## Editorial

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**Biographical notes:** Yue-Shan Chang received his PhD Degree in Computer and Information Science from the National Chiao Tung University in 2001. Since August 2001, he had been an Associate Professor. In August 2004, he joined the Department of Computer Science and Information Engineering, National Taipei University. He has published more than 60 scientific papers in refereed journals and conferences. He has also served as PC member for a number of conferences, e.g., ICA3PP 2010, GridCat2009, 2C-Com 09, HPC Asia conference 2009, etc. His research interests are in distributed systems, object oriented programming, information retrieval, and integration, mobile computing and grid computing.

Chao-Tung Yang is a Professor of Computer Science at Tunghai University in Taichung, Taiwan. He received PhD Degree in Computer Science from National Chiao Tung University, Hsinchu, Taiwan, 1996. In August 2001, he joined the Faculty of the Department of Computer Science at Tunghai University. He got the excellent research award by Tunghai University in 2007. From 2007 to 2009, he got two Golden Penguin Awards and one Open Source Award by Industrial Development Bureau, Ministry of Economic Affairs, Taiwan. His present research interests are in grid and cloud computing, parallel and multi-core computing, and Web-based applications. He is both a member of the IEEE Computer Society and ACM. He is a board member of Taiwan Association on Cloud Computing (TACC).

Cho-Li Wang received his BS Degree in Computer Science and Information Engineering from the National Taiwan University in 1985. He received his MS and PhD Degrees in Computer Engineering from the University of Southern California in 1990 and 1995, respectively. He is currently affiliated with the Department of Computer Science at The University of Hong Kong. His research interests include computer architecture, operating systems, parallel and distributed computing (cluster, grid, and pervasive systems). He is an Editorial Board member of *IEEE Transactions on Computers, Multiagent and Grid Systems, International Journal of Pervasive Computing and Communications*, and *Journal of Information Science and Engineering*. He is also the regional coordinator (Hong Kong) of IEEE Technical Committee on Scalable Computing (TCSC).

Shyan-Ming Yuan received his BSEE Degree from National Taiwan University in 1981, his MS Degree in Computer Science from the University of Maryland, Baltimore County in 1985, and his PhD Degree in Computer Science from the University of Maryland College Park in 1989. He joined the Electronics Research and Service Organisation, Industrial Technology Research Institute as a Research Member in October 1989. Since September 1990, he has been an Associate Professor at the Department of Computer and Information Science, National Chiao Tung University, Hsinchu, Taiwan. He became a Professor in June 1995. His current research interests include distributed objects, internet technologies, and distance learning.

Grid and Cloud computing are among the most popular research topics in recent years. They have been attracting increasing attention because they can integrate some of geographically distributed and heterogeneous resources into a single computing platform. Users can transparently access the resources without worrying about how many resources the platform has and where the resources will be located. Cloud computing can be seen as a natural next step from the grid-utility model. Both do necessarily need some advanced technologies, such as platform, architecture, service, resource discovery and management, job scheduling, replication, and so on, to provide transparent, secure, reliable, and efficient resource access behind the platform.

The new possibility of Grid and Cloud computing on the internet goes beyond traditional distributed computing. Therefore, the advances on the middleware, programming model and tools, components model, and standards will be important issues in developing of Grid platform and Cloud applications. Besides, a well defined model and effective economics are useful for collaborating the resources scattered over virtual organisations in the computing model. In addition, some of the valuable applications and implementation experience will drive the sustained development and success in the topics. This special issue aims to foster state-of-the-art research in the area of Grid and Cloud computing and is expected to focus on all aspects of Cloud technologies and to present novel results and solutions to solve various problems and challenges in Grid and Cloud platforms.

In this special issue, we received a lot of submissions from six countries, and then sent these submissions to 20 qualified experts for review. Finally, we decided, based on the review results and the suggestions of reviewers, to accept five outstanding manuscripts to be included into the special issue. In addition, we also selected one relevant and excellent paper from the workshop on Parallel and Distributed Computing, NCS2009 (2009 National Computer Symposium), held at National Taipei University, Taiwan, 27–28 November, 2009. This paper won the best paper award of the workshop from 46 submissions through three rigid reviews and examination phases, and then the final version was reviewed by two guest editors.

The first paper entitled 'Virtual Data System on distributed virtual machines in computational grids' is by Lizhe Wang, Gregor von Laszewski, Jie Tao and Marcel Kunze. This paper presents the work on building a Grid workflow system on distributed virtual machines. A Grid Virtualisation Engine is implemented to manage virtual machines as computing resources for Grid applications. This paper designs and implements the Virtual Data System on distributed virtual machines, which is enabled by the Grid Virtualisation Engine.

The second paper entitled 'A novel parallel algorithm for frequent pattern mining with privacy preserved in cloud computing environments' that is presented by Kawuu W. Lin and Der-Jiunn Deng. As is well known, the data mining techniques are used to discover the hidden useful information from large databases. As the size of the database increases, however, the computation time and the required memory increase sharply. In the paper, the authors propose a set of algorithms to speed up the mining process in Cloud computing environments. In addition, unlike the existing parallel algorithms that need to distribute an entire database or part of the database directly to cloud nodes, the proposed method is able to preserve the data privacy and, therefore, can be applied to sensitive domains like health-care.

The third paper, entitled 'Predicting vertebrate promoters using heterogeneous clusters' presented by Fang-Yie Leu, Lun-Ni Yang, Neng-Wen Lo and I-Long Lin, proposes an application system on heterogeneous cluster environments, named the Vertebrate Promoter Prediction System (VePPS), which employs a new statistics-based approach to predict vertebrate promoters, and cluster systems to analyse a putative promoter sequence by investigating the presence of short promoter-specific sequences and known transcription factor binding sites. In comparison with other prediction programmes, the proposed system, VePPS, outperformed, e.g., promoter 2.0, by 38.0% and 12.7% in predicting promoter and non-promoter sequences, respectively.

In the fourth paper, a middleware on a heterogeneous grid platform for achieving interoperability entitled 'DockFlow: Achieving interoperability of protein docking tools across heterogeneous Grid middleware' is proposed by Nabeel Azam, Moustafa Ghanem, Dimitrios Kalaitzopoulos, Antje Wolf, Vinod Kasam, Yongjian Wang and Martin Hofmann-Apitius. As well known, enabling the seamless integration between applications executing on heterogeneous Grid middleware will pose a number of challenges to both application scientists and middleware developers. The authors highlight some of these challenges in the context of designing and

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implementing the middleware DockFlow. DockFlow is a virtual screening environment integrating four Grid-based protein docking tools that execute on different Grid middleware technologies at different locations. The authors propose extensions that can be applied to any Grid-based workflow system to support the runtime interoperability between the available tools. The extensions are generic, with an example which describes how they have been implemented in the InforSense workflow system. In the paper the authors also conduct some experiments to evaluate the tradeoffs between performance and the usability of the proposed methods.

The fifth paper entitled 'CloudEdge: a content delivery system for storage service in cloud environment' is produced by Chi-Huang Chiu, Hsien-Tang Lin and Shyan-Ming Yuan. In the paper, a novel architecture called CloudEdge for content delivery networks with the storage service in Cloud computing is introduced. This architecture provides better content manipulation features than storage services in a Cloud environment such as edge network content delivery, caching, secured access control, the variations of content objects generated on demand, and post-process on content objects. The architecture could be leveraged in various kinds of web applications to manage all kinds of content like photo, audio, and video.

The final one entitled 'A Two-Level Scheduling Strategy for optimising communications of data parallel programs in clusters' is made by Ching-Hsien Hsu and Shih-Chang Chen. This paper is selected from the best paper in the workshop on Parallel and Distributed Computing, NCS2009, held at National Taipei University. Many researches in the last decade reveal that irregular array redistribution has been paid attention recently since it can distribute different size of data segment to heterogeneous processors. High Performance Fortran Version 2 (HPF2) provides GEN BLOCK distribution format which facilitates generalised block distributions. In this paper, a two-level is proposed to minimise scheduling method the communication cost in such operations. The proposed technique isolates local messages to avoid synchronisation delay. The authors also conducted many experiments and the results show that the proposed technique works well and yields improved schedules for heterogeneous processors environments.

We thank all the authors for their outstanding contributions. We would also like to thank Prof. Yuh-Shyan Chen and Prof. Han-Chieh Chao, the Editor-in-Chief of the *International Journal of Ad Hoc and Ubiquitous Computing (IJAHUC)* for their 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 included in the special issue.

Finally, we hope 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 and Cloud era".