Offer #2025-08755

Scalable and Resilient Distributed Storage

Contract type : Fixed-term contract

Level of qualifications required : Graduate degree or equivalent

Fonction : Temporary scientific engineer

About the research centre or Inria department

The Inria center at the University of Rennes is one of eight Inria centers and has more than thirty research teams. The Inria center is a major and recognized player in the field of digital sciences. It is at the heart of a rich ecosystem of R&D and innovation, including highly innovative SMEs, large industrial groups, competitiveness clusters, research and higher education institutions, centers of excellence, and technological research institutes.

Context

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This Research Engineer position is part of a collaboration between HIVE and the WIDE and COAST

teams at Inria. The successful candidate will be part of the WIDE team based at Inria Rennes.

About WIDE

The WIDE team at the Inria center at Rennes University investigates the key fundamental theoretical

and practical questions posed by modern distributed computer systems. This involves exploring the

inherent tension between scalability and coordination guarantees and developing novel techniques

and paradigms that are adapted to the rapid and profound changes impacting today's distributed

systems, both in terms of the application domains they support and the operational constraints they

must meet.

About COAST

The COAST team at Inria Center at Lorraine University aims at providing support to build trustworthy

collaborative applications based on the knowledge from replication algorithms, from the composition

of services and from services quality that can be deduced and monitored. The complexity of the

context in which applications are executed makes it impossible to provide provable deterministic

guarantees. COAST tackles this problem by leveraging a contractual and monitored approach to give

users confidence in the services they use.

About Hive

Hive is shaping the future of cloud computing by leveraging unused computing capacity to provide a

decentralized, environmentally friendly, and user-empowered alternative to traditional cloud services.

By utilizing distributed peer-to-peer networks, end-to-end encryption, and blockchain technologies,

Hive aims to establish a more sovereign and efficient cloud ecosystem.

Assignment

Position Overview

We are seeking a Research Engineer to work on the development of a scalable and resilient

distributed storage system suitable for a decentralized, trustless environment. The role will involve

designing, implementing, and optimizing Distributed Hash Tables (DHTs) for large-scale,

permissionless networks, addressing challenges related to scalability, reactivity, and resilience in

adversarial conditions.

Main activities

Research & Development: Analyze and improve existing DHT mechanisms, such as

Kademlia, to ensure scalability and efficiency in handling large numbers of nodes and data

blocks.

Implementation & Optimization: Develop adaptive refreshment and routing strategies

informed by real-world data from IPFS workloads.

Security & Fault Tolerance: Enhance the system's resistance to Byzantine and Sybil attacks

using innovative cryptographic and distributed consensus techniques.

Proof-of-Storage Mechanisms: Explore alternative consensus mechanisms (e.g.,

Proof-of-Storage) to ensure security without the energy consumption or economic

centralization of PoW or PoS.

Collaboration & Integration: Work closely with academic partners, integrating research

insights into practical, deployable solutions for Hive’s decentralized cloud platform.

Testing & Validation: Conduct simulations, benchmarks, and real-world testing to validate the

proposed solutions.

Skills

Preferred Qualifications

Experience working with large-scale decentralized applications.

Familiarity with adversarial models and security threats in distributed environments.

Contributions to open-source projects in distributed storage or blo

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

Remuneration

monthly gross salary from 2695 euros according to diploma and experience

General Information

- **Theme/Domain :** Distributed Systems and middleware
  System & Networks (BAP E)
- **Town/city :** Rennes
- **Inria Center :** Centre Inria de l'Université de Rennes
- **Starting date :** 2025-05-01
- **Duration of contract :** 12 months
- **Deadline to apply :** 2025-04-30

Contacts

- **Inria Team :** WIDE

- **Recruiter :**
  Frey Davide / davide.frey@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

Required Qualifications

Master’s degree or PhD in Computer Science, Distributed Systems, Cryptography, or a related field.

Strong experience in distributed systems, DHTs (e.g., Kademlia), and peer-to-peer

networking.

Proficiency in programming languages such as Go, Rust, or Python.

Experience with blockchain technologies, Byzantine Fault Tolerance (BFT), or distributed

consensus mechanisms is a plus.

Strong problem-solving skills and ability to work in a collaborative research-driven

environment.

Prior experience in implementing or researching distributed storage solutions (e.g., IPFS) is

highly desirable.

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

Please submit online : your resume, cover letter and letters of recommendation eventually

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.