

PhD positions in Computer Science at the University of Neuchatel, Switzerland

We invite applications for fully funded PhD research positions in computer science at the University of Neuchâtel, Switzerland (<http://www.unine.ch>). The positions are funded for 4 years and will address research challenges at the intersection between system and security, including privacy-preserving data processing, confidential computing and trusted execution environments. Applicants must have an MSc degree in computer science (or equivalent), be fluent in English, and demonstrate strong teamwork abilities. Candidates with proven programming skills who are knowledgeable in security and operating systems are particularly encouraged to apply.

Context

Secure data processing is one of the biggest challenges in today's global-scale computing infrastructures. Whereas sensitive computations were previously largely performed confined on the premises of the entities owning the data, the paradigm shift toward cloud computing across data centres and expanding up to the edge of the network has radically changed the threat model. Public and private institutions willing to securely process sensitive data—which often represents their most valuable asset—are reluctant to outsource their computations without strong security guarantees that the data will be processed in a privacy-preserving manner throughout the whole system, from edge devices to data centres at the core of the network. Support for such an end-to-end trustworthy processing workflow is far from trivial, as data is exposed to a wide range of threats in several geographical locations (by the end users, on the network, within cloud providers, etc.) and possibly by attackers with privileged access to the infrastructure (e.g., system administrators). State-of-the-art solutions that exclusively rely on cryptography, such as homomorphic encryption, allow provably secure computations on encrypted data, but they are far from being applicable to real-world systems as they perform many orders of magnitude slower than when processing plaintext data.

In this research project, we plan to develop new techniques to support privacy-preserving data processing in untrusted infrastructures, such as remote data centres, that are also practical, i.e., efficient. To attain the conflicting goals of security and performance, we plan to explore and exploit several hardware-assisted enabling technologies that can synergistically perform secure computations on data using the main processors of edge devices and core servers, during transmission over the network and while stored in memory. We will thereby study the various trade-offs—in particular in terms of security and performance—when leveraging emerging technologies for privacy-preserving data processing throughout the edge-to-cloud continuum.

The students will further collaborate with international research groups on related topics, for which a strong attitude to teamwork is essential.

Requirements

The working languages at the University of Neuchâtel are English and French. The selected PhD students are expected to participate in a limited amount of teaching activities in either language. The candidate is expected to use state-of-the-art tools for collaborative teamwork and software development, such as Git/Gitlab, Slack/Discord, Docker, and such.

Location

The University of Neuchâtel is settled in a beautiful landscape of lakes and mountains that offers a friendly atmosphere to about 5,000 students. It was recently ranked 18th in the world among universities with fewer than 5,000 students. The city of Neuchâtel belongs to the French-speaking part of Switzerland and is located at the border of the German-speaking part of the country. Courses in computer science are taught in French (bachelor) and English (master). For more information, visit <http://www.unine.ch>.

Application

Applications should be submitted by e-mail to [Prof. Pascal Felber](mailto:pascal.felber@gmail.com) at pascal.felber@gmail.com with the title "Application PhD positions 2024", including:

1. Curriculum vitae;
2. List of 2-3 reference persons and their e-mail addresses (we ask for recommendation letters ourselves and we will ignore any recommendation letter sent by the candidate her/himself);
3. Transcripts of undergraduate and graduate studies;
4. Links to masters and internship thesis/reports, and publications if applicable;
5. Links to examples of software personal contributions (on GitHub or similar).

All documents must be sent as a single pdf. The earliest starting date is February 2024. Applications will be screened as they arrive and until appropriate candidates are selected.