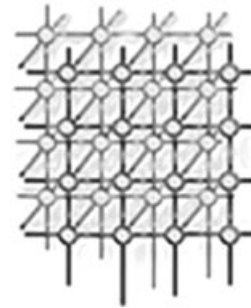


EDITORIAL

Special issue: second international workshop on workflow management in service and cloud computing (WMSC2010)

This special issue of *Concurrency and Computation: Practice and Experience* contains selected high-quality papers from the Second International Workshop on Workflow Management in Service and Cloud Computing (WMSC2010) that was held on 11–13 December 2010 in Hong Kong [1]. The WMSC workshop series aims to provide an international forum for the presentation and discussion of research and development trends regarding workflow support in service and cloud environments. WMSC2010 attracted many international attendants, allowing deep discussion and the exchange of ideas and results related to ongoing research among attendants. Following ICWM2009 on 4 May 2009 in Geneva, Switzerland, WaGe2008 on 25 May 2008 in Kunming China and WaGe2007 on 17 August 2007 in Urumqi China; WMSC2010 continues to discuss workflow management in service and cloud environments from different perspectives and areas in order to tackle different potentials for further research and development.

Workflow management in distributed computing environments has been under investigation for several years [2–8]. In particular, the special issue titled *Workflow in Grid Systems in Concurrency and Computation: Practice and Experience* was a key step [7]. The special issue was edited by Professor Geoffrey C. Fox and Professor Dennis Gannon from Indiana University in USA. A follow-up were the special issues in the same journal for WSGE2006 (first International Workshop on Workflow Systems in Grid Environments), WaGe2007, WaGe2008 and ICWM2009 [9–12]. This WMSC2010 special issue is another follow-up of those special issues in order to further boost the research and development of workflow management and applications.

Many research and development efforts have been made in the field of workflow management and applications in distributed service and cloud environments such as [2–8, 13–21]. More and more people from different areas are trying to facilitate the techniques from their respective areas to tackle tough issues in workflow management such as resource scheduling, security, computation reduction, service discovery and composition and data service query issues. Following the special issue of ICWM2009, this special issue continues to accommodate a range of papers from different perspectives and areas such as service computing, cloud computing, authentication/security in order to provide some different views and hints for workflow management research.

This special issue contains nine papers based on those that were presented at WMSC2010. They are listed as [22–30]. Research problems in these papers have been analysed systematically, and for specific approaches or models, evaluation has been performed to demonstrate their feasibility and advantages. The nine papers were selected on this basis and also peer reviewed thoroughly. They are summarised in the succeeding text.

This paper [22] is a workflow scheduling in dynamic grid environment. The paper defines the workflow scheduling problem and describes the existing heuristic and meta-heuristic-based workflow scheduling strategies in Grids. Then, we propose a dynamic critical path-based adaptive workflow scheduling algorithm for Grids, which determines efficient mapping of workflow tasks to Grid resources dynamically by calculating the critical path in the workflow task graph at every step. Corresponding evaluation is conducted to demonstrate the performance.

This paper [23] is about service discovery in elastic cloud computing environment. A QoS-aware service discovery method is investigated for elastic cloud computing in an unstructured P2P network. The method is deployed by two phases, that is, service registering phase and service discovery phase. More specifically, for a peer node engaged in the unstructured P2P network, it firstly registers its

functional and non-functional information to its neighbours in a flooding way. The simulations are conducted to evaluate the feasibility of our method.

This paper [24] is about service-oriented business ecosystem (SOBE). It presents BSNet, a model based on the service correlation networks to manage the SOBE. The model consists of a who–what–how service correlation network that captures the various relations in SOBE. Finally, a prototyping system has been developed to demonstrate the value of this model for business service management and a simulation-based case study is also provided.

This paper [25] proposes the concept of graph refactoring, which transforms certain types of sequential tasks to run in parallel without changing the system's functionality. Experiments and analysis show that graph refactoring can improve the system performance scalable because of concurrent execution of previously sequential tasks.

This paper [26] proposes a novel Virtual Organization (VO) creating algorithm (called Group-Choose) based on reputation system that can help initiator to minimise the operating risk and guarantee the success on Internet. In our model, a VO initiator aggregate selected partner's trust to find more appropriate new partners for VO, instead of evaluating their trust by himself only. Simulation results illustrate that VO creating with Group-Choose has more stable and higher success rates for tasks workflow executing under various kind attacks.

This paper [27] proposes a service correlation context aware for composite service selection approach is proposed in this paper. Referring to the concept of 'single-entry single-exit (SESE) region' in compiler theory, the paper proposes the concept of 'SESE pattern' and uses it in composite service selection. Experimental results demonstrate that the approach can improve the quality of selected composite services effectively in the correlation context.

This paper [28] proposes an approach to mine batch processing workflow models from event logs by considering the batch processing relations among activity instances in multiple workflow cases. The notion of batch processing feature and its corresponding mining algorithm are also presented for discovering the batch processing area in the model by using the input and output data information of activity instances in events. The algorithms presented in this paper can help to enhance the applicability of existing process mining approaches and broaden the process mining spectrum.

This paper [29] proposes an event view model in order to better support service process collaboration. The model is composed of a set of event types and their dependency relationships. It provides a general and flexible way to define a public view of a service process model and serves as the basis for defining service process collaboration protocols. A case study is presented and some implementation issues for defining and publishing an event view are discussed.

This paper [30] is about encrypted database query in service cloud environment. The paper proposes a nonlinear order-preserving scheme for indexing encrypted data, which facilitates the range queries over encrypted databases. The scheme is secure even there are a large number of duplicates in plaintexts. This scheme is suitable for long-standing databases because its use does not need any assumption on the database data such as their distribution, range and number, which may change dramatically over time.

REFERENCES

1. WMSC2010 Web site. <http://www.swinflow.org/confs/wmsc/wmsc2010.htm>.
2. Yuan D., Yang Y., Liu X., Chen J. On-demand minimum cost benchmarking for intermediate datasets storage in scientific cloud workflow systems. *Journal of Parallel and Distributed Computing* 2011; **71**(2): 316–332.
3. Zhang G., Yang Y., Chen J. A historical probability based noise generation strategy for privacy protection in cloud computing. *Journal of Computer and System Sciences* 2012; **78**(5): 1374–1381.
4. Cybok D.. A grid workflow infrastructure. *Concurrency and Computation: Practice and Experience*, Special Issue on Workflow in Grid Systems 2006; **18**(10): 1243–1254.
5. Qi L., Dou W., Zhang X., Chen J. A QoS-aware composition method supporting cross-platform service invocation in cloud environment. *Journal of Computer and System Sciences* 2012; **78**(5): 1316–1329.
6. Deelman E, Blythe J, Gil Y, Kesselman C, Mehta G, Vahi K. Mapping abstract complex workflows onto grid environments. *Journal of Grid Computing* 2003; **1**(1): 9–23.
7. Fox G.C., Gannon D. Editorial of special issue on workflow in grid systems. *Concurrency and Computation: Practice and Experience* 2006; **18**(10): 1009–1019.
8. Cafaro M., Epicoco I., Mirto M., Lezzi D., Aloisio G. The grid resource broker workflow engine. *Concurrency and Computation: Practice and Experience* 2008; **20**(15): 1725–1739.

9. Chen J., Rana O.F. Editorial of special issue for 1st international workshop on workflow systems in grid environments (WSGE2006). *Concurrency and Computation: Practice and Experience* 2008, **20**(4): 311–313.
10. Chen J., Lee Y. Editorial of special issue for 2nd international workshop on workflow management and applications in grid environments (WaGe2007). *Concurrency and Computation: Practice and Experience* 2008, **20**(15): 1721–1723.
11. Chen J., Cafaro M. Editorial of special issue for 3rd international workshop on workflow management and applications in grid environments (WaGe2008), *Concurrency and Computation: Practice and Experience* 2009, **21**(16): 1961–1964.
12. Chen J., Wang L.. Special issue: fourth international workshop on workflow management (ICWM2009). *Concurrency and Computation: Practice and Experience* 2011, **23**(16): 1853–1856.
13. Brandic I, Pllana S, Benkner S. Specification, planning and execution of QOS-aware grid workflows within the amadeus environment. *Concurrency and Computation: Practice and Experience* 2008, **20**(4): 331–345.
14. Rahman M, Venugopal S, Buyya R. A dynamic critical path algorithm for scheduling scientific workflow applications on global grids. *Proceedings of the 3rd IEEE International Conference on e-Science and Grid Computing (e-Science 2007)*. IEEE CS Press, Los Alamitos, CA, USA, Bangalore, India, 2007; 1–8.
15. Chen J, Yang Y. Adaptive selection of necessary and sufficient checkpoints for dynamic verification of temporal constraints in grid workflow systems. *ACM Transactions on Autonomous and Adaptive Systems* 2007, **2**(2): Article 6.
16. Churches D., Gombas G, Harrison A., Maassen J., Robinson C., Shields M., Taylor I., Wang I. Programming scientific and distributed workflow with triana services, *Concurrency and Computation: Practice and Experience* 2006, **18**(10):1021–1037.
17. Gil Y., Deelman E, Ellisman M., Fahringer T., Fox GC, Gannon D., Goble C., Livny M., Moreau L., Myers J., Examining the challenges of scientific workflows. *IEEE Computer* 2007, **40**(12): 24–32.
18. Chen J, Yang Y. Temporal dependency based checkpoint selection for dynamic verification of temporal constraints in scientific workflow systems. *ACM Transactions on Software Engineering and Methodology* 2011, **20**(3): Article 9.
19. Chen J., Yang Y. A Taxonomy of grid workflow verification and validation. *Concurrency and Computation: Practice and Experience* 2008; **20**(4): 347–360.
20. Chen, J., Yang Y. Multiple states-based temporal consistency for dynamic verification of fixed-time constraints in Grid workflow systems. *Concurrency and Computation: Practice and Experience* 2007; **19**(7): 965–982.
21. Schikuta E., Wanek H., Haq U.I. Grid workflow optimization regarding dynamically changing resources and conditions. *Concurrency and Computation: Practice and Experience* 2008; **20**(15): 1837–1849.
22. Rahman M., Hassan M.R., Ranjan R., Buyya R. Adaptive workflow scheduling for dynamic grid and cloud computing environment. *Concurrency and Computation: Practice and Experience* 2013; **25**(13): 1816–1842.
23. Lin W., Dou W., Xu Z., Chen J. A QoS-aware service discovery method for elastic cloud computing in an unstructured P2P network. *Concurrency and Computation: Practice and Experience* 2013; **25**(13): 1843–1860.
24. Huang K., Fan Y., Tan W. A network-based framework for service-oriented business ecosystem management. *Concurrency and Computation: Practice and Experience* 2013; **25**(13): 1861–1878.
25. Wang M., Wang S., Zhu L., Liao L. Trust-based workflow refactoring for concurrent scheduling in service-oriented environment. *Concurrency and Computation: Practice and Experience* 2013; **25**(13): 1879–1893.
26. Pan M., Li M., Yu Y. a group-choose model supporting VO creation for workflow deployment in cloud environment. *Concurrency and Computation: Practice and Experience* 2013; **25**(13): 1894–1908.
27. Zhang M., Liu C., Yu J., Zhu Z., Zhang B. A correlation context aware approach for composite service selection. *Concurrency and Computation: Practice and Experience* 2013; **25**(13): 1909–1927.
28. Wen Y., Chen Z., Liu J., Chen J. Mining batch processing workflow models from event logs. *Concurrency and Computation: Practice and Experience* 2013; **25**(13): 1928–1942.
29. Cao J., Wang J., Zhao H., Li M. An event view specification approach for supporting service process collaboration. *Concurrency and Computation: Practice and Experience* 2013; **25**(13): 1943–1966.
30. Liu D., Wang S. Nonlinear order preserving index for encrypted database query in service cloud environment. *Concurrency and Computation: Practice and Experience* 2013; **25**(13): 1967–1984.

JINJUN CHEN

Faculty of Engineering and IT,
University of Technology Sydney,
Broadway 2007, Sydney, Australia
E-mail: jinjun.chen@uts.edu.au

RAJIV RANJAN

CSIRO ICT Centre,
Canberra ACT 2601, Australia