



## Extension of the Smart Items scenario for Serenity

### Opportunity for a 6 months internship (MSc) at SAP Research - SAP Labs France Cote d'Azur, FRANCE

Ref 4/3/2008 5:17:00 PM v1.00

The internship will be done in the context of the EU-sponsored Serenity project (<http://www.serenity-project.org>) and it will be performed fulltime at SAP Labs France – in the Security & Trust area of SAP Research.

SAP Research Center Sophia Antipolis contributes, together with others software companies, application solution developers and research institutions, to the EU Integrated Project SERENITY (“System Engineering for Security and Dependability”) whose main goal is to support system designers/developers (persons that in general might not have a deep security know-how) to make their systems — e.g., Ambient Intelligence (AmI) ecosystems applied in the area of healthcare, Enterprise Service-Oriented Applications for domains such as e-business, e-government, etc — secure by capturing security expertise and making it available for automated processing. One of the SERENITY key ingredients will be the enhanced notion of Security and Dependability (S&D) Patterns as precise specifications of validated S&D mechanisms that will serve as vehicles for the provision of S&D over a wide assortment of heterogeneous systems.

In this project, SAP focuses, besides other things, on an AmI scenario based on a Smart Items infrastructure that deals with the growing requirements of the electronic health care monitoring and assistance for patients. This scenario requires collaboration between doctors, pharmacists, patients, social workers and emergency medical teams in a health care landscape as well as interactions between all these human actors and a significant amount of heterogeneous (smart) devices. Not surprisingly the scenario poses challenging requirements varying from security, to privacy and dependability. For instance, the data exchanged, processed, and stored within this scenario is highly sensible and necessitates to be carefully protected against improper misuse. Similarly, reliability of the data inferred (e.g., health status of a patient) and availability of critical scenario's components (e.g., medical emergency response centre) need to be enforced.

The aim of this internship is to model the SERENITY's smart items scenario in a graph expressing the structure and connections between the actors. Transforming this graph into predicates where graph rewriting techniques should be studied for S&D patterns application. Term graph rewriting is concerned with the representation of functional expressions as graphs and the evaluation of these expressions by rule-based graph transformation. In advanced step of this internship, Constraint Handling Rules will be used to apply the applicable S&D patterns in the Smart Items graph.

At this purpose four sequential phases are foreseen:

1. Getting familiar with the Smart Items scenario.
2. Modelling the Smart Items scenario structure into graphs and elaborate required predicates.
3. Study the related works on graph rewriting.
4. Specifying and Implementing a Constraint Handling Rules application to apply the patterns in the Smart Items graph.

Besides to work in an international environment and in the context of an EU project involving 15 partners from industry and academy, the student will get in touch with an industrial research surround offering concrete possibilities of migrating research outcomes into real industrial products.

Estimated effort is 4 to 6 months. The ratio between software development and research related activities is expected to be around 50% research and 50% development.

#### Candidate Profile

- University Level: Last year of MSc and behind
- Good skills in modelling, analysis and programming (Graph theory, Java, Prolog)
- Fluency in English (working languages)
- Good oral and written communication skills
- Willingness and ability to work in an international environment are required

The position is to be filled by September 2008 or as soon as possible.

## Internship Context

### SAP Research

Founded in 1972 as Systems Applications and Products in Data Processing, SAP is the recognized leader in providing collaborative business solutions for all types of industries and for every major market. Serving more than 36,200 customers worldwide, SAP is the world's largest business software company and the world's third-largest independent software provider overall. We have a rich history of innovation and growth that has made us a true industry leader. Today, SAP employs more than 38,400 people in more than 50 countries. Our professionals are dedicated to providing the highest level of customer service and support.

**SAP Research** –*Systematic Thought Leadership for Innovative Business*– is the research department of SAP, significantly contributing to SAP's product portfolio by identifying breakthrough innovation and conducting co-innovation with external partners and customers. SAP Research acts as SAP's IT trend scout, identifying emerging IT trends, researching and developing in strategically important SAP business areas, and leveraging entrepreneurial inventive talent.

SAP Research centers/campus-based engineering centers -- The goal of these technology research centers is to establish SAP as the thought leader in the area of innovative, breakthrough information technology. SAP research centers and campus-based engineering centers study IT trends and deploy new technologies in real-life environments to determine their potential business value for SAP. As a result, SAP Research is able to introduce new technology and concepts for future solutions that will be strategically important to SAP -- and its customers. SAP Research is headquartered in Walldorf, Germany. SAP Research has identified five long-term and global research programs, among them the Security & Trust Research Program, which is lead by SAP Research at SAP Labs France.

**SAP Research Sophia Antipolis**, the Research Center in South-France, is focusing its research activities on Security & Trust and application domains in the area of eGovernment and Environmental Risk Management. Being located in Europe's foremost Science Park, SAP Research Sophia Antipolis is in close relationship with local research organizations. SAP Labs France is a member of the Telecom Valley and Club Hi Tech associations and maintains close collaboration with academic institutions, including the University of Nice – Sophia Antipolis, Eurécom Institute and INRIA. SAP Research also participates to the French poles de competitivites *Risques* (Risk) and *Solutions Communicantes Securisees* (Secure Communicating Solutions). Beyond that, SAP Research Sophia Antipolis is collaborating with industrial partners and customers which provide a strong benefit to the research activities.

17 researchers are working at SAP Labs France (among ~200 employees) and are mainly involved on European Research Projects in the area of Security & Trust with applications to eGovernment, Mobility and Public Security.

### Standard Internship Package

- working hours: 9am to 5pm is the minimum. Other than that we are flexible.
- lunch: SAP Labs France has a local cafeteria; interns contribute 2,1 Euros/lunch, like other SAP employees.
- vacation: at the discretion of your manager (usually 1 worked/day per month).
- holidays: based on french holidays (April 17<sup>th</sup>; May 1<sup>st</sup>, 8<sup>th</sup>, 25<sup>th</sup>; July 14<sup>th</sup>; Aug 15<sup>th</sup>; Nov 1<sup>st</sup>, 11<sup>th</sup>; Dec 25<sup>th</sup> are French holidays).
- travel: no personal travel (your trip to and from Nice) will be paid by SAP.
- accommodation: we can propose to you an accommodation for the duration of your internship. If you accept SAP will take care of the rent but 250 Euros will be deducted from your monthly salary. Otherwise you are on your own.

If you have any question, do not hesitate to contact us.

### Contacts and Procedure

Please send your CV and any relevant documents to the following persons stating the title of the Internship in the Subject [Internship Application] Extension of the Smart Items scenario for Serenity

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