

Offer of a PhD position

Exploring Formal Methods and Formal Concept Analysis for Agile Business Process Management

Funding: French Government Research Grant (**gross income: between 1850 € and 2000 € per month**).

Location : Université Paris 1 Panthéon-Sorbonne, Centre de Recherche en Informatique, 90, rue de Tolbiac 75013 Paris, France

Directors : Irina RYCHKOVA (irina.rychkova@univ-paris1.fr) and Bénédicte LE GRAND (Benedicte.Le-Grand@univ-paris1.fr)

Starting date: between September and November 2013

No application will be considered after 01/07/2013

Keywords : Formal specification, model checking, Formal Concept Analysis, Business Process Modeling

More detail about the context of the work can be found in the full PhD proposal:

<http://crinfo.univ-paris1.fr/thesisSorbonne2013.pdf>

Description

The subject of this PhD thesis lies on **the intersection of the three research areas: business process modeling, formal methods and formal concept analysis**. We propose to explore formal methods and formal concept analysis (FCA) and to build a novel approach for agile process modelling, simulation and analysis. In particular we propose to apply these techniques for unstructured processes such as case management processes (CMP). Case management processes have multiple applications, including licensing and permitting in government, insurance application and claim processing in insurance, patient care and medical diagnosis in healthcare, etc.

The first challenge related to this PhD thesis is to find an appropriate (mathematical) formalism for representation and reasoning about case management processes (CMP) while ensuring an appropriate level of agility. We suggest that, instead of following a predefined execution scenario, a process navigates in the process “state space”, dynamically adjusting its path based on the current state, current situation and navigation rules. Initial navigation rules for process guidance based on Formal Concept Analysis and Galois lattices need to be defined.

The second challenge related to this PhD thesis is to explore the opportunities provided by automated model checking, theorem proving and formal concept analysis for process model validation and for guided process execution.

Requested Work

The candidate will have to carry out the work in the following three directions:

- A. State of the art
- B. Development of a methodology for agile process modelling simulation and analysis
- C. Definition of Formal semantics, Concrete syntax, techniques for Simulation and Analysis.
- D. Implementation of this methodology: developing a prototype
- E. Experimenting with this prototype: developing and working on the case studies

Requirements

The candidate must hold a M.Sc. in Computer Science (or equivalent). He/She must have very good programming skills (C++ or Java), solid skills in formal methods (Alloy is a preference) and model checking / theorem proving techniques. The candidate should have good writing skills in English. He/She must be highly motivated, independent, with a real ability to organize and follow a schedule.

To apply: send a detailed CV (resume) (in English), a motivation letter (in English), copy of official transcript of student record (B.Sc and M.Sc) and letters of reference to Irina Rychkova (irina.rychkova@univ-paris1.fr)

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