

Apartment Heat Diffusion Solver – a code introduction

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In order to reliably solve the heat diffusion problem with the specified geometry and boundary conditions given in the assignment we have chosen to implement a solver containing two classes and one larger function in python. The structure follows as:

1. The Apartment class that contains all geometry properties of the problem
2. The ApartmentHeatSolver class that manages the MPI and distributes the workload upon the separate CPUs
3. ApartmentHeatSolver contains a function (`_solve_PDE`) which solves the PDE for a general rectangular room.

The script `RunHeatSolver` starts the program by setting up an Apartment object and setting boundary conditions. Then, the ApartmentHeatSolver class that is the core of the solver. It is here the split between the different cores will be made. The ApartmentHeatSolver will call upon the `_solve_PDE` function and distribute the workload amongst the CPUs.

For each Dirichlet-Neuman iteration the center room of the apartment will be solved using what we would like to call the master CPU. During this process the other two CPUs will be idle. When a solution to the center room is presented the two edge rooms may be solved for simultaneously occupying two separate CPUs.

