Vol.2010-AL-132 No.7
2010/11/19

# 第12回　IEEE High Performance Computing and Communications国際会議参加報告（アルゴリズム編）

趙　　来平[†1]　　櫻井　　幸一[†2]

本稿では2010年9月1日から9月3日の間、オーストラリアメルボルンで開催された第12回HPCC 2010 (IEEE High Performance Computing and Communications) のアルゴリズムに関して報告する。

# Report on the 12th IEEE International Conference on High Performance Computing and Communications (HPCC2010)

Laiping Zhao [†1] and Kouichi Sakurai[†2]

This paper reports on the IEEE International Conference on High Performance Computing and Communications (HPCC2010) held during Sep. 1-3 in Melbourne, Australia. We first introduce the basic information of this conference such as purpose, history, organizers, etc. And then we introduce several accepted papers in the fields of algorithms.

## 1. Introduction

As a speaker, I attended the 12th IEEE International Conference on High Performance Computing and Communications[1)] held at the CROWN conference center, Melbourne, Australia from Sep. 1 to 3, 2010. In this paper, I make this introduction to this conference.

†1 PH.D. candidate, Department of Informatics, Kyushu University
zlp@itslab.csce.kyushu-u.ac.jp.
†2 Professor, Department of Informatics, Kyushu University
sakurai@inf.kyushu-u.ac.jp.

### 1.1 History of HPCC

IEEE International Conference on High Performance Computing and Communications is sponsored by the IEEE, IEEE computer society, and IEEE CS Technical Committee on Scalable Computing. HPCC has been held successfully for 12 times. IEEE HPCC-10 is the next event in a series of highly successful International Conferences on High Performance Computing and Communications (HPCC),previously held as HPCC-09 (Seoul, Korea, June 2009), HPCC-08 (DaLian, China, September 2008), HPCC-07 (Houston, USA, September 2007), HPCC-06 (Munich, Germany, September 2006), HPCC-05 (Naples, Italy, September 2005), HPCN-04 (Tokyo, Japan, December 2004), PACT-SHPSEC03 (New Orleans, USA, September 2003), PACT-SHPSEC02 (Charlottesville, USA, September 2002), HPCA-01 (Nova Scotia, Canada, November 2001), HPNCA-00(Delft, The Netherlands, May 2000), HPNCA-99 (Amsterdam, The Netherlands, April 1999).

### 1.2 About HPCC2010

IEEE HPCC10 is the 12th edition of the highly successful International Conference on High Performance and Communications (HPCC). It provides a forum for engineers and scientists in academia, industry, and government to address the resulting profound challenges and to present and discuss their new ideas, research results, applications and experience on all aspects of high performance computing and communications. IEEE HPCC-10 is sponsored by IEEE, IEEE Computer Society, and IEEE Technical Committee on Scalable Computing.

## 2. Keynote Speeches of HPCC2010

### 2.1 Big Science on DEISA and PRACE - A European HPC Ecosystem

*Professor Wolfgang Gentzsch*[2)] is Dissemination Advisor for the DEISA Distributed European Infrastructure for Supercomputing Applications[4)], and Member at Large of the Board of Directors of the Open Grid Forum[5)]. Until recently, he was an adjunct professor of computer science at Duke University in Durham, and a visiting scien-



© 2010 Information Processing Society of Japan

表 1 History of HPCC

| HPCC | Time | Place | Acceptance ratio |
|---|---|---|---|
| HPCC2010 | Sep. 1-3 | Melbourne, Australia | 19%(58/304) |
| HPCC2009 | Sep. 25-27 | Seoul, Korea | 21.6%(54/249) |
| HPCC2008 | Sep. 25-27 | DaLian,China | 19.8%(90/455) |
| HPCC2007 | Sep. 26-28 | Houston, USA | |
| HPCC2006 | Sep. 13-15 | Munich, Germany | 29% |
| HPCC2005 | Sep. 21-23 | Sorrento, Italy | 30%(116/387) |

tist at RENCI Renaissance Computing Institute at UNC Chapel Hill, both in North Carolina.

Computational sciences have advanced dramatically, due to ever faster and better computers, numerical algorithms, and software tools. But the better the technologies we build the more demanding our scientific applications. While the need for challenging high performance computing simulations only 5 years ago was in the order of a few teraflop/s, today we see requirements from engineers and scientists approaching petaflop/s performance, with the aim to further reduce job runtime and increase accuracy and insight.

Today, the computational foundation of these scientific grand challenges are compute clusters, and grid and cloud infrastructures. The contribution will examine these e-Infrastructures and, as two examples, present the DEISA Distributed European Infrastructure for Supercomputing Applications and the PRACE Partnership for Advanced Computing in Europe, He describe the DEISA system architecture and the service layers, the production environment, the UNICORE access infrastructure, the distributed user management and administration, all together forming a virtual European supercomputer center.

Finally, this talk presents a few results from science projects successfully run on DEISA and PRACE HPC systems, and a list of lessons learned and recommendations.

### 2.2 HPCC with Grids and Clouds

*Professor Geoffrey Charles Fox*[3] received a Ph.D. in Theoretical Physics from Cambridge University and is now professor of Informatics and Computing, and Physics at Indiana University where he is director of the Digital Science Center and Associate Dean for Research and Graduate Studies at the School of Informatics and Computing. He previously held positions at Caltech, Syracuse University and Florida State University. He has supervised the PhD of 61 students and published over 600 papers in physics and computer science. He currently works in applying computer science to Bioinformatics, Defense, Earthquake and Ice-sheet Science, Particle Physics and Chemical Informatics. He is principal investigator of FutureGrid, a new facility to enable development of new approaches to computing. He is involved in several projects to enhance the capabilities of Minority Serving Institutions.

This presentation discussed the impact of clouds and grid technology on HPCC using examples from a variety of fields – especially the life sciences. The talk covers the impact of the growing importance of data analysis and note that it is more suitable for these modern architectures than the large simulations (particle dynamics and partial differential equation solution) that are mainstream use of large scale "massively parallel" supercomputers. The importance of grids is seen in the support of distributed data collection and archiving while clouds should replace grids for the large scale analysis of the data.

This presentation discussed the structure of applications that will run on current clouds and use either the basic "on-demand" computing paradigm or higher level frameworks based on MapReduce and its extensions. Current MapReduce implementations run well on algorithms that are a "Map" followed by a "Reduce" but perform


© 2010 Information Processing Society of Japan

poorly on algorithms that iterate over many such phases. Several important algorithms including parallel linear algebra falls into latter class. One can define MapReduce extensions to accommodate iterative map and reduce but these have less fault tolerance than basic MapReduce. Both clouds and exascale computing suggest research into a new generation of run times that lie between MapReduce and MPI and trade-off performance, fault-tolerance and asynchronicity.

He concluded with a description of FutureGrid – a TeraGrid[6] system for prototyping new middleware and applications.

## 3. Sessions of HPCC2010

### 3.1 Session 1A: Parallel and distributed system architectures I

- Towards Online Application Cache Behaviors Identification in CMPs.
  *Xiaomin Jia, Jiang Jiang, Tianlei Zhao, Shubo Qi, Minxuan Zhang*
- Flexible Clusters for High-Performance Computing.
  *Paolo Anedda, Massimo Gaggero, Giovanni Busonera, Omar Schiaratura, Gianluigi Zanetti*
- Sim-spm: A SimpleScalar-based Simulator for Multi-level SPM Memory Hierarchy Architecture.
  *Xiaoguang Ren, Yuhua Tang, Tao Tang, Sen Ye, Huiquan Wang, Jing Zhou*
- MN-Mate: Resource Management of Manycores with DRAM and Nonvolatile Memories.
  *Kyu Ho Park, Youngwoo Park, Woomin Hwang, Ki-Woong Park*

### 3.2 Session 1B: Parallel and distributed algorithms

- Hybrid Distributed-/Shared-Memory Parallelization For Re-initializing Level Set Functions.
  *Oliver Fortmeier, H. Martin Bucker*
- Sparse Matrix Formats Evaluation and Optimization on a GPU.
  *Maxime Raphael Hugues, Serge Georges Petiton*
- Insertion Tree Phasers: Efficient and Scalable Barrier Synchronization for Fine-grained Parallelism
  *Stefan Marr, Stijn Verhaegen, Bruno De Fraine, Theo DHondt, Wolfgang De Meuter*
- A software self-organizing middleware for smart spaces based on fuzzy logic
  *Charles Gouin-Vallerand, Bessam Abdulrazak, Sylvain Giroux, Mounir Mokhtari*

### 3.3 Session 2A: Parallel and distributed system architectures II

- A Scheduling Heuristic to Handle Local and Remote Memory in Cluster Computers
  *Monica Serrano, Julio Sahuquillo, Houcine Hassan, Salvador Petit, Jose Duato*
- Adding an Expressway to Accelerate the Neighborhood Communication
  *Kai Wang, Fei Chen, Zheng Cao, Xuejun An, Ninghui Sun*
- Client Based Data Isolation of Blue Whale File System in Non-linear Edit Field
  *Liu Shi, Jingliang Zhang, Lu Xu*
- Research on Rapid Reconfiguration Platform of Dynamic Forest Growth Simulation System Based on Service Component
  *Tian-Yang Dong, Jing Fan, Li-Rong Xiong, Ying Shen, Ying Tang*
- QuickTM: A Hardware Solution to a High Performance Unbounded Transactional Memory
  *Sutirtha Sanyal, Sourav Roy*

### 3.4 Session 2B: Parallel and distributed software technologies

- Aggregation of Real-Time System Monitoring Data for Analyzing Large-Scale Parallel and Distributed Computing Environments
  *Swen Bohm, Christian Engelmann, Stephen L. Scott*
- A Generic Algorithm Template for Divide-and-conquer in Multicore Systems
  *Carlos H. Gonzalez, Basilio B. Fraguela*
- Effortless and Efficient Distributed Data-partitioning in Linear Algebra
  *Carlos de Blas Carton, Arturo Gonzalez-Escribano, Diego R. Llanos*
- MPIActor - A Multicore-Architecture Adaptive and Thread-based MPI Program Accelerator


© 2010 Information Processing Society of Japan

*Zhiqiang Liu, Kaijun Ren, Junqiang Song*

- Enhancing Muesli's Data Parallel Skeletons for Multi-Core Computer Architectures
  *Philipp Ciechanowicz, Herbert Kuchen*

### 3.5 Session 3A: Grid, cluster and cloud computing I

- Enabling GPU and Many-Core Systems in Heterogeneous HPC Environments Using Memory Considerations
  *Francesc Guim, Ivan Rodero, Julita Corbalan, Manish Parashar*
- ASAAS: Application Software as a Service for High Performance Cloud Computing
  *Zhengxiong Hou, Xingshe Zhou, Jianhua Gu, Yunlan Wang, Tianhai Zhao*
- The User-level Remote Swap Library
  *Martin Rehr, Brian Vinter*
- An Effective Scheduling Method for More Reliable Execution on Desktop Grids
  *Ju-Ho Hyun*

### 3.6 Session 3B: Performance evaluation and measurement I

- Extraction of Parallel Application Signatures for Performance Prediction
  *Alvaro Wong, Dolores Rexachs, Emilio Luque*
- A Novel Memory Subsystem Evaluation Framework for Chip Multiprocessors
  *Fucen Zeng, Lin Qiao, Mingliang Liu, Zhizhong Tang*
- K-model: A New Computational Model for Stream Processors
  *Gabriele Capannini, Fabrizio Silvestri, Ranieri Baraglia*
- Developing a Parameterized Performance Proxy for Sequential Scientific Kernels
  *Hongzhang Shan, Erich Strohmaier*

### 3.7 Session 4A: Grid, cluster and cloud computing II

- Managing Peak Loads by Leasing Cloud Infrastructure Services from a Spot Market
  *Michael Mattess, Christian Vecchiola, Rajkumar Buyya*
- Firewall Traversal in the Grid Architecture
  *Jefferson Tan, David Abramson, Colin Enticott*
- Resource Load Based Stochastic DAGs Scheduling Mechanism for Grid Environment
  *Fang Dong, Junzhou Luo, Aibo Song, Jiahui Jin*
- An Adaptive Remote Paging System on Computational Grids
  *Tyng-Yeu Liang, Po-Jen Lo, Min-Jyun Chen, Ti-Hsin Wang, Jyh-Biau Chang*
- Virtual Application Appliances in Practice: Basic Mechanisms and Overheads
  *Erkan Unal, Paul Lu*

### 3.8 Session 4B: Performance evaluation and measurement II

- Evaluation of the Task Programming Model in the Parallelization of Wavefront Problems
  *Antonio J. Dios, Rafael Asenjo, Angeles Navarro, Francisco Corbera, Emilio L. Zapata*
- Performance Analysis of Scientific and Engineering Applications Using MPInside and TAU
  *Subhash Saini, Piyush Mehrotra, Kenichi Taylor, Sameer Shende, Rupak Biswas*
- Analyzing & Modeling the Performance in Xen-based Virtual Cluster *Kejiang Ye, Xiaohong Jiang, Siding Chen, Dawei Huang, Bei Wang*

### 3.9 Session 4G: Security, privacy, reliability and fault-tolerance

- A Flexible and Cost-effective File-wise Reliability Scheme for Storage Systems
  *Tzer-Ta Tseng, Yarsun Hsu*
- **Fault-Tolerant Scheduling with Dynamic Number of Replicas in Heterogeneous Systems**
  ***Laiping Zhao, Yizhi Ren, Yang Xiang, Kouichi Sakurai***
- Improving Energy Efficiency and Security for Disk Systems
  *Shu Yin, Mohammed I. Alghamdi, Xiaojun Ruan, Mais Nijim, Ashwin Tamilarasan, Ziliang Zong, Xiao Qin, Yiming Yang*
- A CellBE-based HPC application for the analysis of vulnerabilities in cryptographic hash functions


© 2010 Information Processing Society of Japan

*Alessandro Cilardo, Luigi Esposito, Antonio Veniero, Antonino Mazzeo, Vicenc Beltran, Eduard Ayguade*

- The Design and Implementation of Standards-based Grid Single Sign-on Using Federated Identity
  *Weizhong Qiang, Aleksandr Konstantinov*

### 3.10 Session 5A: High-performance scientific and engineering computing

- Option Pricing on the GPU
  *Steven Solomon, Ruppa K. Thulasiram, Parimala Thulasiraman*
- Exploiting Parallelism in Iterative Irregular Maxflow Computations on GPU Accelerators
  *Steven Solomon, Parimala Thulasiraman, Ruppa K. Thulasiram*
- Iterative SLE Solvers over a CPU-GPU Platform
  *Alecio Pedro Delazari Binotto, Christian Daniel, Daniel Weber, Arjan Kuijper, Andr Stork, Carlos Eduardo, Pereira, Dieter Fellner*
- Multiple Biological Sequence Alignment with a Parallel Island Injection Genetic Algorithm
  *Lidia Araujo Miranda, Marcos Fagundes Caetano, Alba Cristina Magalhaes Alves de Melo, Jan Mendonc Correa, Jacir Luiz Bordim*

### 3.11 Session 5B: Network protocols, routing, algorithms I

- Constructing a CDS-Based Network Backbone for Energy Efficiency in Industrial Wireless Sensor Networks
  *Sajid Hussain, Mubashsharul Shafique, Laurence Yang*
- Distinguishing the Cause of TCP Retransmission Timeouts in Multi-hop Wireless Networks
  *Mi-Young Park, Sang-Hwa Chung*
- Providing QoS Guarantees in Large-scale Operator Networks
  *Stamatia Rizou, Frank Drr, Kurt Rothermel*
- Monitoring Underwater Pipelines Using Sensor Networks
  *Nader Mohamed, Imad Jawhar, Jameela Al-Jaroodi, Liren Zhang*

### 3.12 Session 6A: Mobile computing and wireless communications

- Tree-based Adaptive Broadcasting of Bandwidth Allocation for Vehicle Ad Hoc Networks
  *Gwo-Jiun Horng, Chi-Hsuan Wang, Sheng-Tzong Cheng, Chih-Wei Hsu, Sheng-Fu Su*
- Efficient Utilization of WLAN Networks in the Next-Generation Heterogeneous Environments
  *Ammar Haider, Iqbal Gondal, Joarder Kamruzzaman, Bin Qiu*
- BF-SD-ZRP: A Smart Integrated Scheme for Service and Route Discovery in Mobile Ad Hoc Network
  *Fatma Outay, Florent Kaisser, Veronique Veque, Ridha Bouallegue*
- Call Admission Control Scheme for the IEEE 802.16e at Vehicular Speeds
  *Iftekhar Ahmad, Daryoush Habibi*
- Markov Modelling of the IEEE 802.11 DCF for Real-time Applications with Periodic Traffic
  *Guosong Tian, Yu-Chu Tian*

### 3.13 Session 6B: Network protocols, routing, algorithms II

- A Feasible Localization Algorithm for Wireless Sensor Networks Using Directional Antenna
  *Baoli Zhang, Fengqi Yu*
- X-Network: An Area-Efficient and High-Performance On-Chip Wormhole-Switching Network
  *Xiaofang Wang, Leeladhar Bandi*
- On Problem for Aggregate Node Selection for Unstructured Overlay Networks
  *Imran Rao*
- Coexistence Mechanism for Industrial Automation Network
  *Muhammad Farrukh Yaqub, Iqbal Gondal, Joarder Kamruzzaman*
- A Distributed Slot Assignment Algorithm with Minimum Jitter and Delay Guarantee for Real Time Applications for Wireless Sensor Networks


© 2010 Information Processing Society of Japan

*Li Qiang Tao, Feng Qi Yu*

## 4. Paper Introduction(Algorithm)

### 4.1 An Effective Scheduling Method for More Reliable Execution on Desktop Grids

*Authors*: Ju-Ho Hyun

A desktop grid, which is a computing grid composed of idle computing resources in a large network of desktop computers, is a promising platform for compute-intensive distributed computing applications. However, due to volatility of computing resources, effective scheduling for reliable execution of parallel computing applications on such a platform is a difficult problem. This paper proposes a new scheduling method aimed at reducing cases of task suspension and failure for more reliable execution of tasks as well as improving the total execution time of a parallel application on a desktop grid. The proposed method is based on utilizing the histories of execution behavior of individual computing nodes in the scheduling algorithm. In order to test out the feasibility of this idea, execution trace data were collected from several desktops and workstations. Then, based on this data, the execution of parallel applications consisting of independent tasks was simulated using trace-driven simulation. The simulation results showed that the proposed method reduced instances of application suspension and failure significantly when compared to FCFS by 52% and 78% on average, respectively. In addition, the total execution time of the target applications was also improved in most simulations when compared to previous desktop grid scheduling methods.

### 4.2 Resource Load based Stochastic DAGs Scheduling Mechanism for Grid Environment

*Authors*: Fang Dong, Junzhou Luo, Aibo Song, Jiahui Jin

The dynamic feature is one of the most important differences between Grid and traditional heterogeneous distributed systems, thus the most significant challenge for task scheduling in Grid environment is how to relieve the resource performance dynamism effectively. However, the existing schedule algorithms usually suppose that computation or communication times are deterministic and static, thus they will lead to bad performance in the practical Grid environment. To address this problem, a mechanism which is used to estimate the probability distribution of task execution time based on resource load is proposed. And then a Resource Load based Stochastic DAGs Scheduling algorithm for Grid environments is introduced. The simulation results show that our mechanism can achieve a significant improvement in several metrics (such as normalized real schedule length) and can relieve the influence brought by the dynamic nature of Grid effectively.

### 4.3 A scheduling heuristic to handle local and remote memory in cluster computers

*Authors*: Monica Serrano, Julio Sahuquillo, Houcine Hassan, Salvador Petit, and Jose Duato

In cluster computers, RAM memory is spread among the motherboards hosting the running applications. In these systems, it is common to constrain the memory address space of a given processor to the local motherboard. Constraining the system in this way is much cheaper than using a full fledged shared memory implementation among motherboards. However, in this case, memory usage might widely differ among motherboards depending on the memory requirements of the applications running on each motherboard. In this context, if an application requires a huge quantity of RAM memory, the only feasible solution is to increase the amount of available memory in its local motherboard, even if the remaining ones are underused. Nevertheless, beyond a certain memory size, this memory budget increase becomes prohibitive. In this paper, the authors assume that the Remote Memory Access hardware used in a HyperTransport based system allows applications to allocate the required memory from remote motherboards. They also analyze how the distribution of memory accesses among different memory locations (local or remote) impact on performance. Finally, an heuristic is devised to schedule local and remote memory among applications according to their requirements, and considering quality of service constraints.


© 2010 Information Processing Society of Japan

### 4.4 Fault-Tolerant Scheduling with Dynamic Number of Replicas in Heterogeneous Systems

*Authors*: Laiping Zhao, Yizhi Ren, Yang Xiang, and Kouichi Sakurai

In the existing studies on fault-tolerant scheduling, the active replication schema makes use of $t+1$ replicas for each task to tolerate $t$ failures. However, this paper shows that it does not always lead to a higher reliability with more replicas. Besides, the more replicas implies more resource consumption and higher economic cost. To address this problem, with the target to satisfy the users reliability requirement with minimum resources, this paper proposes a new fault tolerant scheduling algorithm: MaxRe. In the algorithm, the authors incorporate the reliability analysis into the active replication schema, and exploit a dynamic number of replicas for different tasks. Both the theoretical analysis and experiments prove that the MaxRe algorithms schedule can certainly satisfy users reliability requirements. And the MaxRe scheduling algorithm can achieve the corresponding reliability with at most 70% fewer resources than the FTSA algorithm.

### 4.5 A Feasible Localization Algorithm for Wireless Sensor Networks Using Directional Antenna

*Authors*: Baoli Zhang, Fengqi Yu

Recent years, directional antenna has been extensively used in designing protocols for wireless sensor networks. It provides many advantages over classical omni-directional antenna, such as increased spatial reuse ratio and reduced energy consumption. In wireless sensor networks, location estimation is necessary for sensor nodes to provide meaningful information about their surrounding environment. Numerous localization schemes using anchor nodes equipped with low gain omnidirectional antenna have been proposed. Since the omnidirectional antenna radiate energy in all directions, wanted signal is easily interfered with wide range of environment noise, leading to big localization error. In contrast, a directional antenna concentrates its energy in a particular direction. The reduction in interference of surrounding sensor nodes increases localization accuracy. This paper tackles the problems in estimating location of randomly deployed sensor nodes with a low gain omni-directional antenna. And propose a novel localization scheme using a mobile anchor node equipped with a directional antenna. The localization scheme is verified by OPNET simulation software. The result shows that the proposed localization algorithm has higher accuracy and energy efficiency than other localization schemes.

### 4.6 Hybrid Distributed-/Shared-Memory Parallelization For Re-Initializing Level Set Functions

*Authors*: Oliver Fortmeier, H. Martin Bucker

The ever-increasing power of high-performance computers and advances in numerical techniques make possible the realistic study of two-phase flow problems in three spatial dimensions. Unfortunately, today, there is often still a gap between the design of numerical algorithms and the characteristics of the hardware on which the algorithms are executed. For the solution of a particular subproblem of a two-phase flow problem, this paper develop a numerical algorithm that aims to match the architecture of a cluster of nodes with multi-core chips. The algorithm is concerned with the re-initialization of level set function used to keep track of the interface between two phases of a fluid. It consists of a hybrid MPI/OpenMP parallelization strategy, using a domain decomposition approach on the outermost level of parallelization. On the inner level, a parallel region handles an individual subdomain. So, a domain decomposition approach based on MPI is combined with an OpenMP approach leading to a hybrid distributed-/shared-memory parallelization. Numerical experiments show that using such a hybrid strategy scales better than a pure MPI parallelization on two different Xeonbased clusters of quad-core processors using up to 1024 cores.

### 4.7 The new trends on algorithm research in high performance computing

Through attending this conference, we summarize the new trends on algorithm research in high performance computing.

**Could related research** With the quick development on cloud computing. Cloud research has become an very hot and interesting topic for the computer science.


© 2010 Information Processing Society of Japan

The HPCC conference also reveals this trend. Such as: the paper: Managing Peak Loads by Leasing Cloud Infrastructure Services from a Spot Market, by Michael Mattess et al. paper: ASAAS: Application Software as a Service for High Performance Cloud Computing, by Zhengxiong Hou et al. and paper: Mutual Protection in a Cloud Computing Environment, by Aiiad Albeshri and William Caelli. These papers are all focusing on the cloud research. As the cloud is becoming a popular and general technology, it is expected that more and more algorithm research will concentrate on the cloud environment.

**Service related research** The cloud computing and Software as a service (SAAS) introduce a lot of services to the Internet. Therefore, there are also some algorithm research are taking the service as the objects. For example, the paper: A QoS-Aware Web Service Selection Method Based on Credibility Evaluation, by Lianyong Qi, Rutao Yang, Xuyun Zhang, Wanchun Dou, Jinjun Chen. And the panel session also talked about the service development.

**Scalable** The distributed environment is becoming much more scalable than years before. Through the top 500 supercomputers statistics[7], we find that over 50% supercomputers have 4000-8000 processors. Therefore, it is quite important to design the new scalable technologies to cope with this new challenge. Such as the paper: Failure Influence: Robustness Measure for Scalable Switch Fabric Guanghui Yang, Jianping Wu, Youjian Zhao, Shutao Sun, and the paper: Insertion Tree Phasers: Efficient and Scalable Barrier Synchronization for Fine-grained Parallelism, by Stefan Marr, Stijn Verhaegen, Bruno De Fraine, Theo D 'Hondt, Wolfgang De Meuter.

## 5. About HPCC2011

The next HPCC will be held in Banff, Canada in 2011. The detailed plan will be fixed and announced soon.

## 6. Conclusion

In this paper, we have introduced the 12th IEEE International Conference on High Performance Computing and Communications(HPCC2010). We first introduce the basic information of this conference such as purpose, history, organizers, etc. And then we introduce keynote speeches and several accepted papers in the fields of high performance computing algorithms.

## Acknowledgment

The first author of this research is supported by the governmental scholarship from China Scholarship Council. His travel to HPCC2010 is supported by the Grant of Graduate school of ISEE of Kyushu University for Supporting Students Overseas Traveling

## 参 考 文 献

1) HPCC2010, http://www.ourglocal.com/url/?url=www.anss.org.au/hpcc2010.
2) Prof. Wolfgang Gentzsch, http://de.linkedin.com/in/wolfganggentzsch.
3) Prof.Geoffrey Charles Fox, http://grids.ucs.indiana.edu/ptliupages/projects/HPJava/reports/II-CVM/root/node25.html
4) Project Distributed European Infrastructure for Supercomputing Applications (DEISA), http://www.deisa.eu/.
5) Open Grid Forum, http://www.ogf.org/.
6) Project TeraGrid, https://www.teragrid.org/.
7) Top500 supercomputers, http://www.top500.org/stats/list/35/procclass.


© 2010 Information Processing Society of Japan