

## Proposal for a ParCO mini-symposium

**Title: "Emerging programming models and Tools for Exascale Computing"**

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### Summary

With top systems reaching the PFlop barrier, the next challenge is to understand how applications have to be implemented and be prepared for the ExaFlop target. Multicore chips are already here but will grow in the next decade to several hundreds of cores. Hundreds of thousands of nodes based on them will constitute the future exascale systems.

This is posing a lot of pressure on the scalability that applications can achieve on such systems. One of the elements that will be key on the achievement of high productivity in the development of applications and good performance on such systems is the programming model, together with development and performance analysis tools. Programming models able to provide the necessary support for asynchrony and heterogeneity as well as enabling incremental parallelization, modularity and portability of applications are necessary.

Also, since most of current parallel applications are written in MPI, it is important to propose programming models that can easily integrate within it and propagate its characteristics to the global application level. This will leverage and provide a smooth migration path for the huge number of applications today written in MPI.

There is also a real need for development of performance and debugging support tools in order to provide environments oriented to increase programmer productivity. This is very important to cope with large scales, dynamicity and asynchrony of future systems.

The purpose of this symposium is to bring together researchers and practitioners with diverse backgrounds in order to advance the state of the art in the development of applications with the MPI/SMPs programming model.

The project organizers are involved in the EU funded project TEXT, with its main activities focusing parallel programming models, development and performance analysis tools and porting MPI applications to the MPI/SMPs programming model.

### Schedule

Session 1: Programming models for Exascale architectures

"Hybrid Parallel programming with MPI/StarSs", Jesus Labarta

"GPI -- Global address space programming interface. Model, experiences, scalability and the future", Mirko Rhan

Session 2: Benchmarking and tools

“TEMANEJO - a debugger for task based parallel programming models”, Steffen Brinkmann

“Characterizing Parallel I/O Performance using the TAU Performance System”, Sameer Shende

Session 3: Applications

“Parallelizing Dense Matrix Factorizations on Clusters of MultiCore Processors using SMPs”, Enrique Quintana