

Facing the Multicore-Challenge

Academy Conference for Young Scientists

Venue: Akademie der Wissenschaften
Karlstrasse 4, Heidelberg
Date: March 17 to 19, 2010
Beginning: March 17, 2010, 14:00h

The prevalence of multicore technologies has brought ubiquitous parallelism and a huge theoretical potential for compute-intensive tasks. In theory, advancements in technology bring us closer to the solution of the Grand Challenges in modern computing. In practice however, it is hard to achieve maximal throughput in the results and to exploit all available capabilities. Most applications and algorithms are not yet ready to utilize available capabilities and a tremendous effort is required to close the gap. Only a comprehensive and interdisciplinary approach with contributions from computer science, applied mathematics, high performance computing, and engineering disciplines can face the multicore challenge.

This conference focuses on combination of new aspects of multicore microprocessor technologies, parallel applications, numerical simulation, software development, and tools. The aim is to bring together junior researchers and leading experts in order to discuss recent developments, the present status of the field, and its future prospects in a pleasant atmosphere stimulating exchange of ideas.

Veranstaltet von / Organized by:

- Dr. Rainer Keller,
Oak Ridge National Labs, USA
- Dipl.-Inform. David Kramer,
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- Jun.-Prof. Dr. Jan-Philipp Weiß,
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Further Information:

www.multicore-challenge.org

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Akademiekonferenz für junge Wissenschaftler
Academy Conference for Young Scientists

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HEIDELBERGER AKADEMIE
DER WISSENSCHAFTEN

Akademie der Wissenschaften des Landes Baden-Württemberg

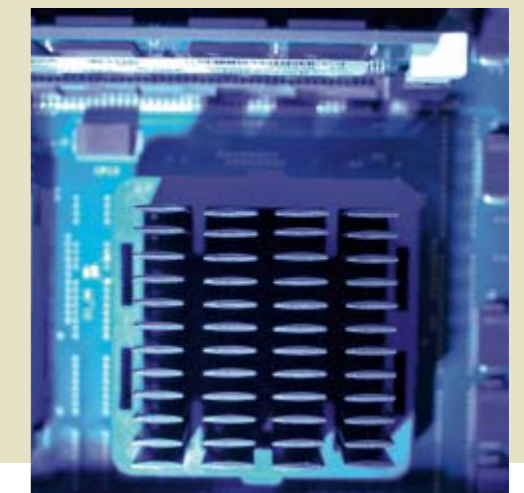
Facing the Multicore-Challenge

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Datum: 17. bis 19. März 2010
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Die Landschaft des Wissenschaftlichen Rechnens wird derzeit von einer Vielzahl neuartiger Prozessorkonzepte auf der Basis von Mehrkern-Technologien bestimmt. Die hochgradige Parallelität verspricht dabei ein immenses Potential an Rechenleistung – die Nutzung ihrer Möglichkeiten erfordert jedoch ein wesentliches Umdenken in der Herangehensweise sowie die Erarbeitung neuer Lösungsmethodiken, die vielfältige Aspekte von der physikalischen Modellierung, den numerischen Verfahren, der parallelen Programmierung bis hin zur Hardwareanalyse umfassen.

Im Rahmen dieser Konferenz sollen die aktuellen Fragestellungen in den Bereichen der Informatik, der Mathematik, des Höchstleistungsrechnens sowie der Ingenieursdisziplinen aus den unterschiedlichen Betrachtungswinkeln beleuchtet werden, mit dem Ziel, ein ganzheitliches Bild zu erzeugen, Erfahrungen auszutauschen und neue Wege aufzuzeigen.



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PROGRAM

WEDNESDAY, MARCH 17, 2010

13:30–14:00 REGISTRATION

14:00–14:15 WELCOME AND INFORMATION

HERMANN H. HAHN
Präsident der Akademie

WILLI JÄGER
Mentor der Konferenz

TUTORIALS

14:15–15:00 **JAN-PHILIPP WEISS**
Karlsruhe Institute of Technology, Germany
Multicore to Manycore:
Technologies and Programming Concepts

15:00–15:30 COFFEE BREAK

15:30–16:45 **MICHAEL KLEMM**
Intel, Germany
Programming Ct – Part I:
Scaling towards Future Multicore

16:45–17:15 COFFEE BREAK

17:45–18:30 **MICHAEL KLEMM**
Intel, Germany
Programming Ct – Part II:
Porting Applications to Multicore

EVENING SESSION

19:00–20:00 RECEPTION

20:00–20:15 CONFERENCE OPENING

20:15–21:15 – INVITED TALK –
DAVID A. BADER
Georgia Institute of Technology, USA
Analyzing Massive Social Networks Using
Multicore and Multithreaded Architectures

THURSDAY, MARCH 18, 2010

MORNING SESSION: COMPUTER ARCHITECTURE AND PARALLEL PROGRAMMING

08:30–08:50 REGISTRATION

08:50–09:00 WELCOME AND INFORMATION

09:00–10:00 – INVITED TALK –
JESUS LABARTA
Barcelona Supercomputing Centre, Spain
MareIncognito: A Perspective Towards Exascale

10:00–10:30 COFFEE BREAK AND POSTER SESSION

10:30–10:55 **IRIS CHRISTADLER**
Leibniz Supercomputing Centre Munich, Germany
RapidMind: Portability across Architectures
and its Limitations

10:55–11:20 **MASAYUKI SATO**
Tohoku University, Japan
A Majority-Based Control Scheme
for Way-Adaptable Caches

11:20–11:45 **SVEN MALLACH**
University of Cologne, Germany
Improved Scalability by Using
Hardware-Aware Thread Affinities

11:45–12:10 **OLIVER MATTES**
Karlsruhe Institute of Technology, Germany
Thread Creation for Self-aware Parallel Systems

12:10–14:00 LUNCH BREAK

AFTERNOON SESSION: APPLICATIONS ON MULTICORE I

14:00–14:45 MODERATED DISCUSSION
Where Does Manycore Lead Us?

14:45–15:10 **GOMIDE FOINA**
Barcelona Supercomputing Centre, Spain
G-means Improved for Cell BE Environment

15:10–15:40 COFFEE BREAK AND POSTER SESSION

15:40–16:05 **FABIAN OBORIL**
Karlsruhe Institute of Technology, Germany
Parallel 3D Multigrid Methods on the
STI Cell BE Architecture

16:05–16:30 **TUDOR IONESCU**
University of Stuttgart, Germany
Applying Classic Feedback Control for Enhancing
the Fault-Tolerance of Parallel Pipeline Workflows
on Multi-Core Systems

16:30–17:10 SHORT TALKS – SESSION I

17:10–17:30 COFFEE BREAK

17:30–18:30 SHORT TALKS – SESSION II

18:30–20:00 GUIDED TOUR: Old Town of Heidelberg

20:00–22:30 CONFERENCE DINNER

FRIDAY, MARCH 19, 2010

MORNING SESSION: APPLICATIONS ON MULTICORE II

08:50–09:00 WELCOME AND INFORMATION

09:00–10:00 – INVITED TALK –
ROBERT STRZODKA
MPI Informatik, Saarbruecken, Germany
The Natural Parallelism

10:00–10:30 COFFEE BREAK AND POSTER SESSION

10:30–10:55 **MARKUS GEVELER**
Technical University of Dortmund, Germany
Lattice-Boltzmann Simulation of the Shallow-
Water Equations with Fluid-Structure
Interaction on Multi- and Manycore Processors

10:55–11:20 **CRISTIAN GROZEA**
Fraunhofer Institute FIRST Berlin, Germany
FPGA vs. Multi-Core CPUs vs. GPUs:
Hands-on Experience with a Sorting
Application

11:20–12:05 MODERATED DISCUSSION
Programming for Manycore –
Challenges and Solutions

12:05–13:30 LUNCH BREAK

AFTERNOON SESSION: GPGPU COMPUTING

13:30–13:55 **HANS HACKER**
Technical University Munich, Germany
Considering GPGPU for HPC Centers:
Is it Worth the Effort?

13:55–14:20 **ALEXEY ABRAMOV**
University of Goettingen, Germany
Real-time Image Segmentation on a GPU

14:20–14:45 **JENS FANGERAU**
University of Heidelberg, Germany
Parallel Volume Rendering Implementation
on Graphics Cards using CUDA

14:45–15:00 COFFEE BREAK

15:00–15:50 SHORT TALKS – SESSION III

15:50–16:00 CONFERENCE CLOSING
AND FAREWELL