



ISC'10 – 25th Anniversary: Focusing on the Program

ISC Review

The first ISC conference was held in the form of a seminar, “Supercomputer: Vergleich und Einsatz” (Supercomputers: Comparison and Applications), with 81 participants from Germany and 11 speeches at the University of Mannheim in June 1986. Three speakers focused on the status of supercomputers at that time and compared the Cray 2, Cray X-MP, IBM 3090 VF and the Fujitsu-Siemens VP 100/200 in particular. Three speakers from the industry discussed applications from the areas of aerodynamics, oil-exploration and finite-element calculations.

The **gigaflop/s** performance mark was first surpassed by the **Cray 2** in 1986. It was 11 years before the **Intel ASCI Red**, the first teraflop/s supercomputer, could be presented as the number one of our 9th TOP500 list at our 12th ISC conference, in Mannheim in 1997. Another 11 years later, in 2008, the next increase by a factor 1000 was IBM's **RoadRunner** from Los Alamos that surpassed the **petaflop/s** mark. Now, the open question is: Can we expect a supercomputer of the **exaflop/s** class by 2019?

2010: HPC at the Crossroads

From now on, like aforementioned, two years after hitting the petaflop/s mark, the new goal is the exaflop/s mark (factor 1000). Practically all of the experts agree that hitting that mark will be more difficult than achieving the petaflop/s frontier. This topic will be thoroughly analyzed by globally acknowledged experts during the panel **80 Years of Computing: From Konrad Zuse to Exascale Computing**.

The near end of Moore's Law and the slow down of the silicon technology was stopped or postponed by the extremely promising approach of the many core systems. However, with the immense quantity of such cores in the near future, the question about the “fault tolerance” arises. This matter will exactly be discussed in the session **Manycore & Fault Tolerance**.

How will parallel computing evolve in the coming years in general? In the session **Parallel Computing in the Years to Come** you will hear two speakers that have been awarded with the Gordon Bell Award and another who has been awarded with the Seymour Cray Award.

The new rapidly changing technologies in multicore, power consumption, GPGPUs, and memory architectures will be a great challenge for the international open source community. The session **International Exascale Software Project** will focus on the efforts required to provide the next generation of HPC software.

The session **HPC: Future Technology Building Blocks** is dedicated to the question, what architects and users of HPC systems will have to consider regarding future HPC systems.

With the advancement of supercomputers into the petaflop/s area, the need for extremely fast and available internal memory modules and external storage media (e.g. SSDs) becomes greater than ever. The panel **New Memory & Storage Hierarchies for HPC – Opportunities & Challenges** aims to clarify the two-fold problem (Memory and Back-End) and will show practical solutions from the industry.

High performance computing can now only be realized using ultra-fast networks, regardless if it concerns cloud-based computing (incl. the necessary network visualizations) or networks inside a singular supercomputer. Both HPC topics will be discussed in the session **High Performance Computing & Networking**, which will, of course, also touch on the topic of the further development of 40Gbit/s Interconnect.



The computing centers will be strongly affected by the development in the coming years, too. The panel **How Will Supercomputer Centers Look Like in the Future?** is dedicated to this issue and will provide concrete advice.

A special focus will be on LINPACK, the yardstick of the successful TOP500 lists for more than 16 years now, and its adaptation to the new situation. The world's top specialist in this field, Jack Dongarra, will focus on the "Linpack Benchmark with Time Limits and GPU Based Accelerators" in particular in the session **Focusing Linpack: The TOP500 Yardstick** and hence highlight the way the TOP500 will be taking in the future.

And for those who are interested in receiving an introduction into the basic terminology and vocabulary of HPC systems, we offer the session **Crash Course on High Performance Computing**, where the fundamental concepts, methods, and technologies of HPC systems are presented.

2010: Status of HPC Applications

"Computational Life Sciences" is becoming a strategic discipline at the frontier between molecular biology and computer science, impacting medicine and biotechnology as well as society. The in-depth session **High Performance Computational Life Sciences – The Challenge for HPC Systems** will provide a forum for discussion of latest research in developing high-performance computing solutions to problems arising from molecular biology.

Trying to understand the behavior of fluids is one of the most fascinating and puzzling areas of science. Since four decades Computational Fluid Dynamics (CFD) continues to be one of the major drivers for advances in HPC. The session **HPC for Turbulence Techniques** offers the opportunity to learn more about impressive achievements in CFD.

Over the past decades, NASA's earth-orbiting satellites and solar system spacecraft have been actively collecting large amounts of data. The session **Innovative HPC Applications at NASA in Earth & Space Science** will focus on three different NASA projects that are very actively using high-performance computing resources.

Since the advent of the first "supercomputers", the simulation of the atmosphere and the oceans has played a mutually beneficial role in the development of more powerful computing capabilities. The session **Supercomputers for Modeling the Climate & the Roles of Energy Production in Climate Change** will concentrate on the HPC-enabled simulation of global warming.

The workshop **Reflections on the History of Computing** will look back to the beginnings of computing and reflect the revolutionary developments in computer science. Internationally well-known speakers will present their views of the evolution of the microprocessors, the developments in computer graphics and software engineering and considered the breakthroughs of the Internet.

2010: New and Established HPC Markets

As a consequence of globalization, also emerging countries like China, the Middle-East and Russia will have to look increasingly to the application of supercomputers in order to stay competitive. The session **Evolving New HPC Markets: China, Middle East & Russia** will give representatives of the aforementioned regions the opportunity to present the situation of the market for HPC in their regions in detail.

In Europe, the USA and Japan, the application of supercomputers has become a must in science and in industry. The session **Current HPC Projects in Europe, Japan & USA** aims to illustrate the newest and most interesting HPC projects from these regions to a broad audience in a comprehensible manner.