PhD position in Software Engineering, Modeling and Computer Science Education

Title: Model-based Learning and Teaching Software Environment for Computer Science Modeling Education

Place: LIUPPA laboratory, University of Pau, IUT des Pays de l'Adour, 371, rue du Ruisseau, 40004 Mont de Marsan, France

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Subject

Computer Science Education is gaining momentum internationally [Bell et al., 2014], [Brown et al., 2014], [Gal-Ezer and Stephenson, 2014], with the introduction of Computational Thinking (CT) [Wing, 2006] concepts in the curricula of elementary and middle schools. In France, CT teaching was introduced in the mathematical curriculum of 2016. One of the essential CT concepts is *modeling*, the process of understanding the problem in the real world, establishing a computational model, solving the problem using this computational model, interpreting the computational results in the real world, and validating the solution [Kaiser, 1995], [Blum, 1991], [Chevallard, 1989], [Coulange, 1997]. However, modeling is not an easy knowledge and know-how to learn or teach. Therefore, in this Ph.D. subject we will propose a software platform to help students learn modeling concepts. This environment will also propose support for teachers to conceive lessons and lesson plans for teaching modeling concepts.

The platform will be defined using Model Driven Engineering (MDE) [France and Rumpe, 2007] principles, such as meta-modeling, process modeling and enactment, code generation. The environment will be tested in middle school classrooms in the French department of Landes. The obtained results will also form the basis for offering further support on architecture design modeling at all levels of expertise. Close work with the Lab-E3D, on Didactics, from the University of Bordeaux, is expected.

Expected Contributions

Your expected contributions are the following:

1. You will adapt and enrich a theoretical description of computational modeling, starting from existing theories on mathematical modeling.
2. Based on this theoretical description, you will design and implement a proof-of-concept environment for helping learning and teaching modeling concepts.
3. You will test the obtained environment in middle school classrooms, analyze and integrate the results of the tests into the environment.

Required Competencies

The candidate will have **solid knowledge** of Object Oriented Programming and the Java programming language. It is desirable that the candidate have knowledge of Model Driven Engineering and/or Didactics (of Computer Science) or be willing to acquire these in short time. It is highly desirable that the candidate followed a Research Masters or equivalent. Good command of both English and French is mandatory.

Compensation

Your work will be sustained by a gross salary according to the French laws, which is around 21.000 euro/year (before taxes).

Note: the candidate will be funded by the "Conseil Général des Landes" and is subject to their approval.

Procedure and Time-line

1. You send your motivation letter, CV, marks for university and masters courses, at least 2 recommendation letters, special achievements and any other documents you feel may be useful at **all supervisors** by e-mail, by **07 July 2017**.

2. Selected candidates will be invited to Skype interviews.

3. The Ph.D. position will start in September/October 2017.

References

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