Exa2Green
energy-aware numerics

NEWSLETTER #1
June 2013

EDITORIAL

Dear Readers,

welcome to the first issue of the Exa2Green newsletter. It is our pleasure to keep you up to date with the progress of our project and to make you aware of news and activities around energy-efficient high performance computing.

The Exa2Green project is driven by an international and interdisciplinary consortium, consisting of project partners located in Germany, Spain and Switzerland. In this issue we present the consortium to you and also give you detailed information on the primary researchers behind the Exa2Green project. Furthermore we also look back to both project meetings held so far, the kick-off meeting in Karlsruhe and the second partner meeting in Lugano.

New events around green HPC are already on the horizon, such as the EnA-HPC conference, which will be held on September 2th and 3rd in Dresden, Germany. This event will present a very good opportunity for researchers to meet and discuss the formidable energy consumption challenges that lie ahead on the road to exascale computing. For more details on this event please read the associated section in this document.

We hope that you will enjoy reading and we also kindly invite you to visit our website at www.exa2green.eu which will also keep you updated about all activities around the Exa2Green project.

Yours sincerely,

The Exa2Green consortium

CONTENT

Exa2Green ID

Title

Energy-Aware Sustainable Computing on Future Technology —Paving the Road to Exascale Computing

Programme

Seventh Framework Programme, Collaborative Project

Project No.

318793

Duration

01/11/2012-31/10/2015

Main objective

Exa2Green *aims at developing a radically new energy-aware computing paradigm and programming methodology for exascale computing.*

Partner countries

Germany, Switzerland and Spain

EXA2GREEN CONSORTIUM

Exa2Green Project Partners:

Coordinator:
Engineering Mathematics and Computing Lab (EMCL)
Interdisciplinary Center for Scientific Computing (IWR)
Universität Heidelberg - Germany

High Performance Computing and Architectures Group
Universitat Jaume I de Castellon - Spain

IBM Research - Zurich - Switzerland

Institute for Meteorology and Climate Research
Karlsruhe Institute of Technology - Germany

Scientific Computing Group, Department of Informatics
Universität Hamburg - Germany

Steinbeis-Europa-Zentrum - Germany

Swiss Federal Institute of Technology Zurich
Swiss National Supercomputing Centre - Switzerland

INTRODUCTION: THE EXA2GREEN PRINCIPLE RESEARCHERS

Prof. Vincent Heuveline, Heidelberg University

Role in the project: Project Coordinator with strong involvement in management and dissemination activities; Leader of WP4: advancing hardware-aware algorithms

Background: Ph.D. in Computer Science, Habilitation and Venia Legendi in Mathematics

Current position: Full professor for scientific computing and director of the University Computing Center (URZ) at Heidelberg University; head of the research group Engineering Mathematics and Computing Lab (EMCL) at the Interdisciplinary Center for Scientific Computing (IWR) at Heidelberg University. Vincent Heuveline is also leading the research group Data Mining and Uncertainty Quantification at the Heidelberg Institute for Theoretical Studies (HITS).

Major research interests: Mathematical modelling, numerical simulation, optimisation, high performance computing, cloud computing and software engineering

Dr. Alessandro Curioni, IBM Research Zurich

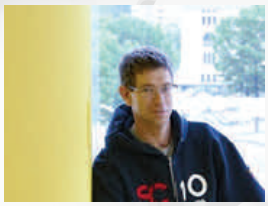
Role in the project: WP2-Leader: Set-up for innovative energy-efficient algorithmic kernels, responsible for the design of new energy-aware performance metrics and the analysis of the power behaviour of the Berkeley algorithmic dwarfs

Background: Diploma in Theoretical Chemistry and Ph.D. in Computational Materials Science

Current position: Manager of the Computational Sciences Group at IBM Research

Major research interests: HPC and Deep Computing applications on novel massively parallel computers, critical power performance characteristics

Dr. William Sawyer, ETH Zurich / CSCS



Role in the project: Technical coordinator of WP5: Showcase for energy-optimized aerosol chemistry packages

Background: M.Sc. in Computational Mathematics, Ph.D. in Applied Mathematics and Climate Science

Current position: Computational scientist in the Scientific Community Engagement group at CSCS

Major research interests: Parallel numerical linear algebra

Dr. Enrique S. Quintana-Ortí, Universitat Jaume I

Role in the project: Leader of WP3: Development of energy-aware numerical linear algebra libraries; Collaboration with IBM in the development and analysis of energy-efficient kernels

Background: BS degree and a Ph.D. both in Computer Science

Current position: Professor in Computer Architecture at the Department of Computer Science and Engineering at UJI since 2009, leader of the HPCA group at Universitat Jaume I

Major research interests: development of numerical kernels, optimisation tools, and run-time accelerators for general-purpose multi-core processors and heterogeneous platforms equipped with hardware accelerators, with special emphasis on energy consumption

Prof. Thomas Ludwig, Universität Hamburg

Role in the project: Leader of WP1: Design of tools for power and energy analysis on HPC systems

Background: From 2001-2009 Professor at Heidelberg University and leader of the Research Group Parallel and Distributed Systems

Current position: Professor at Universität Hamburg and head of the Scientific Computing Group at the Department of Informatics. CEO of the German Climate Computing Centre.

Major research interests: Energy efficiency and high performance storage in high performance computing

Dr. Bernhard Vogel, Karlsruhe Institute of Technology

Role in the project: Contribution to WP4 (advancing hardware-aware algorithms) and WP5 (optimizing the energy consumption of COSMO-ART)

Background: Diploma and Ph.D. in Meteorology

Current position: Senior scientist at Institute for Meteorology and Climate Research - Troposphere Research (IMK-TRO)

Major research interests: Mesoscale meteorology, atmospheric boundary layer, numerical modelling processes on the regional scale, and the interaction of aerosol, chemistry, radiation, and clouds

EXA2GREEN PAST EVENTS

Kick-off Meeting at KIT in Karlsruhe

The Exa2Green kick-off meeting took place on 30th November 2012 in Karlsruhe, Germany. The event was hosted by the project coordinator, the Engineering Mathematics and Computing Lab (EMCL) at Karlsruhe Institute of Technology (KIT). The meeting brought together all partners in Karlsruhe with the objective to learn more about their new collaborators and the project. Each partner presented their institution and role in Exa2Green project. As aspired, the meeting was full of lively discussions about general as well as sometimes very concrete issues related to the project's objectives. Thanks to all the attendees for having contributed to a successful meeting!

Second Partner Meeting at ETH Zurich / CSCS in Lugano

On 6th and 7th May 2013 the Exa2Green partners came together for the second partner meeting at the Swiss National Supercomputing Centre (CSCS) of ETH Zurich in Lugano, Switzerland. The two-day meeting was organised by Dr. William Sawyer of CSCS. Marking the 6th month of Exa2Green project, the meeting was taken as an occasion to look back to the activities initialized since the start of the project in November 2012 and the challenges and opportunities lying ahead for the consortium. All partners presented a status-quo version of their research performed in Exa2Green, which led to inspiring discussions throughout the meeting.

UPCOMING EVENTS: EnA-HPC Conference in Dresden

Power provisioning and energy consumption become major challenges in the field of high performance computing. Energy costs over the lifetime of an HPC installation are in the range of the acquisition costs.

The greening of HPC therefore is an important research field that attracts many scientists. Up to now we see different approaches on different abstraction levels in an HPC environment. For example, vendors work on power efficient processor architectures and software developers on mechanisms of how to use them. However, there is no integrated approach yet that would show ways of how to operate an HPC environment in an energy efficient way.

The EnA-HPC conference aims at bringing together researchers, developers, vendors, and users to discuss the energy consumption challenge that HPC is facing. Some of the key issues are applications, modeling, simulation, measurement, analysis and optimization, facility issues and business concepts. EnA-HPC will provide a forum to present novel solutions that tackle these issues.

Conference Details:

Date: 2 - 3 September 2013

Location: Fakultät Informatik on the campus of the Technische Universität Dresden, Dresden, Germany