

OO-programming Exercise 3

Due Date and Time: Dec 7, 2009, 23:59

You should work out the exercises independently.

Send the sensibly documented program files to gundolf.haase@uni-graz.at or bring them with you (Files for Example. 5: `bsp_5.cpp`, `bsp_5_fkt.cpp`, `bsp_5_fkt.hpp`, etc.) on Laptop or USB-stick

5. Write a template-funktion that calculates the harmonic mean of 4 numbers.
6. In particle simulation, see Lenzen/Kowar¹ and Ellero², each particle (in 3D) has its *mass*, *locus*, *velocity*, *force* assigned to it.

Write a template class that stores the above parameters (double, float could be appropriate template parameters) and implement access/modification methods for the members.
7. Store N particles in a data structure.
8. The particles from task 7 are grouped into cells (small cubes) in order to take advantage of local/far field in computations.
 - (a) Store N particles in a data structure(container) that allows to remove and to append particles.
 - (b) Calculate the new locus of a few particles and move the data to the new cell.
9. Extend your template class for particles such that it can be used in 1D, 2D, 3D, see §1.8.2 from the script³.

¹http://www1-c703.uibk.ac.at/users/c70380/Praktikum/projekt2_files/partikel1.pdf

²<http://www.aer.mw.tum.de/lehre/particlesimulation/index.en.php>

³<http://www.uni-graz.at/~haasegu/Lectures/Kurs-advC/Script/html/main.pdf>