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Assignment Sheet #04

**Submission deadline: 15.05.2018, 12:00**

Organizational hints and related background were presented in the lecture and also can be found in the lecture notes (uploaded to Stud.IP). Send your solution files in a compressed ZIP archive to [sven.bingert@gwdg.de](mailto:sven.bingert@gwdg.de).

## Preparing the development environment

You can find the programs or templates referred in the assignments in the directory in Stud.IP.

Further reading:

- Using the man-pages of GDB, gcc ,....
- <https://computing.llnl.gov/tutorials/openMP>
- <http://hpc.gwdg.de> and [https://info.gwdg.de/dokuwiki/doku.php?id=en:services:application\\_services:high\\_performance\\_computing:running\\_jobs](https://info.gwdg.de/dokuwiki/doku.php?id=en:services:application_services:high_performance_computing:running_jobs)

## Exercise 1 – Basic OpenMP directives (1 Points)

The file `A4_e1.c` contains simple code snippets each containing a different error. Please fix.

## Exercise 2 – Sudoku (6 Point)

The file `sudoku.c` contains the functions for solving a Sudoku. Please complete the code using parallel methods and a brute-force method to find the fitting numbers.

Use different SCHEDULE options to see the difference in the performance. Summarize your conclusion

## Exercise 3 – Partial differential equation (7 Points)

The file `partial.c` contains the basics for the solving the time dependent partial equation also called heat equation. Please complete the code and increase the performance by using OpenMP. What can be parallelized and what can't. Summarize your conclusions.

After compiling the code you can call it with two arguments, e.g. `partial 100 0.01`, where the first parameter gives you the number of grid points and the second the timestep. For more grid points you have to use a smaller time step. If the time step is too big you will get NaN.

## Exercise 4 – Synchronization Clauses(1 Points)

- Please describe the difference between the “critical” and the “atomic” clause.
- Please describe the “firstprivate” clause.