

Offer #2022-04997

High-Performance Computing / Domain specific language for the CROCO ocean simulation model

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : PhD or equivalent

Other valued qualifications : PhD

Fonction : Temporary scientific engineer

About the research centre or Inria department

The Inria Grenoble - Rhône-Alpes research center groups together almost 600 people in 22 research teams and 7 research support departments.

Staff is present on three campuses in Grenoble, in close collaboration with other research and higher education institutions (Université Grenoble Alpes, CNRS, CEA, INRAE, ...), but also with key economic players in the area.

Inria Grenoble - Rhône-Alpes is active in the fields of high-performance computing, verification and embedded systems, modeling of the environment at multiple levels, and data science and artificial intelligence.

The center is a top-level scientific institute with an extensive network of international collaborations in Europe and the rest of the world.

Context

The successful candidate will join the AIRSEA team, a joint team between Inria, CNRS and Université Grenoble Alpes (UGA). The AIRSEA team is part of the Laboratoire Jean Kuntzmann (LJK) and located in Grenoble (St. Martin d'Hères) where also the working place will be.

The AIRSEA team (<http://team.inria.fr/airsea/>) carries out research work in **applied mathematics** and **computer science** for the modeling of **oceanic** and **atmospheric flows**.

The team is particularly active on four areas of research:

- 1) modeling oceanic and atmospheric flows
- 2) model / dimension reduction
- 3) managing uncertainties
- 4) designing and implementing numerical algorithms suitable for high performance computing.

Assignment

The recruited candidate will investigate **domain specific languages (DSL)** mainly for the **CROCO** ocean model (croco-ocean.org). This is a state-of-the-art coastal model which is used across the world, driven mainly by a French research community.

This will be at the intersection of several skills of the AIRSEA team such as **discretization of ocean PDEs** and **high-performance computing**. In addition, external DSL specialists and CROCO developers from Grenoble, France and other countries might be involved in this development.

The main goal is to use either a new or an embedded DSL with CROCO to support different HPC hardware and HPC optimizations which are transparent to the CROCO model developers.

For any questions, feel free to get in touch with me: martin.schreiber@univ-grenoble-alpes.fr

Main activities

Main activities:

- Getting acquainted to the **CROCO** ocean simulation development (croco-ocean.org).
- **Review existing domain specific languages (DSL)** for ocean simulations.
- The activities are split into three main parts:

- **Frontend**: Either develop a DSL from scratch or use an embedded DSL for CROCO.
- **Middle layer**: Work on transformations relevant for **HPC optimizations**
- **Backend**: Develop support for one or more **HPC architectures**

Additional activities:

- Write or contribute to a **scientific publication** for an international journal / conference
- Potentially, **present** the work at international conferences / workshops
- Take the **NEMO** development into account which is another ocean simulation code

Skills

Essential

- **Software development experience** in languages like Python, C/C++, or Fortran
- Excellent communication skills and willing to work in a dynamic and **collaborative environment**

Desired

- A **PhD thesis** in the field of computer science or mathematics
- Knowledge of **PDE solvers** with finite difference methods
- Knowledge of **compilers** or **domain specific languages**

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Remuneration

From 2,562 € (depending on experience and qualifications).

General Information

- **Theme/Domain** : Distributed and High Performance Computing
Scientific computing (BAP E)
- **Town/city** : St. Martin d'Hères
- **Inria Center** : [Centre Inria de l'Université Grenoble Alpes](#)
- **Starting date** : 2022-09-01
- **Duration of contract** : 1 year, 6 months
- **Deadline to apply** : 2022-08-31

Contacts

- **Inria Team** : [AIRSEA](#)
- **Recruiter** :
Schreiber Martin / martin.schreiber@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success

Feeling comfortable in an environment of scientific dynamics, enjoying learning and listening are essential qualities to succeed in this assignment.

Passionate about innovation, with expertise in software development and a strong ability of interdisciplinary work.

Warning : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is

Instruction to apply

Defence Security :

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :

As part of its diversity policy, all Inria positions are accessible to people with disabilities.