Scientific Programming
(Wissenschaftliches Programmieren)

Exercise 9

Preparation

The following exercises should be solved together by two developers, each of them making one part of the exercises in a **separate** repository. Once each developer finished the work, the repositories should be synchronized. Please note, that the two repositories must have a common ancestor (e.g. before starting the exercise, one developer should clone the repository of the other and work in that).

Alternatively, one developer could do the exercises also alone, in that case the development should happen in two different branches, which are then merged accordingly.

1. Optimized solver algorithm (Developer 1)

- Write a small script which creates a random linear system of equations (coefficient matrix and right-hand-side vector) and stores in a format which can serve as input for `linsolve`.

- Test the `linsolve` script with a randomly generated equation, which is big enough that the calculation takes ca. 10 seconds.

- Replace the Gaussian-elimination algorithm in the `linsolve` script by the `solve()` routine from the SciPy package. How does it affect the performance?

- Make sure, all tests are still passed.

- Commit your changes.

2. Extended and optimized input (Developer 2)

- Extend the `linsolve` script so that it calculates the linear system of equation with multiple right-hand-side vectors simultaniously.

- Change the input/output routines accordingly.

- Add an additional test to your test suite testing multiple right-hand-side vectors.

- Commit your changes.

3. Synchronizing development (Developer 1 & Developer 2)

- Synchronize the two repositories (via pull/merge) so that the master branch of both repositories become identical and contain the changes of both developers.

4. *Externally hosted git repository

- Register on GitHub and test its capabilities with a toy project (e.g. the one from the lecture).