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This Ph.D. will address the design and experimentation of collaborative strategies to protect users
the way fingerprints evolve over long periods of time.

Assignments:
Positioned in the context of online privacy and web tracking, this Ph.D. topic will focus on developing
effective browser fingerprinting countermeasures. The PhD will benefit from our fingerprint research
infrastructure, and associated datasets we collected through the AmIUnique.org website and browser
extensions for over 3 years. These datasets will leverage the study of browser fingerprint diversity and
the way fingerprints evolve over long periods of time.

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A propos du centre ou de la direction fonctionnelle
About the research center or the Inria department:

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 the socio-economic development of the Nord - Pas-de-Calais 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
Job environnements:

Browsers and web technologies, such as HTML 5, are redefining the limits of what web applications
can do. At the same time, concerned web users are becoming aware of practices that jeopardize their
privacy, security and comfort, as it can be seen by the immense popularity of browser extensions, like
AdBlock and Ghostery, as well as new legislation concerning the use of cookies and tracking
technologies. However, a new threat to privacy that leaves no trace on users’ devices has emerged.
Browser fingerprinting [Eckerseley10, Laperdrix16] exploits modern web technologies, protocols and
APIs to uniquely identify users. The leaked data is stored on remote servers the user has no control
over it. Encryption does little to limit browser fingerprinting as it is performed by the website you
visit: it is not a sniffing nor man-in-the-middle attack. Moreover, browser fingerprinting is becoming
widespread [Englehardt16], and is used to complement or even replace cookies for tracking purposes.
And new research shows it can be used to track people for extended periods of time [Vastel18].
Browser fingerprinting is therefore an important threat to privacy.

Browser fingerprinting techniques evolve with the addition and deprecation of APIs, web standards
and new technologies. To protect users from long term tracking, we need countermeasures that can
easily be maintained to adapt to new fingerprinting vectors. To address as many users as possible, not
only effectiveness but also usability should be an important objective.

https://www.inria.fr/equipes/spirals

Mission confiée
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Informations générales

- Thème/Domaine : Systèmes distribués et intergiciels
- Ville : Villeneuve d’Ascq
- Centre Inria : CRI Lille - Nord Europe
- Date de prise de fonction souhaitée : 01-10-2018
- Durée de contrat : 3 ans
- Date limite pour postuler : 02-05-2018

Contacts

- Equipe Inria : SPIRALS
- Recruteur : Rouvoy Romain / romain.rouvoy@inria.fr

Conditions pour postuler

Instructions to apply:
Candidates will be treated firstly with a complete file : CV + letter of motivation + one
or more letters of recommendation + transcripts from previous years.

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
ed'établissement, après avis ministériel
favorable, tel que défini dans l'arrêté du 03
juillet 2012, relatif à la PPST. Un avis ministériel
defavorable 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.
Le traitement des candidatures
adressées par d'autres canaux n'est pas
garanti.
nowadays and upcoming browser fingerprinting techniques to uniquely identify browsers.

The objective of this Ph.D. is to define and implement new strategies to protect against browser fingerprinting in particular by reducing fingerprint uniqueness, while ensuring that the proposed solutions are acceptable by non-technical users.

**Principales activités**

**Main activities**

In order to do so, we propose to apply the following methodology:

1. Evaluate and classify the state of the art of browser fingerprinting techniques, including academic and those found in-the-wild (e.g., by reverse engineering commercial fingerprinting scripts and inferring their tracking strategies);

2. Evaluate the impact of current browser fingerprinting countermeasures. One of the ways to detect the presence of fingerprinting countermeasures is to look at inconsistencies they introduce in the fingerprint. Indeed, when these countermeasures alter attributes to spoof the browser’s identity, they may introduce impossible combination of attributes;

3. Model the distance between fingerprinted attribute values and between browser fingerprints.

4. Build a countermeasure that generates consistent fingerprints, and takes into account the strategies used by fingerprinters. One possible strategy to investigate would be to find users with similar fingerprints, and to apply minimal changes so that altered browser fingerprints look the same to fingerprinters.

5. Analyze the usability and the impact of the proposed countermeasure.

This Ph.D. builds upon our previous work, Blink [Laperdrix15], a countermeasure that relies on virtualization (virtual machines or containers) and random reconfiguration to break fingerprint linkability. Although effective against tracking, Blink’s has overhead has shown to be a deterrent to its use and a new approach is needed. This Ph.D. also benefits from our studies regarding fingerprint statistical analyses [Laperdrix16], as well as advanced machine learning techniques to track browsers over long periods of time [Vastel18].

**References**


[iovation] iovation, “Multifactor Authentication and Online Fraud Prevention Solutions “.

**Compétences**

**Skills**
The Ph.D. candidate will develop her/his skills in Web technologies, in particular Javascript. Moreover, the candidate will also develop skills in Python, as well as machine learning and statistical data analysis, among many other technologies.

As is a common practice in the Spirals research team, all source code is expected to be open sourced. The student should publish high-level academic papers, as well as participate in related open source communities. This should assist in the technological transfer from academic prototypes to industry-ready tools.

**Avantages sociaux**

**Benefits**

- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Sports facilities
- Flexible working hours

More information about Lille:

http://www.lille3000.eu/portail/

http://www.lillemetropole.fr/mel.html

**Rémunération**

**Remunerating**

The gross monthly salary is 1982€ for the 1st and 2nd year and 2085€ for the 3rd year.