Offer #2024-07715

I/O request scheduling on heterogeneous storage

**Contract type**: Fixed-term contract  
**Level of qualifications required**: Master's or equivalent  
**Fonction**: Internship Research

**Context**

Inria is the French national research institute for digital science and technology. World-class research, technological innovation, and entrepreneurial risk are its DNA. In 215 project teams, many of which are shared with major research universities, more than 3,900 researchers and engineers explore new paths, often in an interdisciplinary manner and in collaboration with industrial partners to meet ambitious challenges.

As a technological institute, Inria supports the diversity of innovation pathways: from open-source software publishing to the creation of technological startups (Deeptech).

**Assignment**

Horizontally-structured heterogeneous storage uses fine-grained data placement across multiple storage devices of various types (such as e.g., hard drives, solid-state drives, or non-volatile memory) to harness their collective capabilities. Current I/O scheduling on such storage focuses exclusively on extracting the maximum read/write performance from the combined devices: it maps write-heavy threads across devices to maximize write bandwidth while migrating hot data to faster storage to maximize read performance.

**Main activities**

As an intern at Inria, you will explore more advanced I/O scheduling algorithms that (i) take into account wear leveling, (ii) integrate fine-grained heuristics based on the bandwidth and latency of each individual device, and (iii) adequately support hierarchical storage by minimizing write amplification (i.e., data movement across storage layers) and making it possible to update the layout hierarchy on the fly.

**Skills**

- Thorough understanding of computer science fundamentals including data structures, algorithms, and complexity analysis  
- Good problem-solving skills  
- Knowledge and/or experience in systems/low-level programming  
- Advanced C programming  
- Familiarity with the Linux scheduler and/or Linux I/O interfaces is preferred

**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.)  
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)  
- Social, cultural and sports events and activities  
- Access to vocational training  
- Social security coverage

**General Information**

- **Theme/Domain**: Distributed programming and Software engineering  
- **System & Networks (BAP E)**  
- **Town/city**: Paris  
- **Inria Center**: Centre Inria de Paris  
- **Starting date**: 2024-09-01  
- **Duration of contract**: 6 months  
- **Deadline to apply**: 2024-07-17
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

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.