Editorial Message: Special Track on Distributed Systems and Grid Computing

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Introduction

It is a great pleasure to welcome you to the 20th annual ACM Symposium on Applied Computing, Special Track on Distributed Systems and Grid Computing (DSGC) in beautiful Santa Fe, New Mexico, USA. The objective of the DSGC track is to provide a forum for scientists, engineers and practitioners in academia, industry and research institutes to share technical ideas, experiences and results and to present their latest findings in any aspects of Parallel, Distributed, and Grid Computing. The topics of the track emphasize the design, architecture, and software of distributed systems and grid computing environments with their scientific and engineering applications.

Statistical Information

In response to the call for papers for this special track, we received 36 paper submissions. Keeping the identities of the authors hidden, we sent the papers to external reviewers. For almost every paper, we received at least three independent reviews. After this intensive review process, we carefully ranked the papers and selected 12 high quality papers for presentation at this track and publication in the conference proceedings and we selected one high quality paper for a poster presentation. Unfortunately, many interesting papers could not be included in the program due to the limited number of sessions allocated to each track. The final program covers a wide range of topics of parallel and distributed systems, networks, and Grid computing.

Overview of the Accepted Papers

The track has been organized in three sessions: (i) Grid Computing, (ii) Distributed Systems, and (iii) Networks. Each session includes 4 papers.

The session “Grid Computing” starts with the paper “Pegasus Portal” by Gurmeet Singh et al. This paper presents a portal and planning framework for mapping abstract workflows for execution on the Grid. The portal includes components for generating abstract workflows based on a metadata description of the desired data products and application-specific services. The paper “Dynamic Scheduling of Scientific Workflow Applications on the Grid using a Modular Optimisation Tool” by Radu Prodan and Thomas Fahringer presents an approach for scheduling directed graph-based workflows in a Grid with dynamically changing computational and network resources. The paper “Replica Selection in Grid Environment: A Data-mining Approach” by Rashedur M. Rahman, Ken Barker, and Reda Alhajj describes a new optimization technique that considers both disk throughput and network latencies when selecting the best replica
among the replicated data in geographically distributed data stores. The paper “A Grid-Based Architecture for Earth Observation Data Access” by Giovanni Aloisio, Massimo Cafaro, Sandro Fiore, and Gianvito Quarta presents a Distributed Earth Observation System Information Service (DEOSIS) a distributed information service, which aims at managing and accessing EO and geospatial heterogeneous data sources, in a grid environment.

The session “Distributed Systems” includes four papers on leasing, scheduling, reliability and policy management. The opening paper “Realizing the Leasing Concept in CORBA-Based Applications” by Markus Aleksy, Axel Korthaus, and Martin Schader examines different leasing variants and describes different ways to implement these variants in CORBA, e.g. based on a specialized object adapter, a runtime library or framework, or a CORBA service. The paper “On Unit Task Linear-Nonlinear Two-Cluster Scheduling Problem” by Zhichun Xiao, Wing Ning Li, and John JingFu Jenq introduces an exact algorithm to compute an optimal schedule in $O(e + \alpha(n)n)$ time for a set of tasks modeled as a DAG when tasks are restricted to unit tasks, where $n$ is the number of nodes, $e$ is the number of edges, and $\alpha(n)$ is similar to inverse Ackerman function. The paper “Reliability in Three-Tier Systems without Application Server Coordination and Persistent Message Queues” by Francesco Quaglia and Paolo Romano introduces a fault tolerant protocol that allows maintaining safety by avoiding the additional phase of storing the client request into a persistent message queue and avoiding explicit coordination of the application server over the middle tier. The paper “Policies Translation for Integrated Management of Grids and Networks” by Ricardo Neisse et al. describes a policy translation mechanism that creates network policies given grid requirements expressed in grid policies.

The session “Networks” includes four papers on topologies, location, and clustering problems. The opening paper “the Necklace-Hypercube: A Well Scalable Hypercube-Based Interconnection Network for Multiprocessors” by Morteza Monemizadeh and Hamid Sarbazi-Azad introduces a new interconnection network based on the binary cube with an array of processors. The work addresses important operations such as optimal routing and broadcasting, and area-efficient VLSI layout in necklace-hypercubes. The paper “The Recursive Transpose-Connected Cycles (RTCC) Interconnection Network for Multiprocessors” by M. Hoseiny Farahabady and H. Sarbazi-Azad Mohammad proposes a new modular topology for interconnection networks, the Recursive Transpose-Connected Cycles (RTCC). Important properties of RTCC such as diameter, bisection width and issues related to implementation, such as routing algorithms and the average message latency under VLSI layout constraints are studied. The paper “A Solution For the Location Problem in Arbitrary Computer Networks Using Generic Dominating Sets” by Marco Aurelio Spohn and J.J. Garcia-Luna-Aceves deals with the location problem of resources in a network to accommodate client demands. The paper “Node Clustering Based on Link Delay in P2P Networks” by Wei Zheng et al. describes an approach to implement node clustering based on the link delay of node communications in the P2P network. The approach is completely distributed, in which each node only depends on its neighbors to implement node clustering.

Finally, the poster abstract “Adaptation Point Analysis for Computation Migration/Checkpointing” by anqing Ji, Hai Jiang and Vipin Chaudhary proposes a heuristic adaptation point placement algorithm to improve the computation migration/checkpointing schemes’ performance in terms of sensitivity and flexibility. This heuristic algorithm enables automatic and transparent insertion of checkpoints in source code.

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