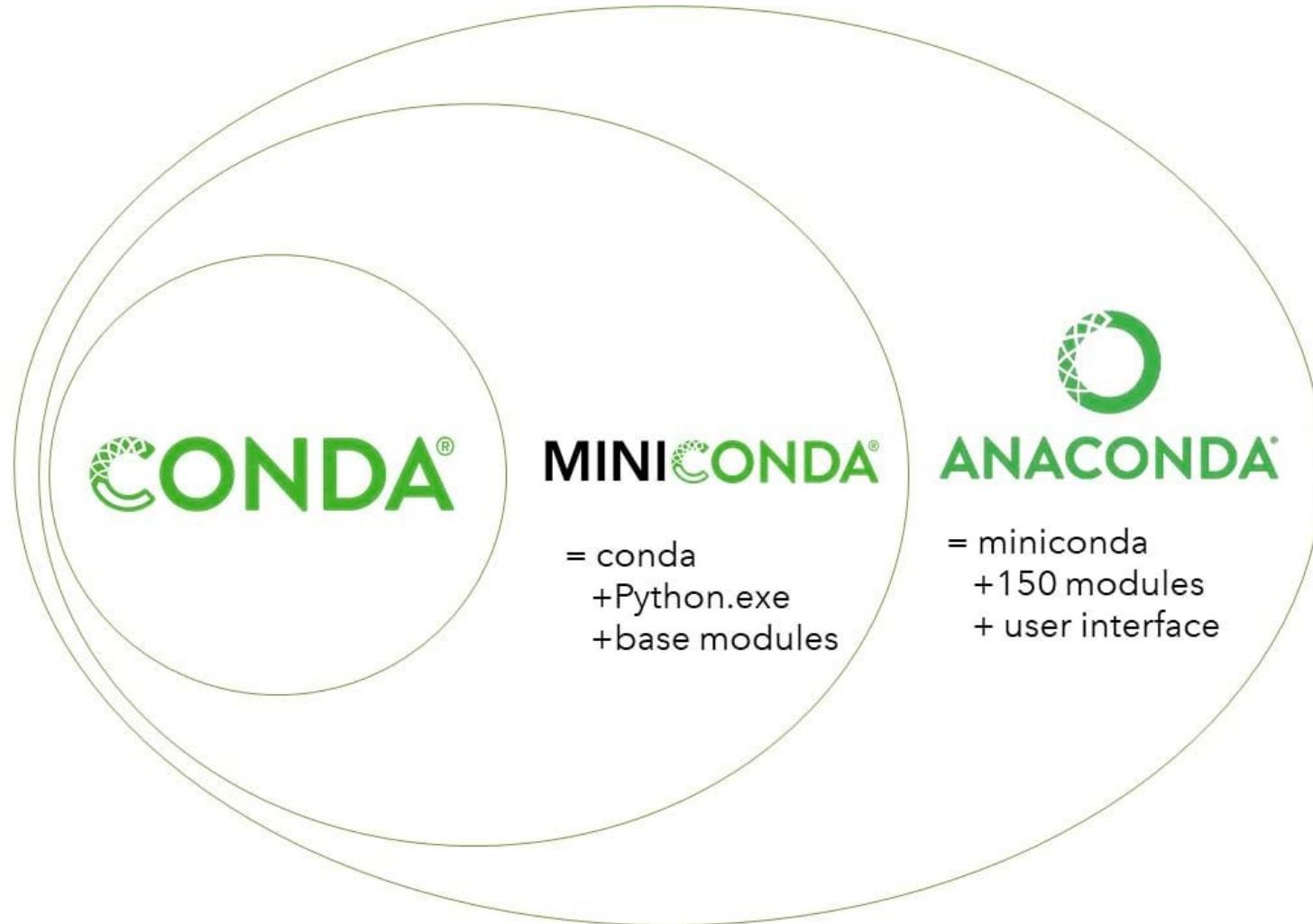
Most models developed in Python -> **some conda magic**

Python is easy, right?



MY PYTHON ENVIRONMENT HAS BECOME SO DEGRADED
THAT MY LAPTOP HAS BEEN DECLARED A SUPERFUND SITE.

Conda to the rescue



GPU driver has to be installed and working:

```
(base) uqsbollm@cai-wks3:~$ nvidia-smi
Thu Dec  3 08:36:30 2020
+-----+
| NVIDIA-SMI 455.45.01      Driver Version: 455.45.01      CUDA Version: 11.1      |
+-----+
| GPU  Name      Persistence-M| Bus-Id      Disp.A  Volatile Uncorr. ECC  | | | |
| Fan  Temp  Perf  Pwr:Usage/Cap|               Memory-Usage | GPU-Util  Compute M.  |
|                               |               |             |           | MIG M.   |
+=====+
|  0  Quadro K4200          On   | 00000000:03:00.0 Off   |                  N/A  | | |
| 30%   40C     P8    14W / 110W |           118MiB /  4035MiB | 0%          Default  |
|                               |               |             |           | N/A       |
+-----+
|  1  Tesla K40c            On   | 00000000:04:00.0 Off   |                  0  | | |
| 23%   36C     P8    21W / 235W |           2MiB / 11441MiB | 0%          Default  |
|                               |               |             |           | N/A       |
+-----+
```

Install miniconda in Linux:

```
(base) uqsbollm@cai-wks3:~$ wget https://repo.anaconda.com/miniconda/Miniconda3-latest-Linux-x86_64.sh
--2020-12-03 08:38:07--  https://repo.anaconda.com/miniconda/Miniconda3-latest-Linux-x86_64.sh
Resolving repo.anaconda.com (repo.anaconda.com)... 104.16.130.3, 104.16.131.3, 2606:4700::6810:8203, ...
Connecting to repo.anaconda.com (repo.anaconda.com)|104.16.130.3|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 94235922 (90M) [application/x-sh]
Saving to: 'Miniconda3-latest-Linux-x86_64.sh'

Miniconda3-latest-Linux-x86_64  10%[=====>]  9.19M  4.38MB/s
```

```
(base) uqsbollm@cai-wks3:~$ bash Miniconda3-latest-Linux-x86_64.sh

Welcome to Miniconda3 py38_4.9.2
```

Installing Tensorflow using conda gets dependencies right (including GPU stuff ☺)

```
(base) uqsbollm@cai-wks3:~$ conda install tensorflow-gpu
Collecting package metadata (current_repodata.json): done
Solving environment: failed with initial frozen solve. Retrying with flexible solve.
Solving environment: failed with repodata from current_repodata.json, will retry with next repodata source.
Collecting package metadata (repodata.json): done
Solving environment: done

## Package Plan ##

environment location: /data/home/uqsbollm/miniconda3

added / updated specs:
- tensorflow-gpu

The following packages will be downloaded:

  package          build
  -----          -----
ca-certificates-2020.10.14      0      121 KB
certifi-2020.11.8    py37h06a4308_0   148 KB
conda-4.9.2           py37h06a4308_0   2.9 MB
cudatoolkit-10.1.243      h6bb024c_0   347.4 MB
cudnn-7.6.5            cuda10.1_0   179.9 MB
cupti-10.1.168          0      1.4 MB
tensorflow-2.1.0        gpu_py37h7a4bb67_0   4 KB
tensorflow-base-2.1.0     gpu_py37h6c5654b_0  155.3 MB
tensorflow-gpu-2.1.0      h0d30eee6_0   3 KB

Total:       687.2 MB
```

Hint: work in conda environments to avoid conflicts of packages!

```
(base) uqsbollm@cai-wks3:~$ conda create -n tensorflow_latest
Collecting package metadata (current_repodata.json): done
Solving environment: done

==> WARNING: A newer version of conda exists. <==
    current version: 4.8.3
    latest version: 4.9.2

Please update conda by running

    $ conda update -n base -c defaults conda

## Package Plan ##

environment location: /data/home/uqsbollm/miniconda3/envs/tensorflow_latest

Proceed ([y]/n)?
```

Hint: work in conda environments to avoid conflicts of packages!

```
#  
# To activate this environment, use  
#  
#     $ conda activate tensorflow_latest  
#  
# To deactivate an active environment, use  
#  
#     $ conda deactivate
```

```
(base) uqsbollm@cai-wks3:~$ conda activate tensorflow_latest  
(tensorflow_latest) uqsbollm@cai-wks3:~$ |
```

HINT: Tensorflow versions require specific Python versions (+Cuda library versions):

<https://anaconda.org/conda-forge/tensorflow/files?page=2>



28.2  I win-64/tensorflow-1.6.0-
MB py36_0.tar.bz2

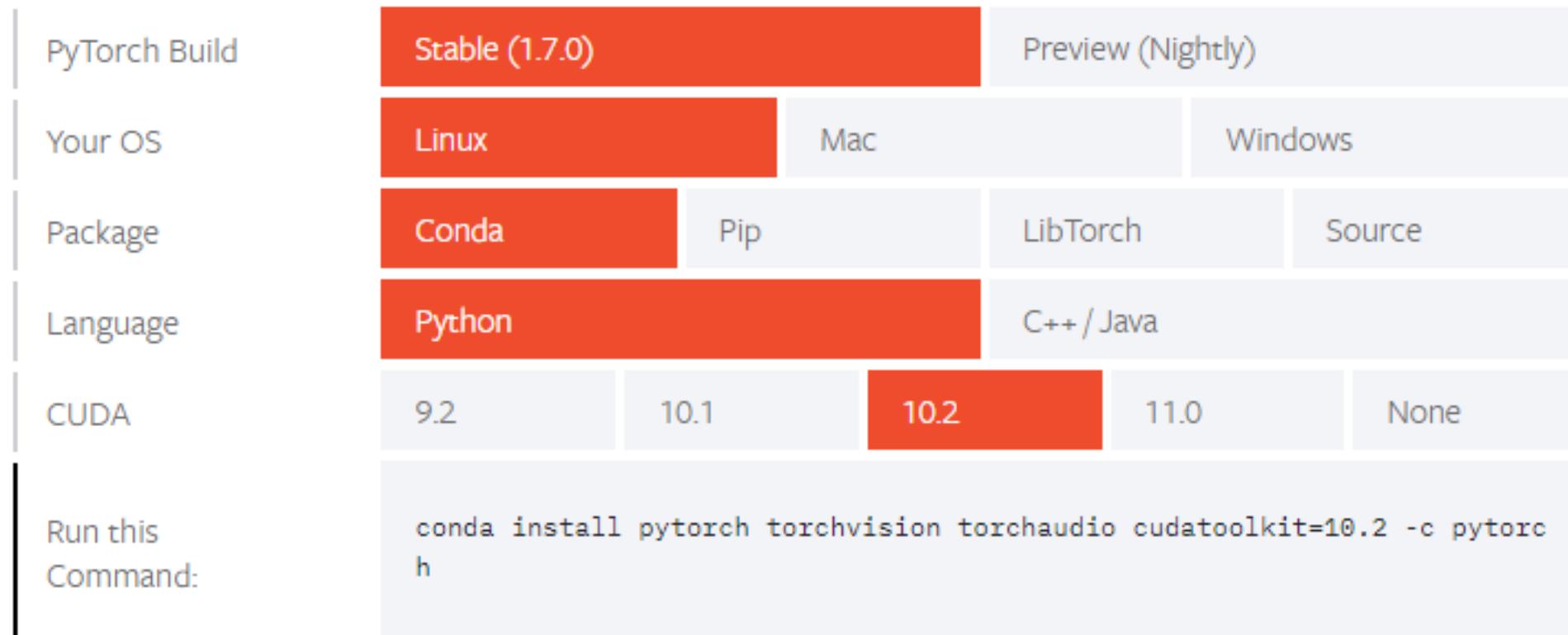
```
(base) C:\Users\uqsbollm>conda create -n fatsegnet python=3.6
Collecting package metadata (current_repodata.json): done
Solving environment: done

## Package Plan ##

environment location: C:\Users\uqsbollm\Miniconda3\envs\fatsegnet

added / updated specs:
- python=3.6
```

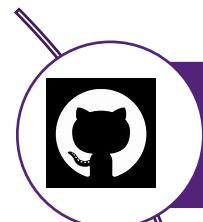
PyTorch also installable using Conda:



PyTorch also installable using Conda:

The following packages will be downloaded:			
package	build		
ca-certificates-2020.10.14	0	121 KB	
certifi-2020.11.8	py37h06a4308_0	148 KB	
conda-4.9.2	py37h06a4308_0	2.9 MB	
cudatoolkit-10.2.89	hfd86e86_1	365.1 MB	
freetype-2.10.4	h5ab3b9f_0	596 KB	
lcms2-2.11	h396b838_0	307 KB	
libtiff-4.1.0	h2733197_1	449 KB	
libuv-1.40.0	h7b6447c_0	736 KB	
lz4-c-1.9.2	heb0550a_3	175 KB	
ninja-1.10.2	py37hff7bd54_0	1.4 MB	
olefile-0.46	py37_0	50 KB	
pillow-8.0.1	py37he98fc37_0	619 KB	
pytorch-1.7.0	py3.7_cuda10.2.89_cudnn7.6.5_0	575.2 MB	pytorch
torchaudio-0.7.0	py37	9.8 MB	pytorch
torchvision-0.8.1	py37_cu102	17.8 MB	pytorch
typing_extensions-3.7.4.3	py_0	28 KB	
zstd-1.4.5	h9ceee32_0	619 KB	
		Total:	975.9 MB

... building AI models is easy? Right?



Code under version control -> **basics in git**



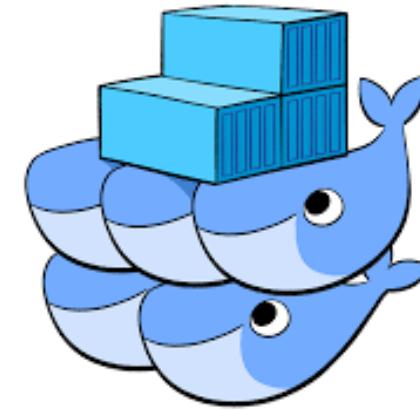
Most models developed in Python -> **some conda magic**



Some models are trained in “containers” -> **docker**

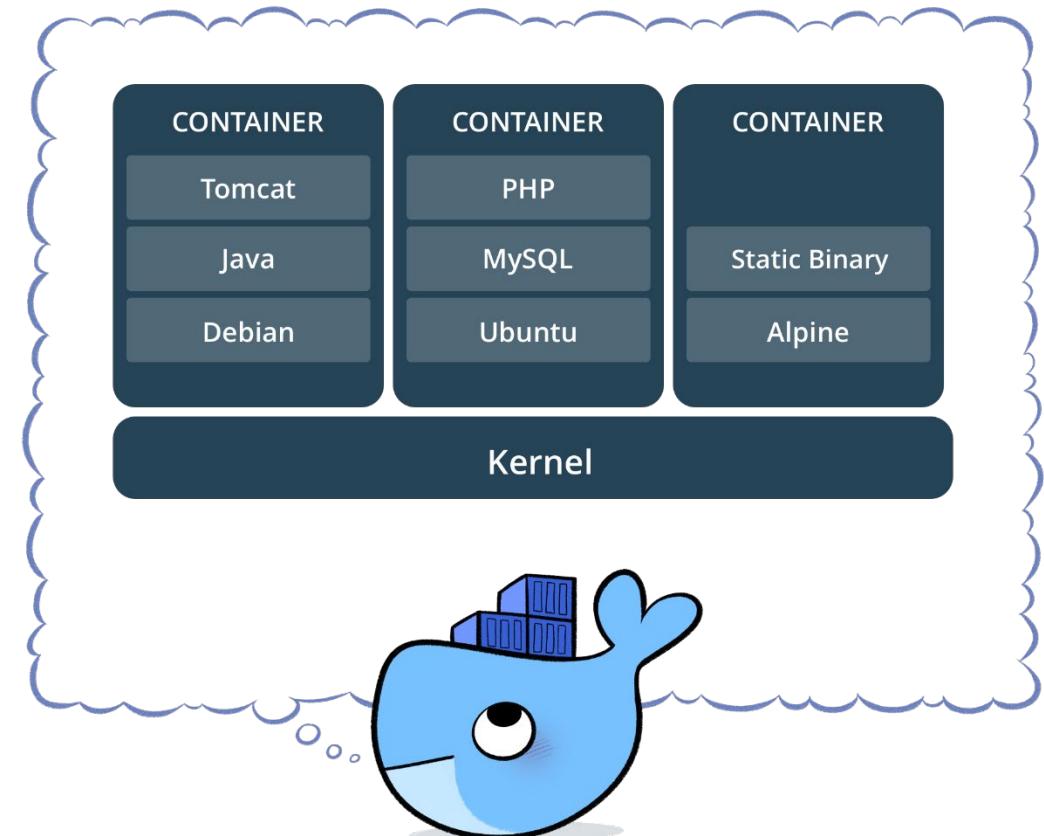
POLL – what ARE containers?

- a) Little virtual machines but without virtualisation of hardware
- b) Plastic boxes to store food in and keep it separated in the fridge
- c) A collection of tools to keep programs from interfering with each other using Linux kernel features, like cgroups and namespaces
- d) all of the above



What are containers?

- isolate software from its surroundings
- container image includes: code, runtime, system tools, system libraries, settings
- resource management provided by the Linux kernel (namespaces and cgroups)
- recipe = describes what should be in an image
- image = stores everything we need to run
- container = what we launch based on an image

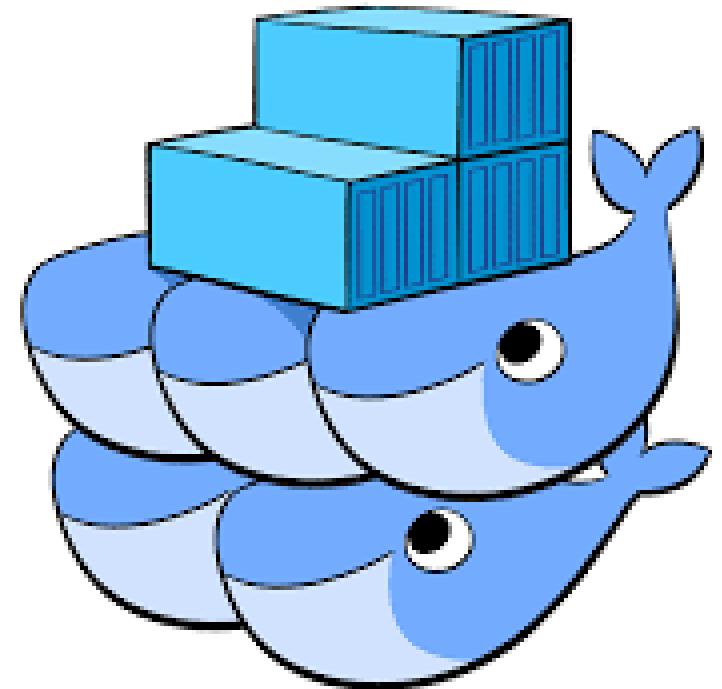


https://www.docker.com/what-container#/package_software

Docker

started the container hype by providing easy to use packages for Linux
widely adopted and supported by cloud providers, including orchestration

not easy to run graphical applications ☹
requires elevated privileges ☹



Singularity

Built to run on HPCs

- simple to install
- untrusted users running untrusted containers
- same user inside image than outside

built for data science

- GPU devices can be accessed in container
- graphical applications can run inside containers

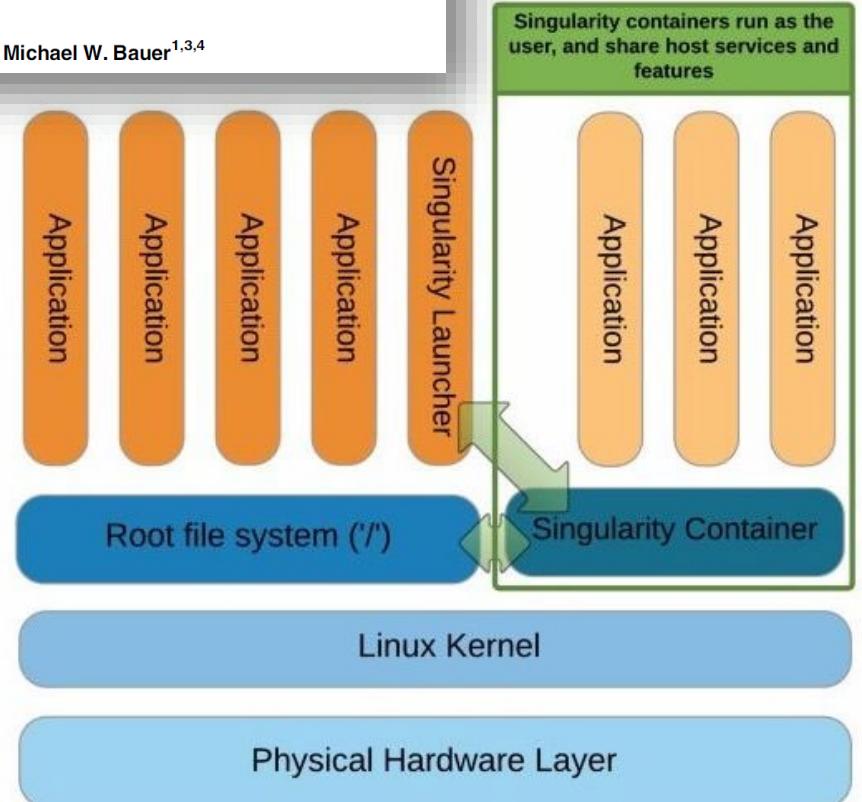
container format based on a single file

- simple file transfer and archive

RESEARCH ARTICLE

Singularity: Scientific containers for mobility of compute

Gregory M. Kurtzer¹, Vanessa Sochat^{2*}, Michael W. Bauer^{1,3,4}



<https://www.hpcwire.com/2017/05/04/singularity-hpc-container-technology-moves-lab/>

Virtual Machines VS Containers

Storage: 10 GB
Startup: 15s
RAM: 4GB



Application • e.g. itksnap

Libraries • e.g. QT4

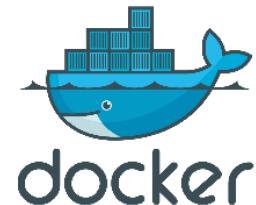
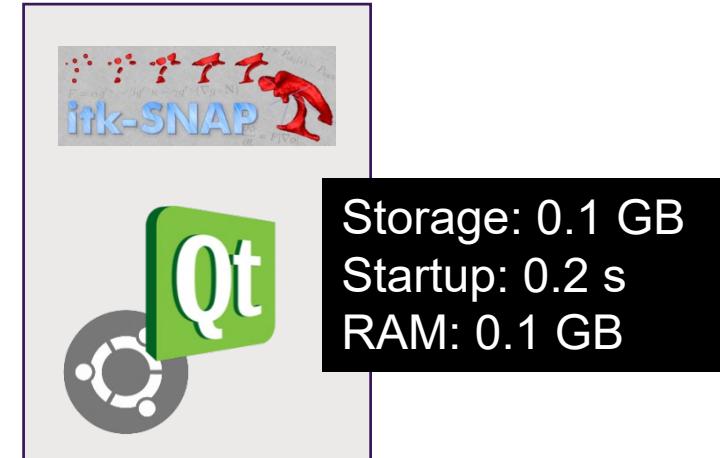
Guest OS • e.g. Ubuntu 16.04

Hypervisor • e.g. Virtualbox

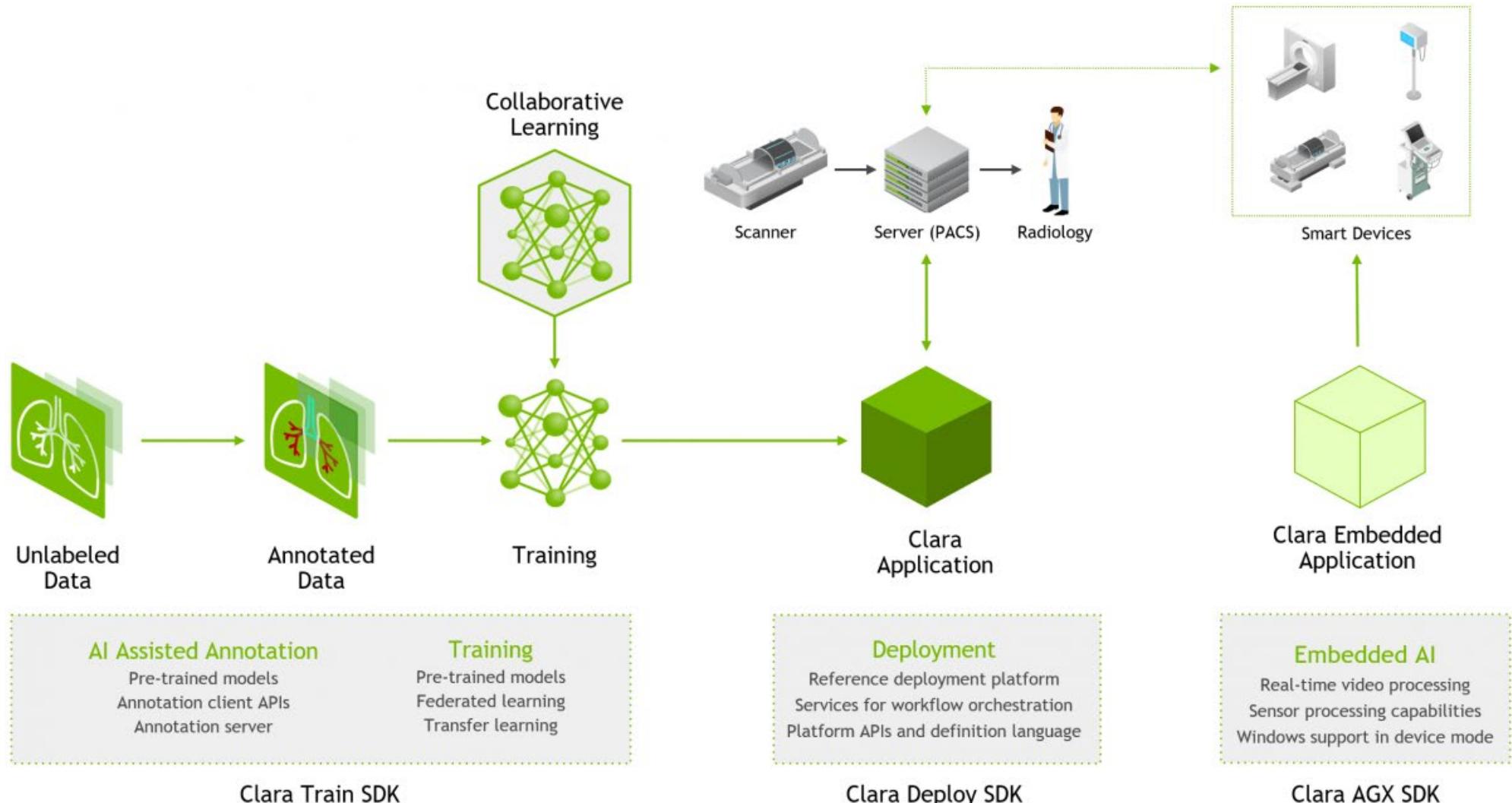
Host OS • e.g. Centos 6

Hardware • e.g. Dell Precision

Storage: 0.1 GB
Startup: 0.2 s
RAM: 0.1 GB



NVIDIA Clara



Setting up docker (+Nvidia Docker for GPU access)

```
curl https://get.docker.com | sh \  
  && sudo systemctl start docker \  
  && sudo systemctl enable docker
```

```
distribution=$(./etc/os-release;echo $ID$VERSION_ID) \  
  && curl -s -L https://nvidia.github.io/nvidia-docker/gpgkey | sudo apt-key add - \  
  && curl -s -L https://nvidia.github.io/nvidia-docker/$distribution/nvidia-docker.list | sudo tee \  
/etc/apt/sources.list.d/nvidia-docker.list
```

```
sudo apt-get update  
sudo apt-get install -y nvidia-docker2  
sudo systemctl restart docker
```

Let's test 😊

```
$ sudo docker run --rm --gpus all nvidia/cuda:11.0-base nvidia-smi
```

```
Unable to find image 'nvidia/cuda:11.0-base' locally
11.0-base: Pulling from nvidia/cuda
54ee1f796a1e: Pull complete
f7bfea53ad12: Pull complete
46d371e02073: Pull complete
b66c17bbf772: Pull complete
3642f1a6dfb3: Pull complete
e5ce55b8b4b9: Pull complete
155bc0332b0a: Pull complete
Digest: sha256:774ca3d612de15213102c2dbbba55df44dc5cf9870ca2be6c6e9c627fa63d67a
Status: Downloaded newer image for nvidia/cuda:11.0-base
Wed Dec 2 22:58:53 2020
+-----
| NVIDIA-SMI 455.45.01     Driver Version: 455.45.01     CUDA Version: 11.1      |
|-----+-----+-----+
| GPU  Name        Persistence-M| Bus-Id      Disp.A  | Volatile Uncorr. ECC  | |
| Fan  Temp  Perf  Pwr:Usage/Cap|               Memory-Usage | GPU-Util  Compute M.  |
|                               |               |             | MIG M.               |
|-----+-----+-----+
|   0  Quadro K4200          On   | 00000000:03:00.0 Off   |                  N/A  | |
| 30%   40C    P8    14W / 110W |               119MiB /  4035MiB |      0%     Default  |
|                               |               |             | N/A                 |
|-----+-----+-----+
|   1  Tesla K40c           On   | 00000000:04:00.0 Off   |                  0  | |
| 23%   36C    P8    21W / 235W |               2MiB / 11441MiB |      0%     Default  |
|                               |               |             | N/A                 |
+-----+-----+-----+
```

Clara Containers for Medical Imaging Deep Learning

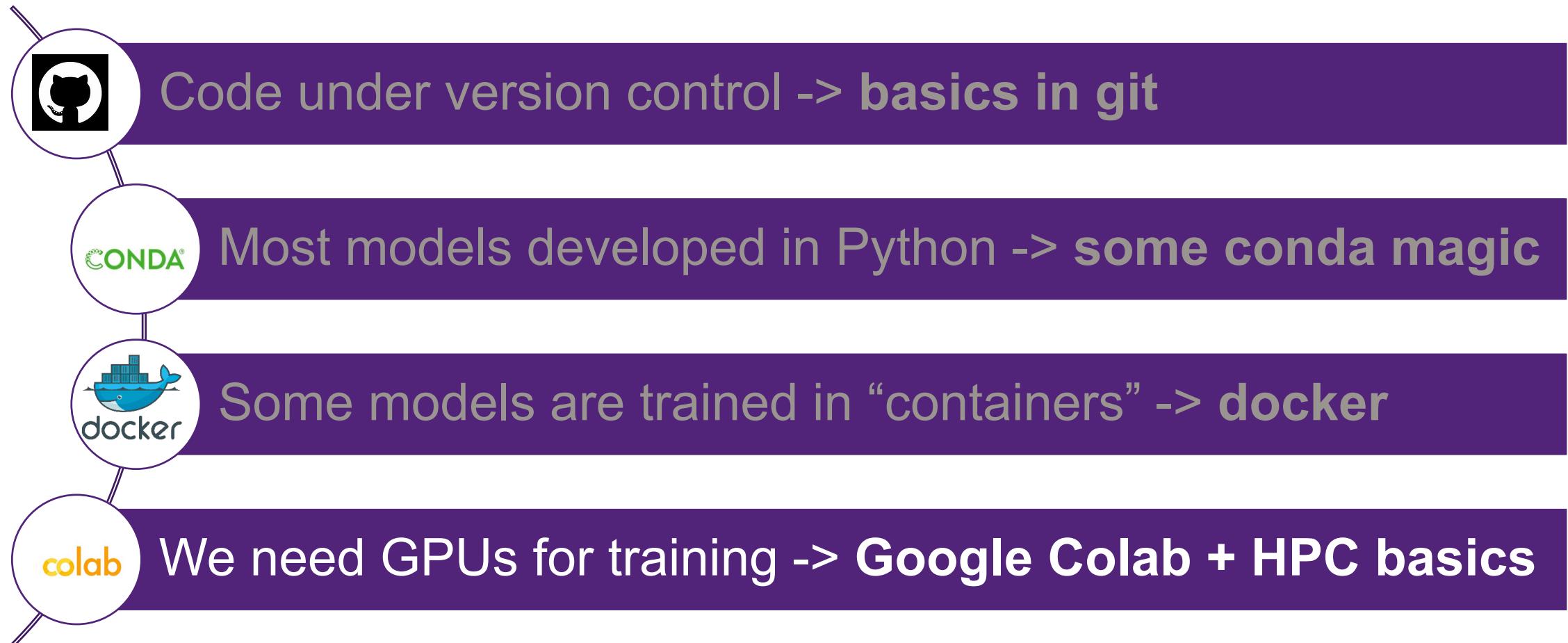
Pull Command

```
docker pull nvcr.io/nvidia/clara-train-sdk:v3.1
```



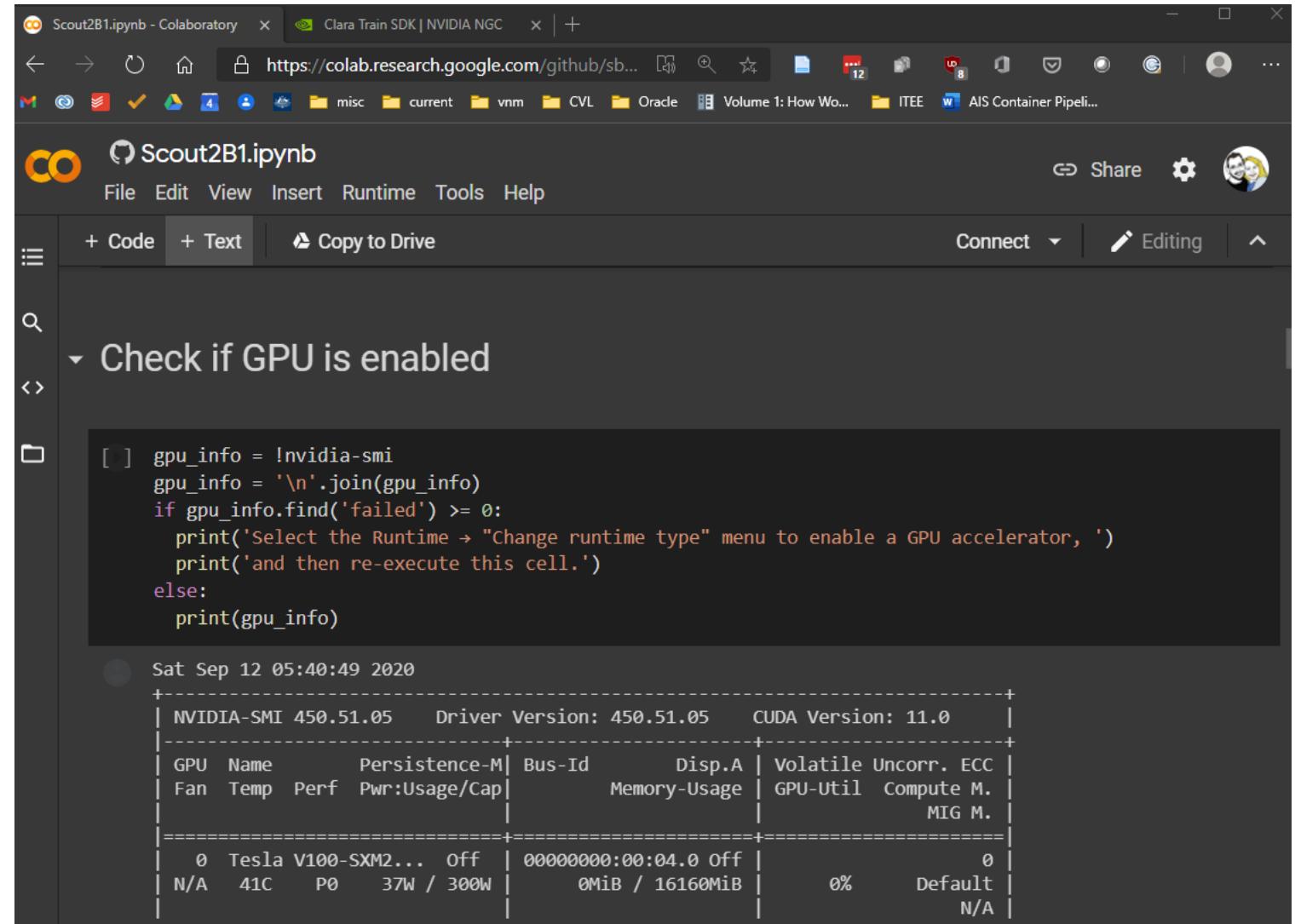
<https://ngc.nvidia.com/catalog/containers/nvidia:clara-train-sdk>

... building AI models is easy? Right?



Google Colab <https://colab.research.google.com>

- Free service provided by google for running python code + DL + free GPUs and TPUs!
- Runs in Browser
- Connect to your Google drive
- Can also connect to your local GPU!



The screenshot shows a Google Colab interface with a Jupyter Notebook titled "Scout2B1.ipynb". The notebook has two tabs: "+ Code" and "+ Text". The "+ Code" tab is active, displaying Python code to check if a GPU is enabled. The code uses the `!nvidia-smi` command and prints output if it fails or succeeds. Below the code cell, the output shows the command being run and its results:

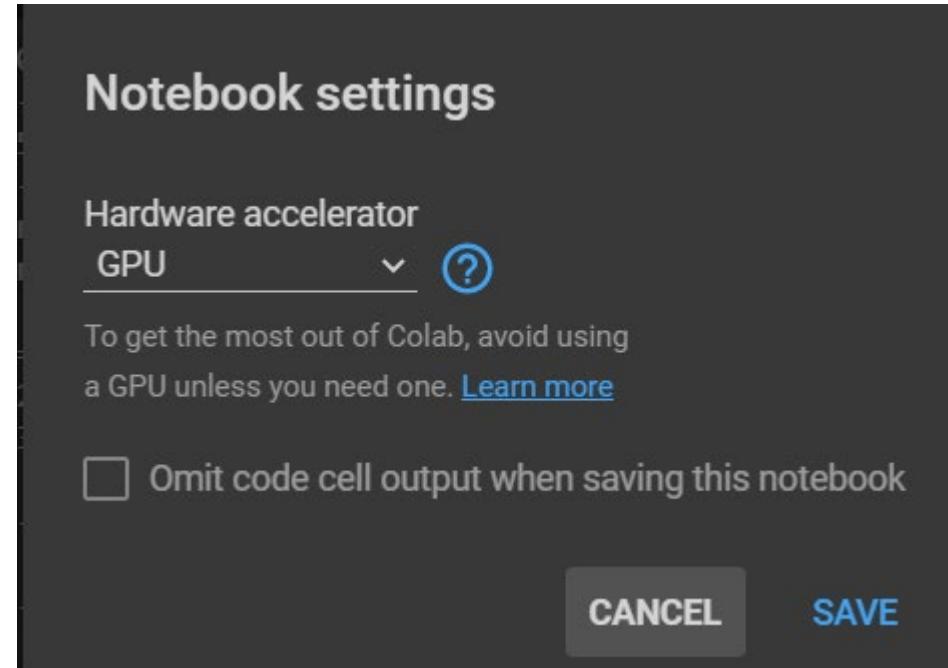
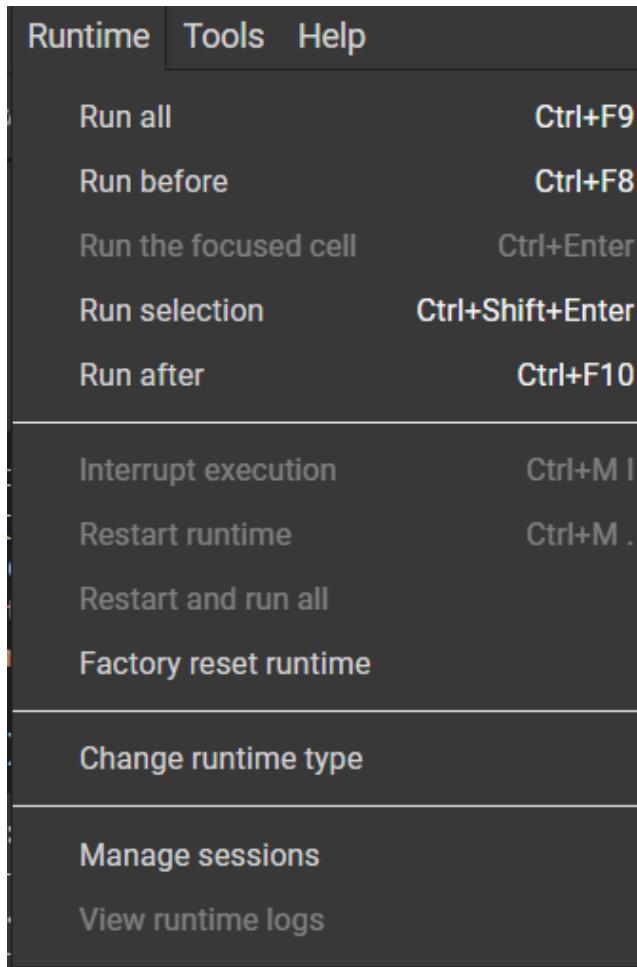
```
[ ] gpu_info = !nvidia-smi
gpu_info = '\n'.join(gpu_info)
if gpu_info.find('failed') >= 0:
    print('Select the Runtime → "Change runtime type" menu to enable a GPU accelerator, ')
    print('and then re-execute this cell.')
else:
    print(gpu_info)
```

Sat Sep 12 05:40:49 2020

NVIDIA-SMI	Driver Version	CUDA Version
450.51.05	450.51.05	11.0

GPU	Name	Persistence-M	Bus-Id	Disp.A	Volatile	Uncorr.	ECC
Fan	Temp	Perf	Pwr:Usage/Cap	Memory-Usage	GPU-Util	Compute M.	MIG M.
0	Tesla V100-SXM2...	off	00000000:00:04.0	Off	0		
N/A	41C	P0	37W / 300W	0MiB / 16160MiB	0%	Default	N/A

Using a GPU/TPU in colab



Testing GPU

```
gpu_info = !nvidia-smi
gpu_info = '\n'.join(gpu_info)
if gpu_info.find('failed') >= 0:
    print('Select the Runtime → "Change runtime type" menu to enable a GPU accelerator, ')
    print('and then re-execute this cell.')
else:
    print(gpu_info)
```

```
Sat Sep 12 05:40:49 2020
+-----+
| NVIDIA-SMI 450.51.05      Driver Version: 450.51.05      CUDA Version: 11.0 |
+-----+
| GPU  Name      Persistence-M| Bus-Id      Disp.A  | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|          Memory-Usage | GPU-Util  Compute M. |
|                               |               MIG M.   |
+=====+
| 0  Tesla V100-SXM2...  Off  | 00000000:00:04.0 Off  |            0 |
| N/A   41C     P0    37W / 300W |           0MiB / 16160MiB |      0%      Default |
|                               |                           N/A   |
+-----+
```

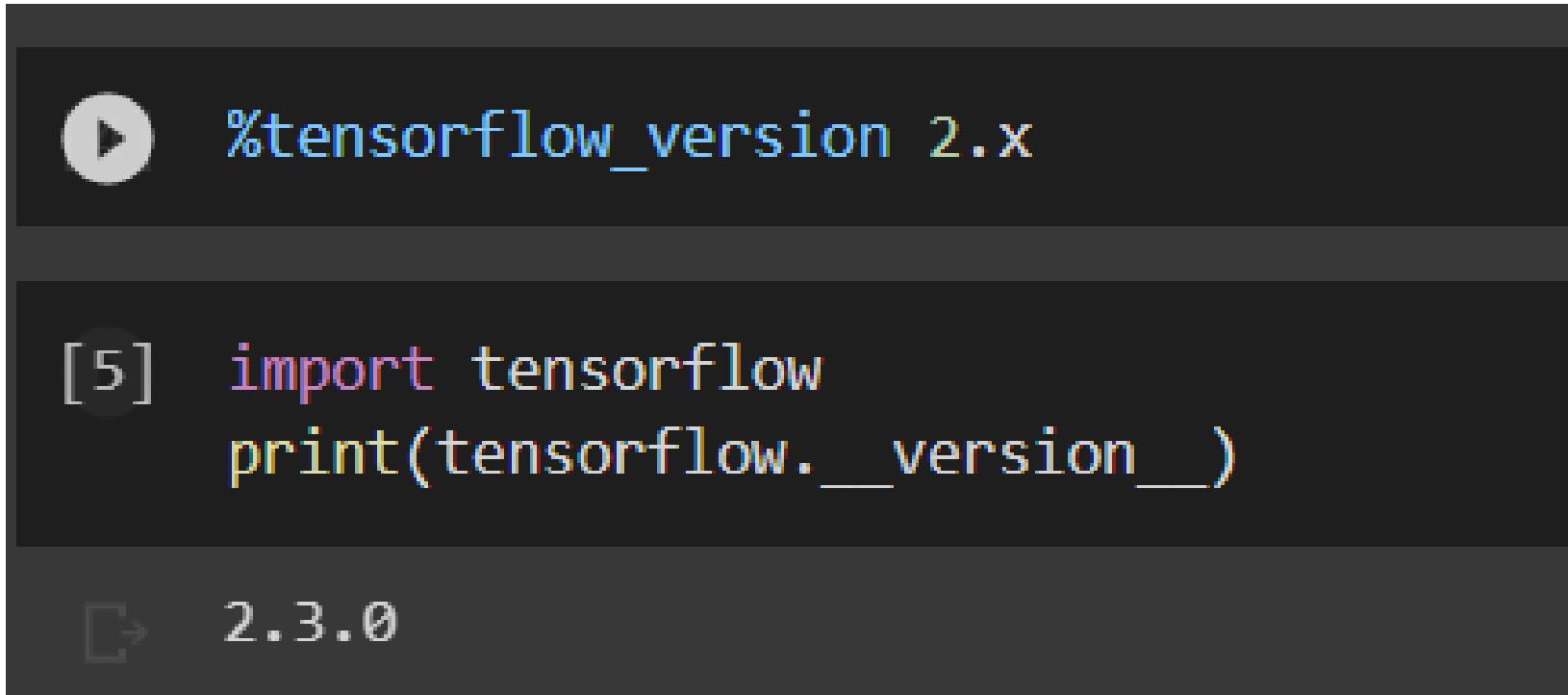
Connecting Colab to Google drive

```
import os

try:
    from google.colab import drive
    google_drive_dir = '/content/drive/My Drive/scout2B1'
    # select where to store the data - a free google account is sufficient to store all data in
    data_directory = google_drive_dir
    # data_directory = local_scratch_dir
    drive.mount('/content/drive')
except:
    local_scratch_dir = '/content'
    data_directory = local_scratch_dir

if not os.path.isdir(data_directory):
    os.mkdir(data_directory)
os.chdir(data_directory)
```

Using Tensorflow inside colab is (un)surprisingly easy

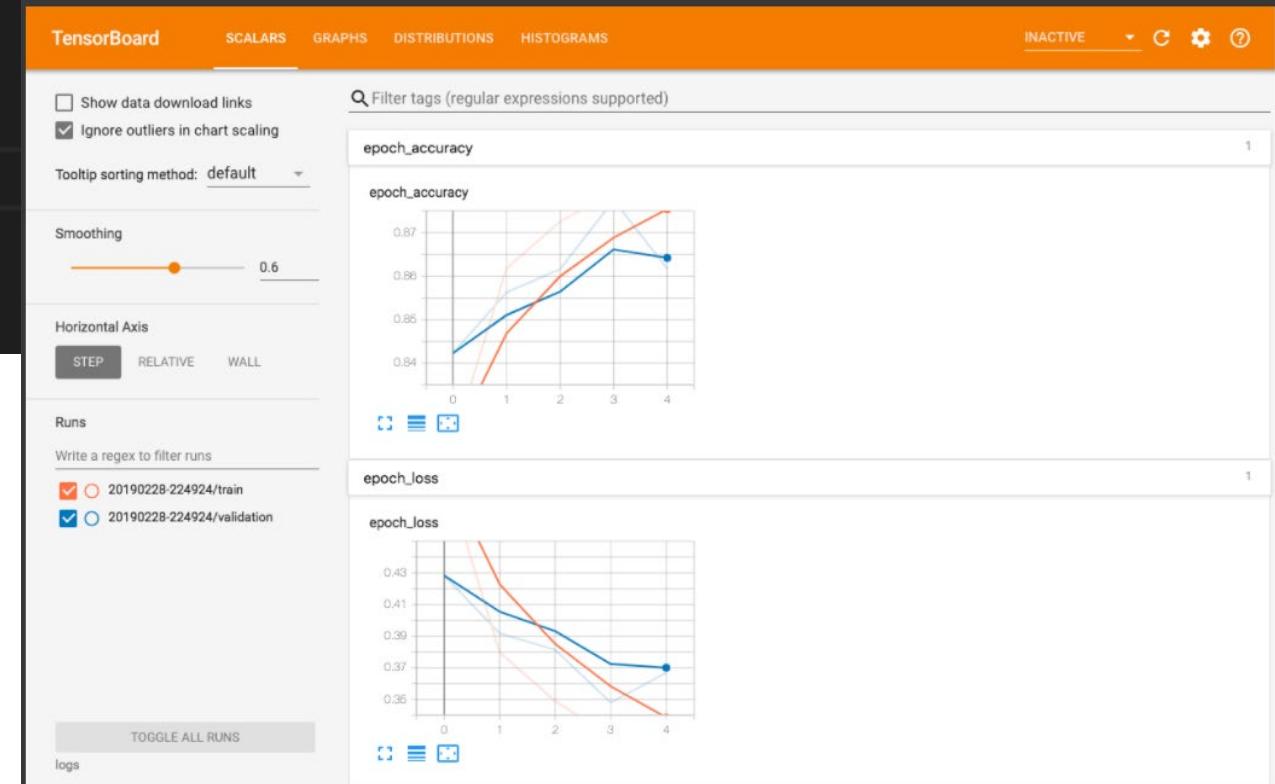


The image shows a screenshot of a Jupyter Notebook cell. At the top, there is a play button icon followed by the text "%tensorflow_version 2.x". Below this, a cell number [5] is shown next to the Python code "import tensorflow\nprint(tensorflow.__version__)". The output of the cell is "2.3.0", preceded by a right-pointing arrow icon.

```
%tensorflow_version 2.x
[5]: import tensorflow
      print(tensorflow.__version__)
2.3.0
```

Tensorboard inside Colab

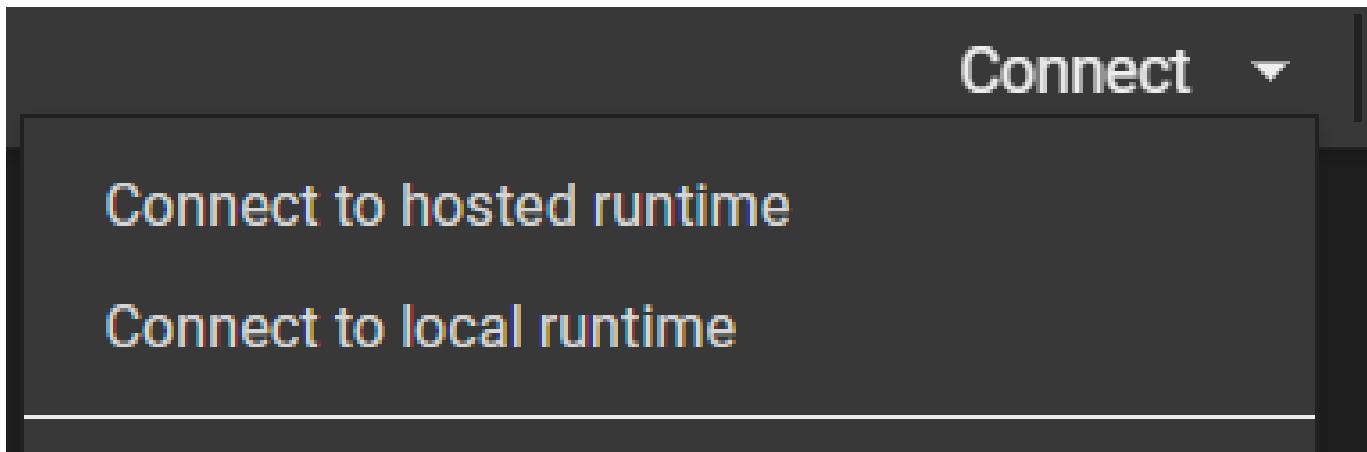
```
try:  
    # more Colab magic that only works on google's servers.  
    %load_ext tensorboard  
    print(checkpoint_directory)  
    os.chdir(checkpoint_directory)  
    %tensorboard --logdir .|  
except Exception:  
    pass
```



Connecting Colab to local/Cloud GPU

```
ssh -L 8888:127.0.0.1:8888 user@your-GPU-server
```

```
jupyter notebook --ip=0.0.0.0 --
NotebookApp.allow_origin='https://colab.research.google.com' --
port=8888 --NotebookApp.port_retries=0
```



Using GPUs on our Wiener cluster

wiener.hpc.dc.uq.edu.au

- great for large scale deep learning projects at UQ <http://www2.rcc.uq.edu.au/hpc/guides/>

Metropolitan Data Caching Infrastructure (MEDICI)



<https://rcc.uq.edu.au/data-storage>

RDM

create storage per project here: <https://rdm.uq.edu.au/> (check HPC option!, don't select identifiable human data)

Data storage

In order to store your projects data correctly, we need to know some details of the data and what you'd like to do with it (note: the two options cannot be modified once the project is active).

The project will store identifiable human data



The project data needs to be mounted on UQ [HPC](#) facilities.



The project data needs to be available on UQ High Performance Computing (HPC) facilities and access via high speed caches.

For more information, please read the [HPC section](#) of the UQRDM Guide.

Warning: Do not have more than 100 000 files on one collection – otherwise things will go really really wrong! Compress folders with many files as much as you can by using the program 7Zip!

RDM

data is also available via a cloud interface (and syncs via nextcloud) <https://cloud.rdm.uq.edu.au>

files are also available

- on windows: <\\uq.edu.au\UQ-Research>
- If the collection is mirrored to CAI (send email to helpdesk@cai.uq.edu.au) it will be faster and at:
<\\uq.edu.au\UQ-Inst-Gateway1>
- on workstations: /winmounts/username/data.cai.uq.edu.au
- on clusters: /QRISdata

Note: changes can take a while to propagate between different locations!

Thank you

- ✉ s.bollmann@uq.edu.au
- 🌐 www.mri.sbollmann.net
- 🐦 @sbollmann_MRI
- ithub.com/sbollmannmri

CRICOS code 00025B

