Università della Svizzera italiana

Institute of Computing CI

High-Performance Computing **2022**

Student: SIMONE TARENZI Discussed with: FULL NAME

Solution for Project 7

Due date: 21.12.2022, 23:59

1. Parallel Space Solution of a nonlinear PDE using MPI [in total 35 points]

1.1. Initialize and finalize MPI [5 Points]

1.2. Create a Cartesian topology [5 Points]

1.3. Extend the linear algebra functions [5 Points]

1.4. Exchange ghost cells [10 Points]

1.5. Scaling experiments [10 Points]

2. Python for High-Performance Computing (HPC) [in total 50 points]

2.1. Sum of ranks: MPI collectives [5 Points]

2.2. Domain decomposition: Create a Cartesian topology [5 Points]

2.3. Exchange rank with neighbours [5 Points]

2.4. Change linear algebra functions [5 Points]

2.5. Exchange ghost cells [5 Points]

2.6. Scaling experiments [5 Points]

2.7. A self-scheduling example: Parallel Mandelbrot [20 Points]

3. Task: Quality of the Report [15 Points]