Postdoc/Junior researcher position – STACK Research Group

Keywords: CDN, decentralized content distribution, decentralized service discovery, mobile edge data provider
Start: ASAP
Duration: 12 to 18 months
Team: http://stack.inria.fr
Location: IMT Atlantique, Nantes
Salary: From 2800 € / month gross salary (depending on diploma and experience)
Benefits: social security coverage, 2 days of remote work per week, partial reimbursement of public transport costs, vocational training

To apply, send a CV and a cover letter to carlos-javier.gonzalez-santamaria@imt-atlantique.fr and adrien.lebre@inria.fr and we will then schedule an interview.

Context

PEPR Cloud/STEEL
Within the framework of the STEEL project (PEPR Cloud France 2030), the STACK research team is seeking a post-doctoral candidate. Our objective is to focus on the storage and effective processing of data on emerging computing infrastructures.

Data Management and Network/Computing Continuum
Cloud computing has significantly increased the volume of data consumed daily, but it has also centralized somehow the storage of data. With the emergence of edge computing, data storage will become more geo-distributed to account for performance or regulatory constraints. One challenge is to maintain an up-to-date view of available content in such a dynamic distributed storage system, for instance to be able to locate the closest replica of a piece of data.

Content Delivery Network (CDN) solutions could be considered due to their ability to cache content near end-users. However, they still rely on a hierarchical and centralized network model. Peer-to-peer systems like IPFS are the second class of candidates, but they lack robust guarantees concerning network overheads, data availability, and performance. Our vision entails an intermediate "edge-to-edge" model, aiming to deliver a fully distributed, reliable, and high-performance storage service by leveraging a distributed fleet of edge servers.

Mission

The motivation for this position is to explore the use of a decentralized indexation system that could be used to build next-generation CDNs, and more generally to develop new distributed edge services. The successful candidate is expected to evaluate metrics such as latency, throughput, availability, and resilience in different applications scenarios involving edge-to-edge exchanges and mobility.

Tasks/Responsibilities
- Implement and validate an indexation algorithm based on existing publications from the STACK research team
- Design and analyze a system involving end-users, data content distribution, computing services and their interactions with the edge-cloud infrastructure and data indexation system.
- Experiment with such a system using the SLICES-FR research infrastructure

- Support research and engineering projects involving distributed storage systems in the context of national projects
- Communicate results through presentations, conference papers, and project reports

Profile and skills
The R&D Engineer must already hold a PhD degree in Computer Science, with a solid background in Software Engineering and Distributed Systems. She/he must also have a (very) good knowledge and interest in Cloud/Edge computing. Knowledge in distributed/cloud storage systems is an asset. In addition, strong development and programming skills are highly recommended.

Finally, the candidate must have good oral and written communication skills in English, with the aim to publish and present research results in high-level international journals and conferences. Autonomous, curious and strongly motivated candidates are expected.

References

- Confais, Bastien, Adrien Lebre, and Benoît Parrein. "An object store service for a fog/edge computing infrastructure based on ipfs and a scale-out nas." 2017 IEEE 1st International Conference on Fog and Edge Computing (ICFEC). IEEE, 2017.
- Lebre, Adrien, Brice Nédelec, and Alexandre Van Kempen. "AS-cast: Lock Down the Traffic of Decentralized Content Indexing at the Edge." International Conference on Algorithms and Architectures for Parallel Processing. Cham: Springer Nature Switzerland, 2022.