



**Offer #2024-07221**

## **Post-Doctoral Research Visit F/M Emissions mapping & analysis of a geo-distributed computing infrastructure in comparison to centralised architectures**

**Contract type :** Fixed-term contract

**Level of qualifications required :** PhD or equivalent

**Fonction :** Post-Doctoral Research Visit

### **About the research centre or Inria department**

The Inria Lille - Nord Europe research centre, created in 2008, has a staff of 360, including 305 scientists in 15 research teams. Recognised for its strong involvement in the socio-economic development of the Hauts-De-France region, the Inria Lille - Nord Europe research centre pursues a close relationship with large companies and SMEs. By promoting synergies between researchers and industrialists, Inria participates in the transfer of skills and expertise in digital technologies and provides access to the best European and international research for the benefit of innovation and companies, particularly in the region.

For more than 10 years, the Inria Lille - Nord Europe centre has been located at the heart of Lille's university and scientific ecosystem, as well as at the heart of Frenchtech, with a technology showroom based on Avenue de Bretagne in Lille, on the EuraTechnologies site of economic excellence dedicated to information and communication technologies (ICT).

### **Context**

The PULSE challenge, shared by Inria and Qarnot computing, aims to develop and promote best practices in geo-distributed hardware and software infrastructures for intensive computing with a reduced environmental footprint.

The aim of this postdoc is to better quantify the difference in environmental footprint of different models of geo-distributed computing, so as to be able to better manage the induced impacts (according to a multi-criteria approach). Ultimately, we hope to be able to recommend best practice hardware and software architectures to drastically reduce impacts while offering the best quality of service to end-users.

### **Assignment**

This project aims to develop two models to compare the environmental impact of a centralised and a decentralised computing service.

The two models should be based on the same assumptions and follow methodologies that are as close as possible in order to achieve directly comparable results.

The project will not be limited to modelling the operational carbon footprint of the service, but will also include:

- all peripheral services requested by the calculation, i.e. storage and network services, etc.
- all the peripheral infrastructures concerned by the calculation, i.e. the land of the data centre, data transport, etc.
- the analysis of the life cycle of the system,
- the entire environmental footprint: in addition to carbon and greenhouse gas emissions, the impact on rare metals, on water, on soil pollution, etc.
- more qualitative data to develop a case for the most virtuous model

### **Main activities**

The researcher will have to understand these different subjects through a consequent bibliographical research. The researcher will then have to work on the modelling of each of these paradigms using the most suitable tools. It will be potentially desirable to propose several qualities of models, for example an advanced model and a simpler model. In all cases, it will be essential to produce a model that is easy to use and modify, a priori in the form of an Excel file.

In addition, it will be necessary to develop a more qualitative argument for the most virtuous model.

## Skills

- Software development: Java / Python / Web
- Cloud technology
- Teamwork

## Benefits package

- You will join a dynamic team of international scientific experts in the field of distributed systems and software engineering (<https://team.inria.fr/spirals/>);
- You will work on emerging research activities with internationally recognised cloud computing players in the context of European collaborations and projects of the Spirals team;
- You will work in a stimulating and pleasant working environment (transport participation (50%), on-site catering; teleworking; leave and special leave of absence (45 days), video-conferencing equipment, technical laboratory for experimentation...);
- You will be able to benefit from quality training adapted to your needs and skills, whether technical, methodological or linguistic;
- In addition to improving your technical skills, Inria offers you the opportunity to develop your entrepreneurial skills by participating in awareness-raising events and training courses on the creation of start-ups (start-up horizon, intellectual property training, hackAthon...  
<https://www.inria.fr/fr/inria-startup-studio>);
- Other advantages include:
- 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

2 788€ gross salary

## General Information

- **Theme/Domain** : Distributed Systems and middleware  
Scientific computing (BAP E)
- **Town/city** : Villeneuve d'Ascq
- **Inria Center** : [Centre Inria de l'Université de Lille](#)
- **Starting date** : 2024-05-01
- **Duration of contract** : 1 year, 7 months
- **Deadline to apply** : 2024-05-06

## Contacts

- **Inria Team** : [SPIRALS](#)
- **Recruiter** :  
Rouvoy Romain / [Romain.Rouvoy@inria.fr](mailto:Romain.Rouvoy@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.

**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 not guaranteed.

## Instruction to apply

CV + cover letter + letters of recommendation

**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.