

## ***2<sup>nd</sup> MDHPCL : Model-Driven Engineering for High Performance and CCloud computing***

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### **1 Objectives and Scope**

The important vitality of IT, recently increased the focus on technologies such as cloud computing, high performance applications and parallelism architectures. Industry needs help from the research community to succeed in its recent dramatic shift ". None of these technologies are traditional users of modeling approaches. However, some results start to emerge on the use of modeling techniques as a mean to help addressing issues related to the complexity of applications in these fields, the need for separation of concerns, or the demand for abstracting from platform concerns.

One of the major common points between High Performance Computing and Cloud Computing is that the two technologies aim at a solution that allows to offer as the simplicity of regular desktop tools, while based on the power of massively parallel computing, respectively complex data architectures and their management. In both cases, the ultimate goal is about maximizing human productivity, by allowing non-experts to create and evaluate complex models quickly and easily. There are several ways to achieve this: by raising the level of abstraction used in the design and development of the application, by decoupling application specific from optimization driven choices, by ensuring a better separation of concerns etc. The above mentioned strategies correspond to techniques largely used and promoted by Model-Driven Engineering.

The purpose of this workshop is to bring together researchers and practitioners, with experience in HPC, cloud computing and MDE and to explore the strategies that would allow a wider use of MDE techniques in the above mentioned application fields.

In spite of the obvious need for abstraction in HPC and cloud computing, the use of MDE is marginal. This is partially due to subjective reasons, such as the lack of MDE experts amongst the HPC and cloud computing teams, insufficient communication between the two communities, reticence of the teams used to intensively combine hardware specific code with application specific code for

optimization reasons. However, there are more fundamental obstacles in using MDE, such as the problems in the scalability of the existing MDE solutions, the insufficient support for collaborative work, etc.

This workshop aims to present existing work on applying modeling techniques in cloud and high performance computing. Beyond offering a forum for current and ongoing work on these topics, the workshop aims to open a discussion on the challenges faced by these new fields, and how model-driven techniques could be adapted to meet these challenges. We intend to find individual success stories on the use of modeling on the fields addressed by this workshop and discuss on the factors that may have contributed to the positive outcome, the difficulties faced and how they were addressed.

This workshop targets researchers and practitioners who work in the area of HPC or Cloud Computing and who feel the use of modeling techniques can be beneficial to their respective fields, as well as to researchers and practitioners in the modeling area who have an interest in adapting their work to new application domains.

## 2 Workshop Venue, Date and Program Committee

The workshop <sup>1</sup> was held as part of the IEEE/ACM MODELS 2013 conference on September 29, 2013 in Miami Beach, FL, USA.

The program committee of this workshop comprised:

- Jean-Michel Bruel, IRIT - University of Toulouse
- Akshay Dabholkar, Nimbula, Inc., USA
- Dirk Draheim, University of Innsbruck, Austria
- Steven Drager, Air Force Research Laboratory, USA
- Robert France, Colorado State University
- Michael Felderer, University of Innsbruck
- Aniruddha Gokhale, ISIS, Vanderbilt University
- James Hill, Indiana University Purdue University at Indianapolis
- David Lugato, CEA, France
- William McKeever, Air Force Research Labs, USA
- Ileana Ober, IRIT - University of Toulouse
- Bernhard Rumpe, RWTH Aachen University

## 3 Why a Second Edition?

This is the second edition of a workshop that focuses on the use of modeling in HPC and Cloud Computing. To our knowledge there was no other workshop on the same topic. The closest to our interest is the workshop *ICSE 2011 Software Engineering For Cloud Computing Workshop*. This workshop proved that there is an important community receptive to applying software engineering techniques in cloud computing. There are two main differences between our

<sup>1</sup> <http://www.irit.fr/MDHPCL2013>

workshop and the workshop held at ICSE: we intend to focus on the use of model-driven techniques (and not on software engineering issues in general) and we would like to look closer to their applicability to both Cloud Computing and High-Performance Computing.

The number of submissions received for the first edition of our workshop was not high (8), however the workshop attracted about 25 participants and generated a lot of discussions. During the discussion the participants asked explicitly for a second edition of the workshop. Our analysis of this situation is that the topic addressed by the workshop is of interest for a lot of people, there are many emerging efforts in this area, although not many are mature enough to generate submissions. Moreover, these topics are also increasingly important to the MODELS community as can be seen in the call for papers.

#### 4 Selected Papers and Workshop Logistics

Two members of the organizing committee, Aniruddha Gokhale and James Hill, moderated the proceedings of the workshop.

Prior to the day of the workshop, we made pre-proceedings of the workshop available online for participants and [http://www.irit.fr/MDHPCL2013/Proceedings\\_files/preproceedings\\_mdhpcl2013.pdf](http://www.irit.fr/MDHPCL2013/Proceedings_files/preproceedings_mdhpcl2013.pdf).

A total of 7 papers were selected to be presented of which 6 were long papers and 1 short paper. The long papers got 20 mins (15 + 5 for Q&A); short papers got 15 mins (12 + 3 for Q&A). Attendees were requested to hold off the most interesting questions to the end for the panel discussion.

This half-day workshop selected the following papers for presentation at the workshop:

1. Towards a Solution avoiding vendor lock-in to enable Migration between Cloud Platforms
2. Modeling Cloud Architectures as Interactive Systems
3. VehicleForge: A Cloud-based Infrastructure for Collaborative Model-based Design
4. A Model-driven Approach for Price/Performance Tradeoffs in Cloud-based MapReduce Application Deployment (short paper)
5. Towards Domain-specific Testing Languages for SaaS
6. Architecture Framework for Mapping Parallel Algorithms to Parallel Computing Platforms
7. Model-driven Transformations for Mapping Parallel
8. Algorithms to Parallel Computing Platforms

There were about 20 or more members in the audience. Each paper evoked significant interest in the audience giving rise to some fruitful discussions. At the end of the paper presentations, the audience discussed many long term ideas. There was enough interest demonstrated by the audience that will justify a third edition of this workshop at MODELS 2014.