A propos du centre ou de la direction fonctionnelle

The Inria Lille - Nord Europe Research Centre was founded in 2008 and employs a staff of 360, including 300 scientists working in sixteen research teams. Recognised for its outstanding contribution to the socio-economic development of the Hauts-de-France region, the Inria Lille - Nord Europe Research Centre undertakes research in the field of computer science in collaboration with a range of academic, institutional and industrial partners.

The strategy of the Centre is to develop an internationally renowned centre of excellence with a significant impact on the City of Lille and its surrounding area. It works to achieve this by pursuing a range of ambitious research projects in such fields of computer science as the intelligence of data and adaptive software systems. Building on the synergies between research and industry, Inria is a major contributor to skills and technology transfer in the field of computer science.

Contexte et atouts du poste

Context

The Spirals project-team conducts research activities in the area of large-scale distributed systems that are deployed across the Internet, from the Internet of Things (IoT) to the Cloud. More specifically, Spirals studies legacy software infrastructures with the objective of delivering better privacy, resilience, performance and energy efficiency properties to end users and related stakeholders.

This challenge requires to combine advanced skills in computer science, including operating systems, software engineering, networks, security and privacy.

Mission confiée

Motivation

The Internet—once advocated as a global peer-to-peer (P2P) village enabling each citizen to communicate with one another—seems to have fully embraced the client-server model, where everyone is a client, connecting to a limited set of servers. For various reasons, networking clients in a decentralised manner was deemed less practical than having them all connect to a centralised server (or group of servers) to provide service. The client-server model indeed allows more control and an easier protocol design, but it also induces an inherent bottleneckwe: the server. Because the P2P model treats each peer as a server it is more scalable by design [1]. In this post-doc position, we aim at reconciling the two models, in order to enable both simple and scalable protocols for the future Internet.

Let us consider the case of anonymity systems, that aim at anonymizing clients by intelligently routing their connections through an overlay network [2]. Towards that goal, many P2P solutions were initially proposed [3-7]; alas, most exhibited fatal security flaws, making them unfit for their purpose [8, 9]. Consequently, the most successful anonymity network—the Tor [10]—follows the client-server model; its thousands of servers collaborate to anonymise millions of users at any time to create anonymous routes, each client needs to know the whole registry of online servers; as the network grows, broadcasting the registry consumes an increasing proportion of the available bandwidth [11, 12]. Changing this behaviour would have serious impacts on the network’s security [13].

Principales activités

Objective

During this post-doc, we will tackle the scalability issues of Tor by dusting off the P2P model, while keeping the functioning client-server parts, that provide easier security. We will allow clients to know a subset of the registry of online peers through secure Random Peer Sampling (RPS) [14], taking the utmost care not to engender new attack vectors on the users’ anonymity. We will notably leave the existing-client-server overlay as-is—with each client knowing the full list of online servers—to route the RPS traffic between peers. We expect to find a secure and efficient solution to make peers collaborate with the currently deployed infrastructure, allowing Tor to scale beyond its limits. More broadly, we plan to leverage existing client-server infrastructures (e.g., the fediverse) to realise both collaborate with the currently deployed infrastructure, allowing Tor to scale beyond its limits. More

References


HR EXCELLENCE IN RESEARCH

Informations générales

- Thème/Domaine: Systèmes distribués et intergiciels
- Ville: Villeneuve d'Ascq
- Centre Inria: CRI Lille - Nord Europe
- Date de prise de fonction souhaitée : 2020-10-01
- Durée de contrat : 1 an, 3 mois
- Date limite pour posteruler : 2020-04-22

Contacts

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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. 500 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.

L’essentiel pour réussir

We are looking for highly talented, motivated and autonomous candidates who are interested in conducting applied research activities that can compete with the state of the art.

Consignes pour postuler

CV + application letter + recommendation letters + List of publications

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 défavorable, 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 :

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.

Attention : Les candidatures doivent être déposées en ligne sur le site Inria.


Compétences
Strong skills in computer sciences, including software engineering, software systems and networks.

Avantages
- 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
- Social security coverage

Rémunération
Gross monthly salary (before taxes) : 2653 €