

Preface

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Due to the demand for the mass distributed computing and efficient data transmission, the grid system has become an important emerging platform. Grid systems provide the ability to aggregate geographically-distributed resources into a single integrated computing platform for supporting high-performance distributed computing. Therefore, the discovery and integration of various distributed resources on Internet have become convenient and flexible in terms of the combination of grid computing and web services adopted in various grid applications. The progresses on the middleware, programming model, resource discovery and management, job scheduling, replication, and so on will be important issues in developing grid systems and their applications. Therefore, this special issue intends to foster state-of-the-art researches in the areas of Grid computing, Technologies, and Applications through a forum for novel results and solutions to solve various problems and challenges foreseen in the future.

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For organizing this special issue, we sent all the submitted papers from different countries to qualified peer reviewers. Based on the reviewing results and the suggestions of reviewers, four outstanding manuscripts were accepted to be included in this special issue.

The first paper, entitled “Efficient selection strategies towards processor reordering techniques for improving data locality in heterogeneous clusters,” is presented by Ching-Hsien Hsu and Shih-Chang Chen. This paper introduces a research model and two methods named Centralized Selection Strategy (CSS) and Distributed Selection Strategy (DSS). Their approaches derive new lists of processor logical IDs according to the characteristics of heterogeneous network under consideration for their proposed methods. Both methods provide choices of more low-cost communication schedules in grids. Moreover, they show a great performance improvement in simulation.

The second paper, entitled “A threshold-based dynamic data replication strategy,” is presented by Mohammad Bsoul, Ahmad Al-Khasawneh, Yousef Kilani and Ibrahim Obeidat. In this paper, the authors provide a dynamic replication strategy that is based on Fast Spread but superior to it in terms of total response time and total bandwidth consumption. The main idea of this strategy is using a threshold to determine whether the requested replica needs to be copied to the node or not. This is achieved by storing only the important replicas on the storage of the node. The simulation results show that the proposed strategy achieves better performance compared with that of Fast Spread with Least Recently Used (LRU), and Fast Spread with Least Frequently Used (LFU).

The third paper, entitled “Improving grid performance through processor allocation considering both speed heterogeneity and resource fragmentation,” is presented by Po-Chi Shih, Kuo-Chan Huang and Yeh-Ching Chung. This paper presents several intelligent processor allocating methods to improve system performance in heterogeneous grid environments. The authors analyze the relative strength of existing allocation methods and present three different approaches to dynamically switch allocating decision based on current workload and resource conditions. The authors also conduct some extensive simulation studies to evaluate the proposed methods and the experimental results.

The fourth paper, entitled “A scientific data extraction architecture using classified metadata,” is presented by Yue-Shan Chang and Hsiang-Tai Cheng. In this paper, a scientific data extraction architecture based on the assistance of metadata classification mechanism is proposed. Currently, the architecture is applied to the Argo project for constructing an Argo data extraction system, which is built by utilizing mediator/wrapper, to help oceanographer to analyze the ocean’s ecology by means of temperature, salinity and other information. The authors also conducted many experiments; the results of performance evaluation show that the architecture with the help of metadata classification can extract user’s desired data effectively and efficiently.

We thank all the authors for their outstanding contributions. We would also like to thank the Editor-in-Chief of the *Journal of Supercomputing* for his kind encouragement and invaluable support during the preparation of this special issue. We also want to express our deepest gratitude to all the anonymous reviewers who devoted much

of their precious time to review all the papers. Their timely reviews greatly helped us in selecting the best papers for this special issue. Finally, we hope that you will enjoy reading these selected papers as we did and you will find this issue informative and helpful in keeping yourselves up-to-date in the fast changing field of the grid computing.