Offer #2024-07905

Engineer F/M: Benchmarking of applications'I/O behavior and storage systems (performance and energy consumption)

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : Graduate degree or equivalent

Fonction : Temporary scientific engineer

Level of experience : Up to 3 years

About the research centre or Inria department

The Inria center at the University of Bordeaux is one of the nine Inria centers in France and has about twenty research teams.. The Inria centre is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative SMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute...

Context

Within the framework of a Numpex project called Exadost, in collaboration with Inria Rennes, La Maison de la Simulation, the CEA-DAM, and DDN.

This project aims at building the I/O infrastructure of next-generation HPC machines.

Assignment

The recruited person will be responsible for characterizing the I/O behavior of applications that have been chosen as representative of the French HPC workload. This characterization will be done by using profiling tools such as Darshan and Tau, tracing tools such as Recorder, and by inspecting the source code of the applications. We are interested in developing I/O kernels, which are codes that mimic the I/O activities (accesses to persistent data) of the applications and can be used to more easily evaluate them on different platforms.

In addition to that, the person will be responsible for performing experiments on different I/O infrastructures to characterize their behavior and how they are affected by different characteristics of the accesses. For that, existing benchmarks such as IOR and mdtest will be used at first, but new benchmarks may need to be developed.

The selection of benchmarks and access pattern will involve the study of research papers.

Finally, the expected results are a suite of benchmarks that can be easily applied to new platforms, the I/O kernels, a database of obtained results, and a report.

For more information on the proposed research subject:

Examples of similar work conducted in the same research team:

- https://hal.inria.fr/hal-03753813

- https://hal.inria.fr/hal-03808833/

Main activities

Main activities:

- Studying papers about workload of real large HPC machines and imposed by known classes of applications (for example, machine learning);
- Running applications and benchmarks on HPC systems using scripts, treating and plotting results;
- Studying large HPC applications (usually written in C/C++ or Fortran) to understand their I/O

behavior;
- Development of I/O kernels and benchmarks in C/C++ using MPI-IO;
- Statistical analysis of results and modeling (Python or R).

Additional activities:

- Writing reports and research papers (Latex)

Skills

Technical skills and level required:

- C/C++;
- scripting (Bash, Python,etc);
- Unix: command line, ssh, etc;
- a plus (not mandatory): using HPC systems, slurm, etc;
- experience in research, especially in HPC, would also be a plus.

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 partial teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities

Remuneration

Remuneration according to diplomas and professional experiences :

from 2692 euros to 3085 euros gross monthly

General Information

- **Theme/Domain :** Distributed and High Performance Computing System & Networks (BAP E)
- **Town/city :** Talence
- **Inria Center :** [Centre Inria de l'université de Bordeaux](#)
- **Starting date :** 2024-10-01
- **Duration of contract :** 2 years
- **Deadline to apply :** 2024-09-06

Contacts

- **Inria Team :** [TADAAM](#)
- **Recruiter :**
  Zanon-boito Francieli / francieli.zanon-boito@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

The ideal candidate:

- Is not afraid of low-level programming and of investigating large application source codes;
- Can learn whatever new skills become necessary for working on the project;
- Has an interest in research, even if not necessarily intending to follow a carreer in it;
- Is motivated to work in a team with people from different genders and nationalities.

Instruction to apply

Merci d'envoyer :

- CV
- Lettre de motivation
- copie Diplôme-s
- Lettre de recommandation si vous en avez

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.