

My name is Francesca Mele and I currently work as Computer Science Researcher in the High-End Computing research group of the CMCC (Euro-Mediterranean Center on Climate Change) Advanced Scientific Computing (ASC) Division in Lecce (Italy).

After the master's degree in computer engineering in 2012, I have worked at the Department of Innovation Engineering of the University of Salento (Lecce) with an annual Research fellow grant focusing on Cloud Computing research topic. In 2016 I joined the ASC division at CMCC and since then, I constantly have been dealing with the activities of the division working on several research projects.

My research activity focuses on the optimization and the parallelization of climate models with special regard to the NEMO ocean model. In particular during these years I have expanded my skills about the advanced techniques of parallelization on distributed and shared memory architectures using the hybrid MPI and OpenMP parallel programming; I have performed scalability tests and analyzed the computationally relevant aspects that can limit performance and affect scalability of the climate models running on modern parallel architectures; I have applied optimization strategies, including cache blocking and loop fusion techniques, aiming to improve memory hierarchy exploitation and to increase the computational efficiency of each core/node. Currently, I'm involved in IS-ENES3, IMMERE and ESCAPE2 European projects leading activities on single-node issues aiming to improve the computational performance of NEMO working on the vectorization level and cache reuse of the code. I am also member of the NEMO System Team within the NEMO Consortium and most of the optimization and improvement, that I implement in NEMO, take place in the official releases of the model.

I believe that my scientific background qualifies me as an adequate applicant for the ESIWACE Summer School on Effective HPC for Climate and Weather. The topics covered in the summer school could allow me to improve knowledge and expand my skill in the HPC field and can be decisive for my future work for sure.

Finally, I think I can act as a multiplier of the gathered information distributing lesson notes and informative documents to my colleagues when I get back and encouraging dissemination activities within the Nemo consortium.

keywords: ocean model, structured grid, GPU programming, NEMO, single core performance optimization

Reference paper: Vecchio P., Mele F., De Paolis L.T., Epicoco I., Mancini M., Aloisio G., "Cloud Computing and Augmented Realty for Cultural Heritage", Second International Conference Augmented and Virtual Reality (AVR 2015), Lecce (Italy), August 31 – September 3, 2015, Lecture Notes in Computer Science, LNCS 9254, pp. 51-60, Springer, ISBN: 978-3-319-22887-7