

1) Make a new directory with name practice-project

```
axoy@AxoyUX5401: ~/practic  X + v
axoy [19:56:27]:~$ mkdir practice-project
axoy [19:56:35]:~$ cd practice-project/
axoy [19:56:38]:~/practice-project$ |
```

2) Run git init in this directory

```
axoy@AxoyUX5401: ~/practic  X + v
axoy [19:57:02]:~/practice-project$ git init
hint: Using 'master' as the name for the initial branch. This default branch name
hint: is subject to change. To configure the initial branch name to use in all
hint: of your new repositories, which will suppress this warning, call:
hint:
hint:   git config --global init.defaultBranch <name>
hint:
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
hint: 'development'. The just-created branch can be renamed via this command:
hint:
hint:   git branch -m <name>
Initialized empty Git repository in /home/axoy/practice-project/.git/
axoy [19:57:04]:~/practice-project$ |
```

3) Make directory useful_package, and __init__.py inside it

```
axoy@AxoyUX5401: ~/practic  X + v
axoy [19:57:31]:~/practice-project$ mkdir useful_package
axoy [19:57:36]:~/practice-project$ touch __init__.py
axoy [19:57:46]:~/practice-project$ ls
__init__.py  useful_package
axoy [19:57:55]:~/practice-project$ mv __init__.py useful_package/
axoy [19:58:07]:~/practice-project$ ls useful_package/
__init__.py
axoy [19:58:09]:~/practice-project$ |
```

4) Add and commit changes to a master branch

```
axoy@AxoyUX5401: ~/practic × + v
axoy [19:58:32]:~/practice-project$ git status
On branch master

No commits yet

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

nothing added to commit but untracked files present (use "git add" to track)
axoy [19:58:33]:~/practice-project$ git add useful_package/
axoy [19:58:35]:~/practice-project$ git commit -m "4th point in the task"
[master (root-commit) 84eea92] 4th point in the task
 1 file changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 useful_package/__init__.py
axoy [19:58:53]:~/practice-project$ |
```

5) Create and checkout a folder module_a_dev

```
axoy@AxoyUX5401: ~/practic × + v
axoy [19:59:22]:~/practice-project$ mkdir module_a_dev
axoy [19:59:36]:~/practice-project$ cd module_a_dev/
axoy [19:59:38]:~/practice-project/module_a_dev$ |
```

6) Create a file module_a.py under it

```
axoy@AxoyUX5401: ~/practic × + v
axoy [19:59:57]:~/practice-project/module_a_dev$ touch module_a.py
axoy [20:00:04]:~/practice-project/module_a_dev$ ls
module_a.py
axoy [20:00:07]:~/practice-project/module_a_dev$ |
```

7) Add to module_a.py a function polynom_3 that returns some cubic expression of X^3

```
axoy@AxoyUX5401: ~/practic × + v
axoy [20:00:53]:~/practice-project/module_a_dev$ vim module_a.py
axoy [20:03:03]:~/practice-project/module_a_dev$ cat module_a.py
#!/usr/bin/env python3

def polynom_3(x):
    return x**3
axoy [20:03:13]:~/practice-project/module_a_dev$ |
```

8) Add import of `polynom_3` to a `useful_package/__init__.py`

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:14:16]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ cat useful_package/__init__.py
#!/usr/bin/env python3

from module_a_dev.module_a import polynom_3
axoy [20:14:28]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

9) Add and commit changes to a `module_a_dev` branch.

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:17:50]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git checkout -b "module_a_dev"
Switched to a new branch 'module_a_dev'
axoy [20:17:54]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git status
On branch module_a_dev
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
    modified:   useful_package/__init__.py

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

no changes added to commit (use "git add" and/or "git commit -a")
axoy [20:17:55]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git add .
axoy [20:18:07]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git status
On branch module_a_dev
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
    new file:   module_a_dev/module_a.py
    modified:   useful_package/__init__.py
axoy [20:18:11]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git commit -m "9th point of t4"
[module_a_dev 77681c9] 9th point of t4
 2 files changed, 7 insertions(+)
 create mode 100755 module_a_dev/module_a.py
 mode change 100640 => 100755 useful_package/__init__.py
axoy [20:18:25]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

10) Checkout on master

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:18:42]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git checkout master
Switched to branch 'master'
axoy [20:18:46]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git branch
* master
  module_a_dev
axoy [20:18:51]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

11) Create and checkout on `module_b_dev`

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:19:10]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git checkout -b "module_b_dev"
Switched to a new branch 'module_b_dev'
axoy [20:19:24]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git branch
  master
  module_a_dev
* module_b_dev
axoy [20:19:25]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$
```

12) Create a file `module_b.py` under `useful_package` directory

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:19:42]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ touch useful_package/module_b.py
axoy [20:19:54]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ ls useful_package/
__init__.py module_b.py
axoy [20:19:59]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$
```

13) Add to `module_b.py` a function `hyperbola` that returns some hyperbola of `X` (with known definition area)

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:20:19]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ cat useful_package/module_b.py
#!/usr/bin/env python3

def hyperbola(x):
    y = 0
    try:
        y = 1/x
    except:
        print('Zero division error')
    return 1/x
axoy [20:21:13]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

14) Add import of hyperbola to a useful_package/__init__.py

```
axoy@AxoyUX5401: /mnt/c/U X + v
axoy [20:22:49]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ cat useful_package/__init__.py
#!/usr/bin/env python3

from useful_package.module_b import hyperbola
axoy [20:22:50]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

15) Add and commit changes to a module_b_dev branch.

```
axoy@AxoyUX5401: /mnt/c/U X + v
axoy [20:23:19]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git add .
axoy [20:23:22]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git commit -m "15th point"
[module_b_dev 0e69892] 15th point
 2 files changed, 12 insertions(+)
  mode change 100644 => 100755 useful_package/__init__.py
  create mode 100755 useful_package/module_b.py
axoy [20:23:37]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git status
On branch module_b_dev
nothing to commit, working tree clean
axoy [20:23:39]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

16) Checkout on master and merge module_a_dev

```
axoy@AxoyUX5401: /mnt/c/U X + v
axoy [20:28:18]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git status
On branch master
nothing to commit, working tree clean
axoy [20:28:24]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git merge module_a_dev
Merge made by the 'ort' strategy.
 module_a_dev/module_a.py | 4 ++++
 useful_package/__init__.py | 3 +++
 2 files changed, 7 insertions(+)
 create mode 100755 module_a_dev/module_a.py
axoy [20:28:43]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

17) Then merge module_b_dev and resolve conflicts (after modification don't forget to git add)

```
axoy@AxoyUX5401: /mnt/c/U X + v
axoy [20:29:48]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git merge module_b_dev
Auto-merging useful_package/__init__.py
CONFLICT (content): Merge conflict in useful_package/__init__.py
Automatic merge failed; fix conflicts and then commit the result.
axoy [20:29:51]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git add .
axoy [20:31:00]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git status
On branch master
All conflicts fixed but you are still merging.
(use "git commit" to conclude merge)

Changes to be committed:
  modified:   useful_package/__init__.py
  new file:   useful_package/module_b.py
axoy [20:31:10]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git merge module_b_dev
fatal: You have not concluded your merge (MERGE_HEAD exists).
Please, commit your changes before you merge.
axoy [20:31:19]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git commit -m "merge commit"
[master eb2ff66] merge commit
axoy [20:31:35]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git merge module_b_dev
Already up to date.
axoy [20:31:38]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git status
On branch master
nothing to commit, working tree clean
axoy [20:31:44]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

18) Checkout on master and hold on

```
axoy@AxoyUX5401: /mnt/c/U X + v
axoy [20:33:10]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git checkout master
Already on 'master'
axoy [20:33:46]:/mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

19) Go to github.com, create a new empty repository

<https://github.com/AxoyTO/FSE-3>

20) Add this repository to ours as a remote repository

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:33:18]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git checkout master
Already on 'master'
axoy [20:33:46]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git remote add origin https://github.com/AxoyTO/FSE-3.git
axoy [20:35:59]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

21) Push to github.com our master branch

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:40:41]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git push -u origin master
Username for 'https://github.com': AxoyTO
Password for 'https://AxoyTO@github.com':
Enumerating objects: 23, done.
Counting objects: 100% (23/23), done.
Delta compression using up to 20 threads
Compressing objects: 100% (15/15), done.
Writing objects: 100% (23/23), 1.92 KiB | 33.00 KiB/s, done.
Total 23 (delta 3), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (3/3), done.
To https://github.com/AxoyTO/FSE-3.git
 * [new branch]      master -> master
branch 'master' set up to track 'origin/master'.
axoy [20:40:50]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

22) Create a new branch regression-feature

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:41:28]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git checkout -b regression-feature
Switched to a new branch 'regression-feature'
axoy [20:41:34]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

23) Create the main.py in the root of our project with a sklearn RandomForestRegressor to approximate functions and calculate MSE of the predictions a. hyperbola b. polynomial_3

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:46:20]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ vim main.py
axoy [20:46:24]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ cat main.py
#!/usr/bin/env python3

import useful_package
import numpy as np
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import mean_squared_error

X = np.linspace(1,10,100).reshape(-1,1)
y_hyp = useful_package.hyperbola(X).ravel()
y_pol = useful_package.polynom_3(X).ravel()

#for hyperbola
model_1 = RandomForestRegressor()
model_1.fit(X,y_hyp)
y_pred_hyp = model_1.predict(X)
mse_hyp = mean_squared_error(y_hyp, y_pred_hyp)

#for polynomial_3
model_2 = RandomForestRegressor()
model_2.fit(X,y_pol)
y_pred_pol = model_1.predict(X)
mse_pol = mean_squared_error(y_pol, y_pred_pol)

if __name__ == '__main__':
    print('MSE for hyperbola: ', mse_hyp)
    print('MSE for polynom: ', mse_pol)
axoy [20:46:26]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ ./main.py
MSE for hyperbola: 3.5167506519496374e-05
MSE for polynom: 162113.9977793928
axoy [20:46:31]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

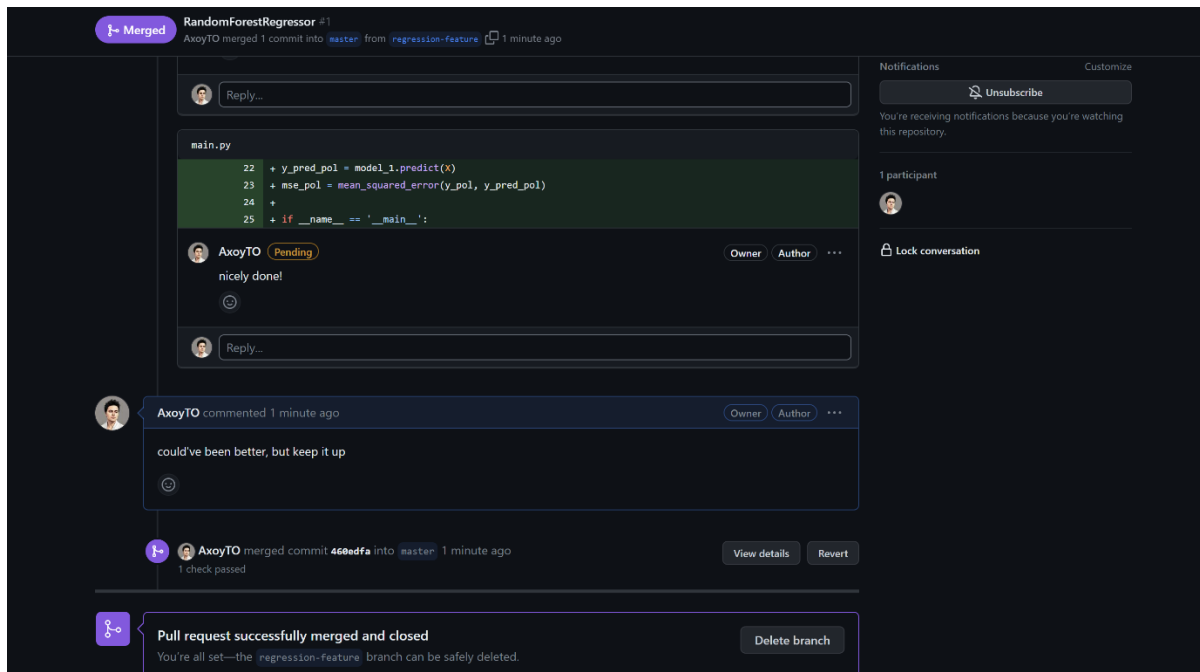
24) Add changes, commit them to regression-feature

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [20:47:06]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git add .
axoy [20:47:08]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git commit -m "RandomForestRegressor"
[regression-feature bd16f30] RandomForestRegressor
4 files changed, 27 insertions(+)
create mode 100755 main.py
create mode 100755 module_a_dev/__pycache__/__init__.cpython-310.pyc
create mode 100755 useful_package/__pycache__/__init__.cpython-310.pyc
create mode 100755 useful_package/__pycache__/module_b.cpython-310.pyc
axoy [20:47:43]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

25) Push regression-feature to a remote regression-feature and open a pull request on github (to master)

```
axoy [20:47:43]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ git push origin regression-feature
Enumerating objects: 13, done.
Counting objects: 100% (13/13), done.
Delta compression using up to 20 threads
Compressing objects: 100% (10/10), done.
Writing objects: 100% (10/10), 1.84 KiB | 30.00 KiB/s, done.
Total 10 (delta 0), reused 0 (delta 0), pack-reused 0
remote:
remote: Create a pull request for 'regression-feature' on GitHub by visiting:
remote:   https://github.com/AxoyTO/FSE-3/pull/new/regression-feature
remote:
To https://github.com/AxoyTO/FSE-3.git
 * [new branch] regression-feature -> regression-feature
axoy [20:50:01]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ |
```

26) Accept pull request (add comments to some lines first) and look at new master



<https://github.com/AxoyTO/FSE-3>

27) Return back to our local, remove whole directory and clone it from the github.com

```
axoy@AxoyUX5401: /mnt/c/U x + v
axoy [21:00:38]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3/practice-project$ cd ..
axoy [21:00:42]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3$ rm -rf practice-project/
axoy [21:00:45]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3$ git clone https://github.com/AxoyTO/FSE-3.git
Cloning into 'FSE-3'...
remote: Enumerating objects: 34, done.
remote: Counting objects: 100% (34/34), done.
remote: Compressing objects: 100% (23/23), done.
remote: Total 34 (delta 4), reused 32 (delta 3), pack-reused 0
Receiving objects: 100% (34/34), 4.22 KiB | 332.00 KiB/s, done.
Resolving deltas: 100% (4/4), done.
axoy [21:01:08]: /mnt/c/Users/toaxo/Desktop/Dev/SkoltechACS/1B/Foundations of Software Engineering/FSE_2023_G4/HW3$ |
```