CPHPCA’16 workshop

NAME AND ACRONYM OF THE WORKSHOP

2nd Workshop on Complex Problems over High Performance Computing Architectures (CPHPCA).

MAIN OBJECTIVES AND RELEVANCE TO ISC-HPC COMMUNITY

The main proposal of CPHPCA is to provide a scenario to discuss how those problems compromising important challenges and high computational requirements can be mapped over current and upcoming high performance architectures.

The importance of high performance computing is increasing and has become as one of the foremost fields of computing research. This raise brings up many issues, in form of new network topologies and technologies (fast accessing data), new low-consumption architectures, new programming models, etc. It forces us to adapt our codes or create new ones to take advantages of the last computational features.

This workshop focuses on the challenges that suppose how to adapt/implement complex and big problems over those platforms composed by a high number of cores, dealing with communication, programming, heterogeneous architectures, load balancing, benchmarking, etc.
Today, the difficulty of the problems to be implemented is increasing considerably, large data and computational requirements, dynamic behavior, numerical simulations, automatic modeling, are just a few examples of this kind of problems.

The goal of this workshop is to bridge the gap between the theory of complex problems (computational fluid dynamics, bioinformatics, linear algebra, big data computing ...) and high performance computing platforms by proposing new trends/directions in programming.

Authors are invited to submit manuscripts that present original and unpublished research in all areas related with programming of complex problems via parallel and distributed processing.
Works focused on emerging architectures and big computing challenges are especially welcome.

Relevant topics include, but are not limited to:

- New strategies to improve performance.
- Code adapting to take advantages of last features.
- Numerical modeling for complex problems.
- Communication, synchronization, loads balancing.
- Benchmarking, performance and numerical accuracy analysis.
- Scalability of algorithms and data structures.
- Analysis of new programming models.
- Auto-Tuning Computing Systems (high level abstraction).

WORKSHOP ORGANIZERS

Pedro Valero-Lara, University of Manchester, UK.
Fernando L. Pelayo, University of Castilla-La Mancha, Spain.

DATES OF THE WORKSHOP

August 24-26, 2016 - Paris, France

WORKSHOP FORMAT

Full-day

POTENTIAL ATENDEES

Around 15 ~ 25 people

POTENTIAL AUTHORS

Around 8 ~ 10 papers

PROPOSED FORMAT AND AGENDA

1 hour Invited Talk, and 30 minutes per paper (20' +10' or 25' + 5', presentation + discussion).
Presentations will be arranged in sessions according to the topics covered, up to 4 papers per session.

INVITED SPEAKERS

Manuel Ujaldón, NVIDIA CUDA Fellow.

Title: “GPGPU: Challenges ahead”

Abstract:
After a decade being used as hardware accelerators, GPUs constitute nowadays a solid alternative for high performance computing at an affordable cost. Increasing volumes of data managed by large-scale applications make GPUs very attractive for scientific computing, deploying SIMD parallelism in an unprecedented way to produce impressive speed-up factors.

This talk reviews current achievements of many-core GPUs and future hardware enhancements taken from Nvidia’s roadmap to leverage exascale computing on heterogeneous CPU-GPU platforms: Maxwell (2015) to unveil unified memory, and Pascal (2017) to introduce Stacked DRAM (3D memory). In the final part, we discuss scenarios where speed-ups can be maximized on future GPUs.

Short bio:

Manuel Ujaldon is Prof. of Computer Architecture at the University of Malaga (Spain) and CUDA Fellow at Nvidia. He worked in the 90's on parallelizing compilers, finishing his PhD in 1996 by

developing a data-parallel compiler for sparse matrix and irregular applications. Over this period, he was part of the HPF and MPI Forums, working as post-doc in the CS Dept. of the University of Maryland (USA).
Last decade he started working on the GPGPU movement early in 2003 using Cg, and wrote the first book in spanish about programming GPUs for general purpose computing. He adopted CUDA when it was first released, then focusing on image processing and biomedical applications. Over the past five years, he has published more than 50 papers in journals and international conferences in these two areas.
Dr. Ujaldon has been awarded as NVIDIA Academic Partnership 2008-2011, NVIDIA Teaching Center since 2011, NVIDIA Research Center since 2012, and finally CUDA Fellow. Over the past four years, he has taught around 60 courses on CUDA programming worldwide sponsored by Nvidia, including more than 10 keynotes and tutorials in ACM/IEEE conferences.

PROGRAM COMMITTEE

- **Pedro Valero-Lara**, University of Manchester, U.K.
- **Fernando L. Pelayo**, University of Castilla-La Mancha, Spain.
- **Sedukhin Stanislav,** University of Aizu, Japan.
- **José Ignacio Aliaga Estellés**, University Jaume I (UJI), Spain.
- **Omar Abdelkafi**, Université de Haute-Alsace, France.
- **J. Daniel García**, University Carlos III (UCIII), Spain.
- **Marcin Paprzycki,** Systems Research Institute of the Polish Academy of Sciences, Poland.
- **Manuel Prieto Matías**, Complutense University of Madrid (UCM), Spain.
- **Yuehai Xu**, VMWare Inc., USA.
- **Miguel Cárdenas**, Research Center of Weather, Energy and Technology (CIEMAT), Spain.
- **Violeta Holmes,** Universityof Huddersfield, UK.
- **Abel Francisco Paz Gallardo**, CETA-CIEMAT, Spain.
- **José Luis Sánchez García**, University of Castilla-La Mancha (UCLM), Spain.
- **Leonel Sousa**, Technical University of Lisbon, Portugal
- **Qusay Fadhelm**, Mansoura University, Egypt.
- **Daniel Rubio Bonilla,** High Performance Computing Center Stuttgart (HLRS), Germany.
- **Ivan Lirkov,** Bulgarian Academy of Science, Bulgaria.

SPECIAL ISSUE

After the conference, selected papers will be invited for a special issue of the journal Scalable Computing: Practice and Experience.

PREVIOUS EDITIONS

1st Workshop on Complex Problems over High Performance Computing Architectures (CPHPCA) at conjunction of International Symposium on Applied Reconfigurable Computing (ARCS) 2015 (http://www.cister.isep.ipp.pt/arcs2015/cphpca/). 6 participants in total, taking into account authors and keynotes. 35 attenders among researchers, faculty members, students, organizers and participants.