Biweekly MSc Thesis Progress Presentation – Lukas Strebel

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CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Updates from last time

- Halo communication:
  - Numpy views with MPI4Py had non-contiguous issue
  - But with numpy.ascontiguousarray() for sending and a receive buffer/copy into actual array works.
  - Also now I store the halo numpy views as slices when the field is registered not in communication function.
  - 4 views for each halo: Receive, Send (MPI), Get (local subdivision), Get (global boundary).

- Global boundary condition:
  - One numpy array file (.npy) per field.
  - Access with memory map from numpy the parts of the global boundary a subdivision needs for its halo.

Running the use case / 100x100 domain

Reference / Python with Gridtools4py from Stefano:

```
u max = 0.99819, u min = 0.00295, v max = 0.60605, v min = 0.00000,
  ||u|| max = 0.998188635214
Overall time                                        T =        3.38
-Initialization                                     T =      0.3288
-Time integration                                   T =       3.051
```

Domain decomposition / 2x2 Subdivisions / 4 MPI Processes on Greina

```
u max = 0.99672, u min = 0.00286, v max = 0.60163, v min = 0.00000,
  ||u|| max = 0.996720317123
Overall time                                        T =       6.485
-Initialization                                     T =      0.1659
-Time integration                                   T =       6.296
--Compute during time integration                   T =      0.4444
--Communication during time integration             T =       5.822
```

Working on

- Writing the thesis text on library implementation
- Running the use cases for experiments
- Code / Tests clean up

- Use case output:
  - Currently user can call save_fields() with field name and all subdivision save the field into a file.
  - Subdivisions save file with global coordinates in name.
  - Post process function collects all subdivision files of a field into a single file.
  - Reference output saved all fields during runtime with time step into a save array and at the end dumped all of it into a pickle file.

Next Milestone – August 15

- Implementation of all library functionality.
- Library ready for benchmarks and optimizations.