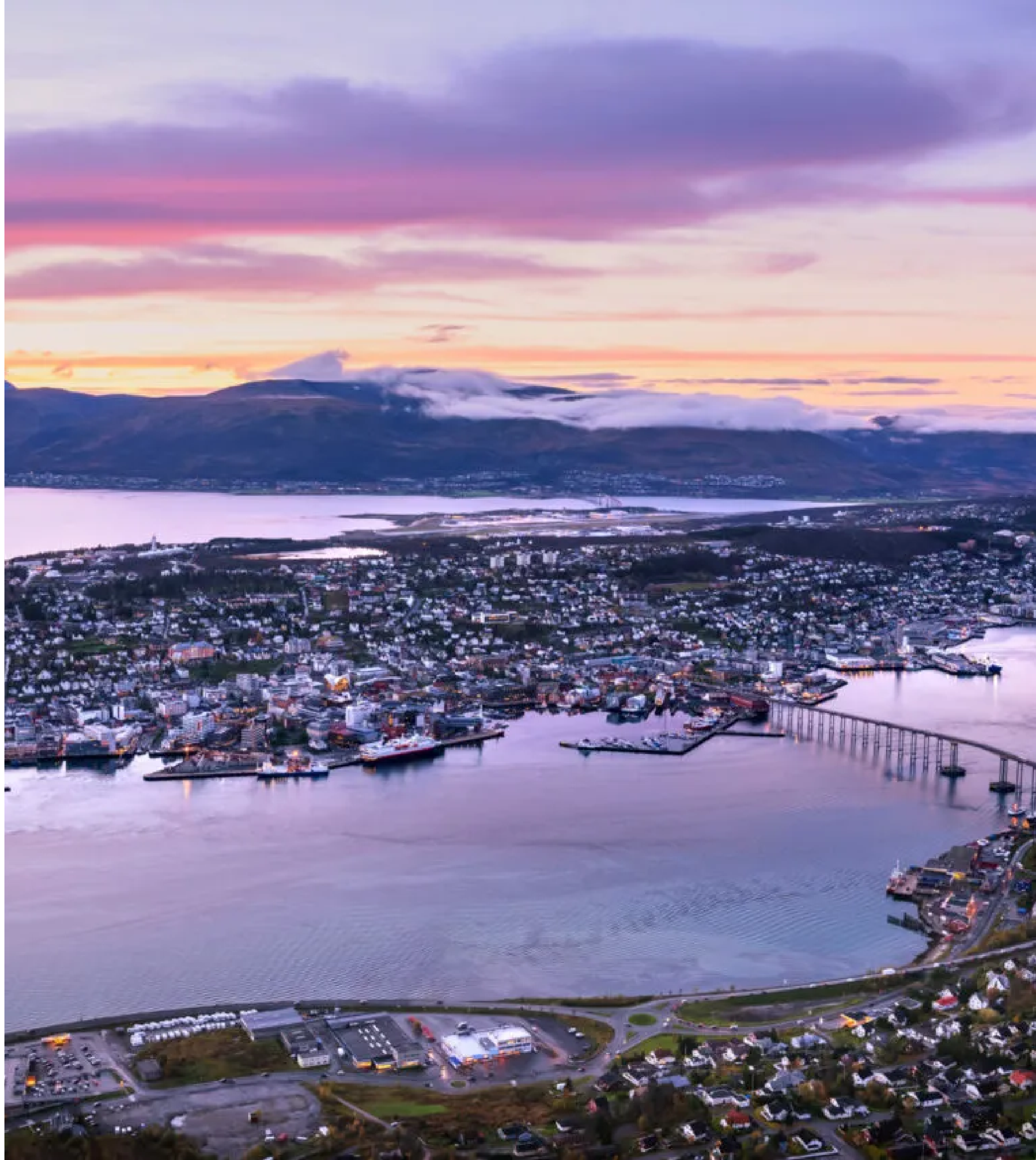
Bioinformatics session

3rd Annual workshop on bioinformatics and variant interpretation in InPreD

https://inpred.github.io/25-06_bioinfo_ws/bioinfo_ws



1. Unit testing

What is unit testing?

- test smallest piece of code that can be logically isolated in software application (function, subroutine, method)
- the smaller the better - more granular view of what is going on; also faster
- should not cross systems (database, filesystem, network) -> integration and functional tests

Example

```python
# calculator.py
def add(x, y):
    """add numbers"""
    return x + y
```

```python
# test_calculator.py
import calculator

def test_add():
    assert calculator.add(1, 2) == 3
```

Why do we need unit testing?

- early defect detection
- code quality improvement
- facilitates refactoring
- faster development cycles
- better documentation
- enables more frequent releases

How to design a unit test?

- identify the unit (function, method)
- what is its functionality?
- what is the input (correct and incorrect)?
- how to handle incorrect input? (edge cases, invalid data)
- what does it return?
- positive and negative results should be tested

Set up unit testing for your functions

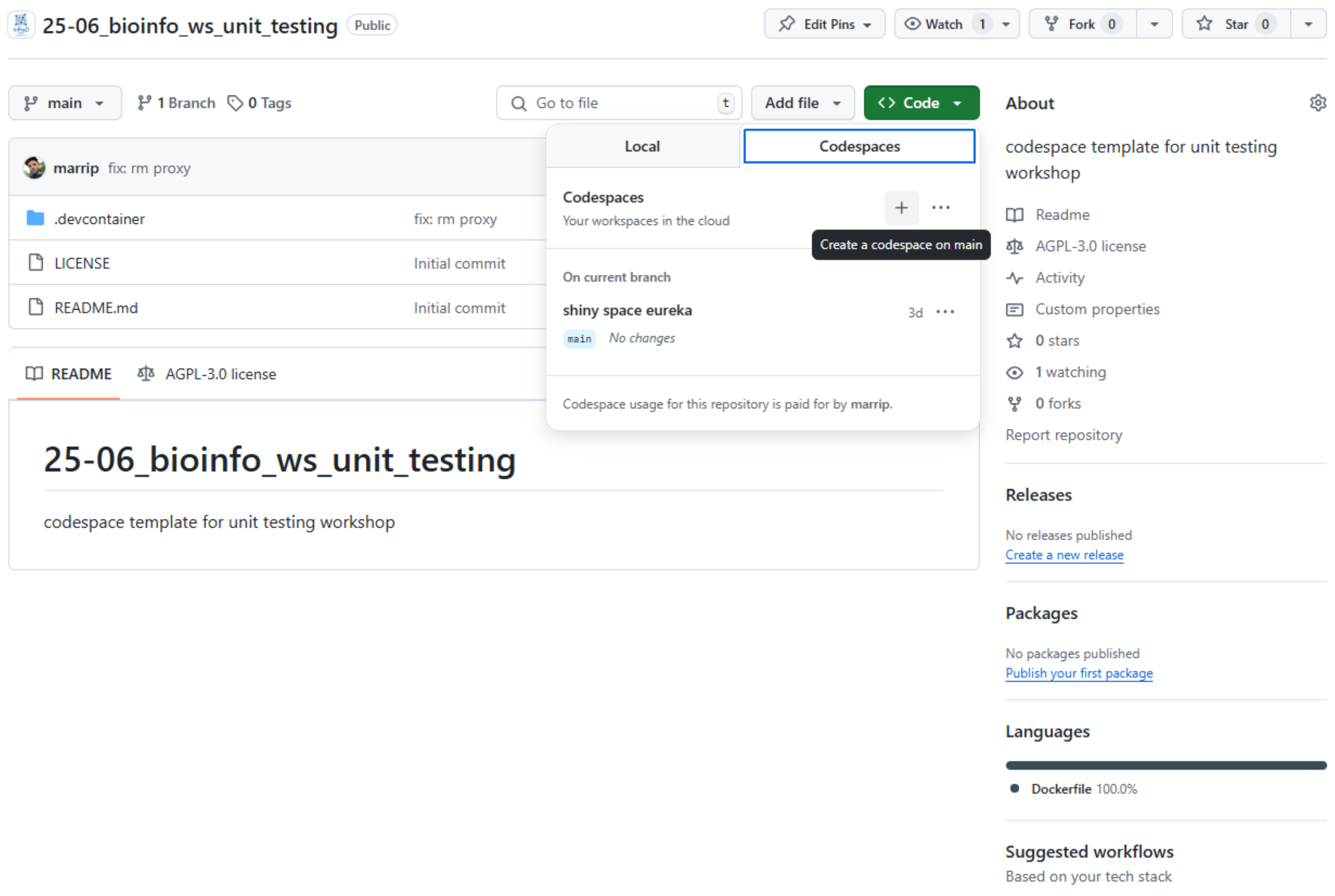
- install pytest

  ```
  $ pip install pytest
  ```

- add your function to a module at `my_module/my_module.py`
- add your unit test at `my_module/tests/my_module_test.py`
- in the test file import your module `from my_module.my_module import my_function`

First exercise

- go to https://github.com/InPreD/25-06_bioinfo_ws_unit_testing



Codespaces
Your workspaces in the cloud

On current branch
shiny space eureka 3d
main No changes

Codespace usage for this repository is paid for by marrip.

codespace template for unit testing workshop

25-06_bioinfo_ws_unit_testing

codespace template for unit testing workshop

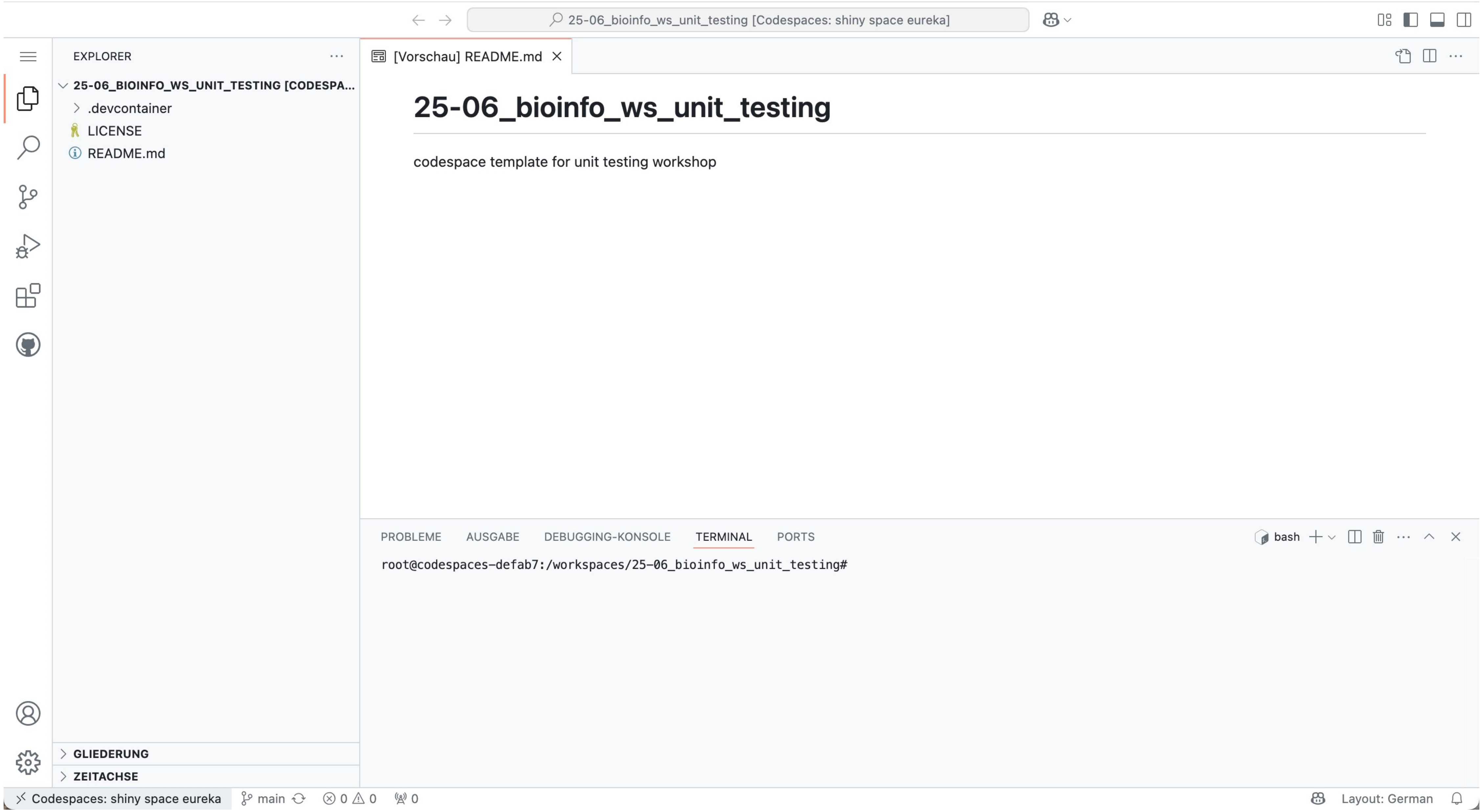
No releases published
Create a new release

No packages published
Publish your first package

● Dockerfile 100.0%

Based on your tech stack

First exercise



25-06_bioinfo_ws_unit_testing [Codespaces: shiny space eureka]

EXPLORER

25-06_BIOINFO_WS_UNIT_TESTING [CODESPA...
- .devcontainer
- LICENSE
- README.md

GLIEDERUNG

ZEITACHSE

[Vorschau] README.md

25-06_bioinfo_ws_unit_testing

codespace template for unit testing workshop

PROBLEME AUSGABE DEBUGGING-KONSOLE TERMINAL PORTS

bash

```
root@codespaces-defab7:/workspaces/25-06_bioinfo_ws_unit_testing#
```

Codespaces: shiny space eureka main 0 0 0 Layout: German

First exercise

- pytest was already installed in the codespace
- the suggested layout was already applied
- create a branch for your work:

  ```
  $ git checkout -b unit-tests-<your name>
  ```

- start with the first exercise in `first/tests/first_test.py`
- whenever you are done, commit your changes (use commit message conventions):

  ```
  $ git add first/tests/first_test.py
  $ git commit -m "test: <your commit message>"
  ```

- and we push them to GitHub:

```
$ git push --set-upstream origin unit-tests-<your name>
```

Handle exceptions in unit tests

- functions can raise exceptions and we would like to test for those
- import `pytest` to have access to `raises()`
- add `with`-block to handle the exception:

```python
import calculator
import pytest

def test_add_exception():
    with pytest.raises(TypeError):
        assert add("one", "two") == None
```

Second exercise

- continue with the second exercise in `second/tests/second_test.py`
- whenever you are done, commit your changes (use commit message conventions):

  ```
  $ git add second/tests/second_test.py
  $ git commit -m "test: <your commit message>"
  ```

- and we push them to GitHub:

```
$ git push
```

- to condense this as much as possible (ideally one unit test per function), we can use the `pytest` decorator `parametrize`
- again, import `pytest` to gain access to the decorator
- add the decorator `@pytest.mark.parametrize` as a header to your function
- define the required variables (input, exception, output)
- add your test cases as a list of tuples (one tuple per case)
- also use `nullcontext` from the module `contextlib` to account for cases without exceptions

```
import calculator
import pytest

from contextlib import nullcontext

@pytest.mark.parametrize(
    "x, y, exception, want",
    [
        (1, 2, nullcontext(), 3),
        ("one", "two", pytest.raises(TypeError), None)
```

Third exercise

- continue with the third exercise in `third/tests/third_test.py`
- whenever you are done, commit your changes (use commit message conventions):

  ```
  $ git add third/tests/third_test.py
  $ git commit -m "test: <your commit message>"
  ```

- and we push them to GitHub:

```
$ git push
```

2. Nextflow