Cenaero

Ref.: BE-JO-2022-006

JOB OFFER

Senior Research Engineer
High-Performance Solvers for Computational Mechanics

Cenaero, located in Gosselies (Belgium), is a private non-profit applied research center providing to companies involved in a technology innovation process numerical simulation methods and tools to invent and design more competitive products. Internationally recognized, in particular through its research partnership with Safran, Cenaero is mainly active in the aerospace, process engineering, energy and building sectors.

Cenaero provides expertise and engineering services in multidisciplinary simulation, design, and optimization in the fields of mechanics (fluid, structure, thermal and acoustics), manufacturing of metallic and composite structures as well as in analysis of in-service behavior of complex systems and life prediction. It also provides software through its massively parallel multi-physics platform Argo, its manufacturing process simulation and crack propagation platform Morfeo and its design space exploration and optimization platform Minamo. Cenaero operates the Tier-1 Walloon supercomputing infrastructure, that is currently composed of 14,000 computing cores and will be renewed by the end of 2022 with an investment of 10 M€.

To sustain its expanding research activities in the **development of high-performance solvers for computational mechanics**, Cenaero is currently looking for a senior research engineer and offers a permanent contract (CDI) in Belgium.

Position

Advanced numerical methods are being developed at Cenaero for computational mechanics. Two main areas are targeted: Computational Fluid Dynamics, with a focus on the simulation of turbulent flows in aerodynamics, and the simulation of manufacturing processes , with a particular interest in additive manufacturing. Cenaero is at the forefront of the simulation technology in these areas with its numerical platforms Argo and Morfeo. The rapid evolution of hardware technologies requires us to adapt the implementation of our solvers. In particular, the advent of GPU computing makes it necessary to develop GPU-capable versions of our core numerical methods. This need is particularly pressing in the domain of High-Performance Computing (HPC), where the upcoming generation of supercomputers will be essentially based on GPU accelerators.

The successful candidate will strengthen the numerical development activities at Cenaero in the context of collaborative research projects and industrial contracts at both Regional and European levels. As an expert in the efficient implementation of numerical methods on modern hardware (specifically on GPU-based architectures), he/she will collaborate with numerical experts and application specialists at Cenaero to develop high-performance simulation tools. In particular, he/she will contribute to the efficient implementation of core numerical solvers based on the Finite Element Method in large simulation software packages written in C++. HPC being a distinctive aspect of Cenaero's numerical developments, he/she will ensure that the performance of the newly implemented code scales in a massively parallel context. He/she is also expected to share his/her expertise on programming for modern hardware architectures with collaborators, possibly through training sessions.

Profile

Candidates should:

- Hold a Master's degree in either Applied Mathematics, Computer Science, Physics, Aerospace/Mechanical Engineering, or related disciplines. A PhD will be considered an asset.
- Have a solid background in:
  - Numerical analysis.
  - Numerical methods for computational mechanics (specifically Finite Volume and/or Finite Element Methods).
  - Object-oriented programming for scientific computing.
- Demonstrate at least 3 years of experience (either academic or industrial) in:
  - GPU programming of numerical methods.
  - Numerical software development for HPC.
- Have excellent analytical skills and a solution-oriented thinking capacity.
- Be fluent in English with effective communication skills (both written and spoken).
- Be a team player yet have a proactive and autonomous attitude.

The following skills will be considered as valuable assets:

- Specific experience with GPU programming with CUDA or HIP
- Experience with the exploitation of machine learning frameworks (PyTorch, TensorFlow...) on modern hardware architectures.
- Fluency in French.

Offer

Cenaero offers the opportunity to take part in the development of cutting-edge numerical simulation technologies, in direct relation with renowned academic partners (UCLouvain, the Von Karman Institute, University of Bergamo, among others) and major industrial players of the aeronautical sector (such as the Safran group). The successful candidate will benefit from outstanding supercomputing capacity with a brand-new Tier-1 facility at regional level and the possibility to access one of the most powerful supercomputers in the world through the LUMI consortium, in which Belgium has a significant share.

Cenaero offers a competitive salary package and the possibility to develop one's professional skills in a stimulating and dynamic work environment. We believe that our co-workers are the source of our success. We care for the personal development of our collaborators and seek to make them harmoniously progress.

Contact

Interested candidates should send a cover letter, quoting the reference number of the offer, and a resume to rh@cenaero.be.