ServMark (DiPerF+GrenchMark): A Proposal for Project Globus Incubation

1. A proposed name for the project

ServMark: A Grid Services Testing Architecture

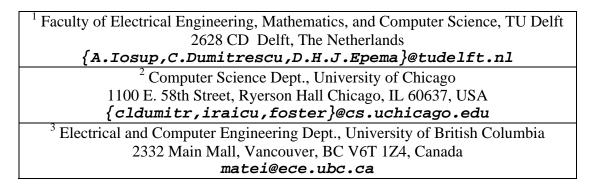## 2. The prefix to use for the email lists that will be set up(*-dev, *-user, etc)

servmark-dev, servmark-user

3. A proposed project chair, with contact information

Catalin L. Dumitrescu <cldumitr@cs.uchicago.edu>

4. A list of the proposed committers for the project

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5. An overview of the aims of the project

Although performance evaluation is an 'everyday' task, testing suites are often built from scratch for each particular evaluation scenario. To address this issue, we have developed independently, and we are currently integrating two performance evaluation tools, DiPerF and GrenchMark. These two tools tackle orthogonal issues in performance evaluation, namely the ability to test services in a distributed and scalable way, and the capacity to generate and run dynamic test workloads with complex structure.

DiPerF, a DIstributed PERformance evaluation Framework, aims to simplify and to automate service performance evaluation. DiPerF coordinates a pool of machines that access a target service and measure its client-centric performance, aggregates the performance measurements results, and generates performance statistics. The aggregate

data collected provide information on service throughput, service response time, service 'fairness' when serving multiple clients concurrently, and on the impact of network latency on service performance.

GrenchMark is a generic framework for testing, analyzing, and comparing Grid settings using synthetic workloads, that is, sets of Grid applications/services with associated orchestration rules. GrenchMark greatly eases the test manager's task of defining a test workload, e.g., specifying a dynamic job/request arrival time, defining multiple users/VOs, creating long workloads, or replaying existing system traces. In addition, GrenchMark deals with parallel/distributed/Grid environments notions, e.g., co-allocated services, and can provide a wide-range of performance metrics, including resource waste, service completion factor, (average) run/wait/return time, and system utilization.

5.1. Current Status

We have used DiPerF in various environments (PlanetLab, Grid3, TeraGrid, and a cluster) and with a large number of services. We have shown evidence that DiPerF is accurate: the aggregate client view matches the tested service view within a few percents, and scalable: DiPerF can handle more than 10,000 clients and 100,000 transactions per second [1, 2, 4]. Moreover, rapid adoption and extensive use demonstrate that the ability to automate performance characteristics extraction makes DiPerF a valuable tool.

We have used GrenchMark in a wide range of scenarios, from the generic categories of performance testing, what-if analysis, system functionality testing, periodic system testing, and Grid settings comparison [3]. GrenchMark has proven critical in testing a Grid scheduler with co-allocating capabilities, and in releasing it on a large-scale environment (the DAS) serving a community of over 200 researchers from 12 institutions.

5.2. Future Work: DiPerF - GrenchMark Integration

With DiPerF and GrenchMark addressing orthogonal issues that are critical for performance evaluation, our future work focuses on the integration of these tools into ServMark. Our vision is of ServMark acting as a complete testing environment for Grid services and settings.

6. An overview of any current user base or user community, if applicable
DiPerF:
> Globus Team: the GridFTP team, the MDS team, the GRAM team
> Lingyun Yang and Xuehai Zhang (Computer Science / University of Chicago)
> Peter Gardafjall and Johan Tordsson (Umeå Universitet/Sweden)
> Yan Ma (China)

GrenchMark:
> The DAS community (over 200 researchers from 12 academic institutions)

The VL-e community (over 100 researchers from over 20 academic and industrial institutions)
KOALA Team (5 researchers)
The StarPlane project (4 researchers)

7. An overview of how the Candidate relates to other parts of Globus

Firstly, the ServMark offers an automated method for Grid service testing (e.g., GRAM, GridFTP, Index-Service, KOALA, etc). Secondly, it also supports automated functionality and performance testing of the environments leveraging the Globus middleware, e.g., single and multi-cluster Grid sites.

8. A summary of why the Candidate would enhance and benefit Globus

Our main goal is to provide a testing service, not only for different part of the Globus toolkit, but also for any other new services developed by end-users, as well as a benchmark of the environments where the Globus toolkit is deployed. Generic applications of ServMark also include: rapid application prototyping, system design and procurement, functionality testing and system tuning, performance testing of Grid services, demonstration set-ups, and building runtime databases for Grid schedulers. We therefore conclude that such a testing service will provide a big advantage to the entire Grid community, and in particular to the (now service-oriented) Globus community.

9. References

1. Dumitrescu, C., et al. *DiPerF: Automated DIstributed PERformance testing Framework*. in *5th International Workshop in Grid Computing*. 2004.
2. Raicu, I., *A Performance Study of the Globus Toolkit® and Grid Services via DiPerF, an automated DIstributed PERformance testing Framework*, in *Computer Science*. 2005, The University of Chicago: Chicago. p. 100.
3. Iosup, A. and D. Epema. *GrenchMark: A Framework for Analyzing, Testing, and Comparing Grids*. in *the 6th IEEE/ACM Int'l Symposium on Cluster Computing and the Grid (CCGrid'06)*. 2006. Singapore: IEEE Computer Science Society.
4. Ioan Raicu, Catalin Dumitrescu, Matei Ripeanu, Ian Foster. "The Design, Performance, and Use of DiPerF: An automated DIstributed PERformance testing Framework", *International Journal of Grid Computing, Special Issue on Global and Peer-to-Peer Computing*, to appear in 2006.