Foreword and Editorial

International Journal of Grid and Distributed Computing

We are very happy to publish this issue of an International Journal of Grid and Distributed Computing by Science and Engineering Research Support soCiety.

This issue contains 10 articles. Achieving such a high quality of papers would have been impossible without the huge work that was undertaken by the Editorial Board members and External Reviewers. We take this opportunity to thank them for their great support and cooperation.

The paper “A Load Balancing Algorithm with Key Resource Relevance for Virtual Cluster” states that load balancing is one of key techniques in the virtual cluster system. In view of the fact that resource relevance has not been considered in the load balancing algorithm under current virtual cluster application environment, this paper proposes a load balancing algorithm with key resource relevance (RRK). Firstly, virtual resources are divided into groups by category. Then, considering the relevance between user tasks and each virtual resource group as well as the integrated load of each virtual resource group, the priorities of the tasks assigned to each virtual resource group are dynamically calculated, and thus the tasks can be assigned to the corresponding virtual resource group based on the priorities; while those tasks will be distributed depending on load values of the virtual resources and the weight values of resources needed to be consumed.

Paper “A DNA Sticker Algorithm for Parallel Reduction over Finite Field GF(2n)” proposes a DNA sticker algorithm for parallel reduction over finite field GF(2n). This algorithm is suitable for some specific finite fields defined with trinomials or pentanomials. Authors use one binary finite field GF(2163) which is recommended by National Institute of Standards and Technology (NIST) to describe the details about our algorithm. The solution space of 2325 cases could be figured out within 3059 DNA steps. This work also presents clear evidence of ability of DNA computing to perform complicated mathematic operations for elliptic curve cryptosystem over finite field GF(2n).

The paper “Implementing a Storage Pattern in the OR Mapping Framework” discusses that heading towards the next decade, a major paradigm shift has been observed in the way the software services are being provided to the enterprises and corporate sector. Corporations and enterprises are switching to www host applications being offered as a service by software vendors and on-premises LOB (Line of Business) applications are taking a toll back. SaaS (Software as a Service) is the new concept. Adapting of SaaS, however, requires that the applications which are being provided as a service should be generalized for users or groups of users and it would require a vast space to be allocated to user or user group. The users or user groups ordinarily correspond to a company or group of companies/businesses and are termed as tenants. In this regard, the architecture of SaaS applications needs to be customized to support certain characteristics — e.g., configurability, maintainability and scalability — to support high storage for hosting resources made available to diverse number of users. This paper, firstly, analyzes new trends in the present day business environment alongside the hardware and software industry that led to the development of SaaS model; and then looks
into the characteristics and features that a storage pattern for multi-tenant system in SaaS needs to possess in order to put this concept into practice.

The paper “Routing Protocols using Directional Antennas in Ad Hoc Networks: A Comparative Review” presents a discussion that directional antennas have the potential to provide a fundamental breakthrough in ad hoc network capacity. Omni-directional nature of transmission restricts the network capacity, where distribution of energy in all directions other than the intended direction of the destination node not only generated unnecessary interference to other neighboring nodes but also decreases the potential range of transmission. Directional antenna systems are increasingly being recognized as a powerful way of increasing the capacity, connectivity, and covertness of MANETs. This paper survey the state-of-the-art routing protocols and give a comparison result of them with respect to the important challenging issues.

The Authors of “Cost-aware Workload Dispatching and Server Provisioning for Distributed Cloud Data Centers” states that as the demand on online services and cloud computing has kept increasing in recent years, the power usage and cost associated with cloud data centers’ operation have been uprising significantly. Most existing research focuses on reducing power consumption of data centers. However, the ultimate goal of cloud service operators is to reduce the total operating cost of data centers while guaranteeing the quality of service such as service delay to the end users. This paper exploits both the workload dispatching and the service provisioning to address the total electricity cost minimization problem. This problem is formulated as a hierarchical capacitated median model based on mixed integer linear programming (MILP) technique.

In “Performance Evaluation of Energy Detection in Spectrum Sensing for Cascaded Multihop Networks over Nakagami-n fading channel”, the spectrum sensing is an important activity of cognitive radios over fading channels. A proper sensing performance depends upon the fading margin and number of relays within a wireless link. This paper evaluates the sensing performance of energy detector in multihop networks over Nakagami-n fading channels. The decode and forward relays are considered for the analysis because of their best performance characteristics.

In the paper “Improving MapReduce Performance by Data Prefetching in Heterogeneous or Shared Environments”, MapReduce is an effective programming model for large-scale data-intensive computing applications. Hadoop, an open-source implementation of MapReduce, has been widely used. The communication overhead from the big data sets’ transmission affects the performance of Hadoop greatly. In consideration of data locality, Hadoop schedules tasks to the nodes near the data locations preferentially to decrease data transmission overhead, which works well in homogeneous and dedicated MapReduce environments. However, due to practical considerations about cost and resource utilization, it is common to maintain heterogeneous clusters or share resources by multiple users. Unfortunately, it’s difficult to take advantage of data locality in these heterogeneous or shared environments. To improve the performance of MapReduce in heterogeneous or shared environments, a data prefetching mechanism is proposed in this paper, which can fetch the data to corresponding compute nodes in advance.

The paper “ECTP: An Enhanced Data Collection Protocol based on CTP” presents a discussion that in wireless sensor networks (WSNs), the communication radius of a single
sensor node is constrained. Thus, many-to-one and multi-hop routing protocols are designed to relay collected data back to the sink node. One of the challenges handled by present routing protocols is to prevent or reduce traffic congestion, which inevitably causes high packet drop rate, low energy efficiency, and long end-to-end delay. This paper presents an enhanced data collection protocol based on the Collection Tree Protocol (CTP), which introduces the concept of congestion detection and congestion avoidance into CTP. Authors have implemented test-bed experiments containing 10 TelosB motes, and compared results of the ECTP with the original CTP protocol and also with another enhanced CTP which takes the main mechanisms of ECODA.

The Authors of “Cloud Computing Pricing Models: A Survey” presents a discussion that Cloud computing is emerging as a promising field offering a variety of computing services to end users. These services are offered at different prices using various pricing schemes and techniques. End users will favor the service provider offering the best QoS with the lowest price. Therefore, applying a fair pricing model will attract more customers and achieve higher revenues for service providers. This work focuses on comparing many employed and proposed pricing models techniques and highlights the pros and cons of each. The comparison is based on many aspects such as fairness, pricing approach, and utilization period. Such an approach provides a solid ground for designing better models in the future.

In “Allocation of Distributed Generations Based on TSPSO Algorithm”, when the system is with DG (distributed generation), Power system structure has changed. The structure has change to complicated new model with distributed generations from traditional open network. The voltage and power losses of traditional network will be influenced by the location connected with DG, reactive power, active power and the number of DG. The purpose to connect DG is to improve reliability of the system, reduce the loss of network and reduce the cost. In order to achieve this goal, this paper analyzes the indicator of power loss and takes it as objective function. Considering the superior properties of particle swarm optimization algorithm in solving discrete values problem, the algorithm is improved by the tabu search mechanism. Authors use the TSPSO (Tabu Search mechanism Particle Swarm Optimization) algorithm to study the problems which include the positions, capacity and numbers of DGs.

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Editors of the October Issue on
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