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Editors' Message

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This issue of the Journal of Grid Computing is focused on Cloud Computing. Grid and cloud computing are two closely related technologies and research fields. Many authors have discussed their similarities and differences. In this short introductory message we will not repeat these analyses, but simply emphasize some of the major similarities.

Cloud and grid both aim to provide communities with access to large set of resources. Cloud computing builds on virtualization as a key technological foundation. When grid computing started, virtualization was not sufficiently mature to be a basic pillar of this technology—indeed, at least one major virtualization project, Xen, was motivated by the challenges that grid computing faced in achieving application portability. However, now that virtualization is broadly available, there is no obstacle to using it within grid systems. The similarities between the two technologies then become even more obvious.

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Another apparent difference between the two technologies is that commercial infrastructure-as-a-service providers are organized so as to provide the illusion of unlimited capacity, while in grid computing we often work to combine multiple resource providers to achieve large resource capacity. However, this difference—while important—is more one of business model than technology. Many groups are now working to integrate commercial cloud providers into grid-based computing infrastructures and applications. And when academic institutes create their own small-scale clouds and seek to share them with others, we face the federation challenges that grid technology has been designed to address, with the only difference that these sites use virtualization. Ultimately, academic cloud systems are simply grid computing enhanced with virtualization. Interestingly, federation issues are now also arising within commercial cloud computing, as consumers seek resource provider independence and integration with in-house computing infrastructures.

This special issue contains four papers directly related to cloud systems. The first, from Bhaskar Prasad Rimal et al., gives a thorough comparison of grid and cloud systems. This is a good starting point to study their difference and similarities. The second paper, by Tram Truong Huu et al., describes a framework for automating cloud resources allocation, deployment and application execution control. This work also shows many

similarities to previous grid research and developments as clearly shown in the section on related research. The third paper, by Eddy Caron et al., investigates the dynamic scaling of cloud resources. They propose a new approach to the problem of workload prediction based on identifying similar past occurrences of the current short-term workload history. The fourth paper, from Ricardo Graciani Diaz et al., investigates how large-scale scientific experiments like the Large Hadron Collider Beauty (LHCb) collaboration can make use of commercial clouds. They use the Distributed Infrastructure with Remote Agent Control (DIRAC) software framework (originally developed for the gLite grid) as the overall management tool to control both the tasks to be executed and the deployment of virtual machines using the Amazon Elastic Compute Cloud as service provider.

In closing, we express the hope that this Special Issue on Cloud Computing will help build bridges between cloud and grid computing. Computer science is sometimes criticized for being particularly prone to reinvention. We encourage other researchers to submit work on cloud computing to the Journal of Grid Computing, with the goal of expanding a dialog about how the twin forces of aggregation and federation can best be combined to advance computing and society.

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