**Offer #2023-06904**

**GDPR-Compliant Sharded Blockchain**

**Contract type**: Fixed-term contract  
**Renewable contract**: Yes  
**Level of qualifications required**: Graduate degree or equivalent  
**Other valued qualifications**: PhD  
**Fonction**: Temporary scientific engineer

**About the research centre or Inria department**

The Inria Rennes - Bretagne Atlantique Centre is one of Inria's eight centres 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 R&D and innovation ecosystem: highly innovative PMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute, etc.

**Context**

This development project lies in the context of the PriCLeSS Proof-of-Concept action ([https://project.inria.fr/pricless](https://project.inria.fr/pricless)) led by Davide Frey (WIDE team) and funded by the Cominlabs LabEX ([https://cominlabs.inria.fr/](https://cominlabs.inria.fr/)). The PriCLeSS project establishes a cross-disciplinary partnership to understand the legal challenges and address the technical obstacles associated with data storage in a blockchain context.

From a technical perspective, the project focuses on designing algorithmic responses to the legal issues that arise when using blockchain technology to handle personal data.

In this context we first proposed Splitchain, a novel fully decentralized state-sharding solution that does not require the maintenance of a synchronization blockchain or any heavy synchronization mechanisms, allowing shards to progress at their own pace in a non-blocking manner. Then, we augmented Splitchain with the ability to enforce geographical or administrative constraints in the placement of data thereby addressing some of the requirements of privacy legislation like the GDPR. We refer to this augmented version as Splitchain2.

**Assignment**

This engineering position involves implementing first Splitchain and then Splitchain2. In this task the engineer will be guided by the team who have been working on Splitchain and Splitchain2 consisting of Antoine Rault, Davide Frey and Emmanuelle Anceaume from Inria, and Damien Franchi and Sandrine Turgis from the IODE Team at the University of Rennes. The engineer will also have the opportunity to collaborate with other partners from the PriCLeSS project.

**Main activities**

The engineer will follow the following approximate timeline.

- **M1-M2**: Analysis of the state of the art:
  - Sharding and Proof-of-Eligibility consensus implementations.
  - Research paper on Splitchain
  - Current working Draft on Splitchain2
- **M3**: High-level design of the implementation.
- **M5**: Single shard implementation, with features for multiple shards and privacy (indirection, encryption, etc.).
- **M8**: Hypercube routing for inter-shard communication.
- **M12**: Prototype implementation of the complete system.

**Skills**
Technical:
- Proficiency in Rust or willingness to learn the language and use it.
- At least basic terminal usage: bash or other environments
- Familiarity with git

Non technical:
- Fluent written and spoken English
- French can be a plus
- Ability to work in a team
- Flexibility
- Planning and ability to meet deadlines

Benefits package
- Subsidized meals
- Partial reimbursement of public transport costs
- Possibility of teleworking (90 days per year) and flexible organization of working hours
- Partial payment of insurance costs

General Information
- **Theme/Domain:** Distributed Systems and middleware
- **Software engineering (BAP E)**
- **Town/city:** Rennes
- **Inria Center:** Centre Inria de l'Université de Rennes
- **Starting date:** 2024-01-01
- **Duration of contract:** 1 year
- **Deadline to apply:** 2024-01-13

Contacts
- **Inria Team:** WIDE
- **Recruiter:** Davide Frey / 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
You are interested in systems programming, blockchain, and distributed systems. You are not afraid to design and implement large pieces of software. You can clearly write documentation in English.

**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

For more information, please contact davide.frey@inria.fr

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.