

Discover Vulnerabilities in Open-Source through Mining Software Repositories

Opportunity for a 6-month internship

Security Research @ SAP Labs France
Sophia-Antipolis – France

SAP's security vision is built on 5 ideals to secure business: Defendable Application, Zero-Knowledge, Zero-Vulnerability, Security by Default, and Transparency.

SAP's security research group lays the foundation for realising the vision: The 30+ researchers of the Security Research unit focus on security engineering (e.g., the automation of the secure software development lifecycle), secure business execution (e.g., business process security and security in cloud based business applications) and secure operations (e.g., secure maintenance and support of complex and heterogeneous cloud IT landscapes).

[Security Research](#) proposes a 6-month internship in its Sophia-Antipolis offices (Mougins, France).

INTERNSHIP TOPIC

In average, Java applications comprise 30 open-source (OSS) libraries, representing 80% of the code base. Between 2012 and 2014, the download of Java components from Maven Central doubled to 13B/year [1,2].

These figures indicate the extent to which modern software applications depend on OSS components. In that context, it is of crucial importance to assess the impact of bugs contained in such OSS components on the application using it. In some cases, a vulnerability comprised in OSS may not be relevant for the application due to the specific usage context. In other cases, the security of the application may be entirely compromised (as in the case of Heartbleed, a vulnerability discovered early 2014 in OpenSSL).

Today, tools supporting such impact assessments rely on so-called vulnerability databases such as the NVD, which are enumerations of known software vulnerabilities. Those databases, however, cannot provide complete coverage, i.e., many known vulnerabilities will never be listed. This internship aims at automatically discovering vulnerabilities and their fixes by mining the software repositories of open-source projects. The goal is to become independent from questions like whether, when and how information about vulnerabilities is listed in vulnerability databases.

In the above-described context, the specific goals of the internship are as follows:

- Develop code patterns and classification techniques for common security vulnerabilities (e.g., SQL Injection) and corresponding fixes
- Automatically scan versioning control systems and software repositories in order to discover instances of such patterns, i.e., concrete bugs and their fixes

Technologies/techniques involved are: Java, JavaScript, GIT/SVN, Maven, and Machine Learning

We expect that 40% of time will be dedicated to research activities, and 60% to development

CANDIDATE PROFILE

- University Level: Last year of MSc or less if the student has a good profile
- Good knowledge of the Java programming language
- Good knowledge of versioning control systems like GIT or SVN
- Good knowledge of HTML5 technologies (JS, CSS, AJAX)
- Good knowledge of data science and machine learning algorithms
- Interest in research work
- Fluency in English (working language)
- Good oral and written communication skills

INTERNSHIP CONTEXT

SAP

Over the past 45 years, SAP has grown to become the world's leading provider of business software solutions. With 12 million users, 96,400 installations, and more than 1,500 partners, SAP is the world's largest inter-enterprise software company and the world's third-largest independent software supplier, overall. SAP solutions help enterprises of all sizes around the world to improve customer relationships, enhance partner collaboration and create efficiencies across their supply chains and business operations. SAP group includes subsidiaries in over 180 countries and employs more than 84 000 people.

Security Research at SAP Labs France, Sophia Antipolis

Based at SAP Labs France Mougins, Security Research Sophia-Antipolis addresses the upcoming security needs, focusing on increased automation of the security life cycle and on providing innovative solutions for the security challenges in networked businesses, including cloud, services and mobile.

STANDARD INTERNSHIP PACKAGE

- *Salary*: depending on the length of the internship and your diploma.
- *Lunch*: SAP Labs France has a local cafeteria; interns contribute 2,40 €uro/lunch, like other SAP employees.
- *Holidays*: French Bank Holidays
 - January 1st; April 2nd, May 1st, May 8th, May 10th, May 21st, July 14th; August 15th, Nov 1st and 11th; December 25th
- *Travel*: no trip will be paid by SAP.
- *Accommodation*: SAP can propose an accommodation for the duration of your internship. The accommodation is subsidized by SAP: the intern pays half of the rental cost: 342€ for a 1-room apartment or 442€ for a 2-room apartment (Choice depending on the availability).

CONTACTS AND PROCEDURE

Please send **in English** your CV, a cover letter and any relevant documents to the following persons stating the title of the Internship in the subject: [Internship Application] **Mining Software Repositories**.

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