HR EXCELLENCE IN RESEARCH

2022-05131 - Post-Doctoral Research Visit F/M Stream data processing in shared Fog environments

Type de contrat : CDD
Niveau de diplôme exigé : Thèse ou équivalent
Fonction : Post-Doctorant

A propos du centre ou de la direction fonctionnelle

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.

Mission confiée

Context:

The mutual low-latency objective for both Data Stream Processing (DSP) and Fog environments has resulted in a continuous growth of DSP deployments on Fog environments. The success of DSP deployments in the Fog relies on operators placements and the ability to sustain low latency. Accordingly, much work have focused on placement strategies across Edge-servers or across hybrid Cloud and Edge environments. Previous efforts have focused on reducing the volume of communication overhead between nodes (inter-node communication) and dividing the computation between edge servers and clouds. Unfortunately, they are oblivious to (1) the dynamic nature of data streams (i.e., data volatility and bursts) and to (2) the bandwidth and resource heterogeneity in the Edge, which negatively affects the performance of stream data applications.

Principales activités

In a recent work, we addressed the problem of data stream dynamicity. In particular, we showed that Maximum Sustainable Throughput (MST) -- which refers to the amount of data that a DSP system can ingest while keeping stable performance -- should be considered as an optimization objective for operators placements in the Edge. Accordingly, we design and evaluate a MST-driven operators placement (based on constraint programming) for stream data applications [1].

The goal of this post-doctoral project is to investigate how to enable dynamic operators placements in heterogeneous and dynamic environments like Fogs and meet the requirements of diverse stream data applications. Accordingly, we will develop a new scheduling framework (operators' placement) that allows a stream data application to receive the compute and I/O resources it requires to compute, transfer and store data when running in a shared Fog environment. The proposed framework will be integrated in one of state-of the art data stream engines such as Flick [2], Storm [3] or Spark [4] and evaluated at large-scale using syntactic applications and real-world stream data application.

[1] Thomas Lambert, David Guyon, and Shadi Ibrahim. 2020. Rethinking Operators Placement of Stream Data Application in the Edge. In The 29th ACM International Conference on Information and Knowledge Management (CIKM '20), October 19–23, 2020, Virtual Event, Ireland.
[2] "Apache flink," https://flink.apache.org.
[3] Apache Storm. 2020. https://storm.apache.org/
[4] M. Zaharia, T. Das, H. Li, T. Hunter, S. Shenker, and I. Stoica, "Discretized streams: Fault-tolerant streaming computation at scale," in Proceedings of the Twenty-Fourth ACM Symposium on Operating Systems Principles, ser. SOSP '13, 2013, pp. 423–438.

Compétences

- A Ph.D. in computer science
- A solid background in the area of distributed systems
- Ability to conduct experimental systems research
- Experience with building systems and tools
- Working experience in the areas of Big Data management, Cloud Computing, Data Analytics are advantageous
- Very good communication skills in oral and written English

Avantages

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT
- Possibility of teleworking (90 days per year) 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
- Partial payment of insurance costs

Rémunération

Monthly gross salary amounting to 2653 euros

Informations générales

- **Thème/Domaine :** Systèmes distribués et intergiciels
  Système & réseaux (BAP E)
- **Ville :** Rennes
- **Centre Inria :** Centre Inria de l'Université de Rennes
- **Date de prise de fonction souhaitée :** 2022-08-01
- **Durée de contrat :** 1 an, 6 mois
- **Date limite pour postuler :** 2023-01-15

Contacts

- **Equipe Inria :** MYRIADS
- **Recruteur :**
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A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 200 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3500 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 180 start-up. L'institut s'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

Consignes pour postuler

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

For more information, please contact shadi.ibrahim@inria.fr

Sécurité défense :
Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :
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