

## **DEVELOPING A METHODOLOGY FOR PREDICTING CHARACTERISTICS OF EMERGING/FUTURE WORKLOADS**

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### **Project Description**

Typically tomorrow's computers are designed on the basis of evaluations with benchmarks of today, which are programs from yesterday. While this has been recognized as a problem, it has been hard to solve the problem. Finding benchmarks that are representative of existing applications is hard enough a problem, that developing benchmarks that represent future workloads that have not yet arrived is next to impossible. Representativeness has been hard to quantify and establish.

The objective of the proposed project is to develop a methodology to speculatively generate/synthesize workloads of the future based on the applications that are just emerging. For instance, the e-business field is constantly evolving. If we do not predict these workloads and understand their features and characteristics, computer system designers could be caught by surprise after spending millions or billions of dollars on designing the next generation computers.

John et. al. describe some basic methodology that can be applied to find a solution to this problem, in the paper "Workload Characterization: Motivation, Goals and Methodology", (IEEE Computer Society) [1]. Basically it involves understanding the parameters that define a workload, understanding the values of these parameters for modern workloads and then extrapolating into workload predictions of the future. The generated future workloads need not be completely synthesized and artificial; they can be real workloads with adjustable 'knobs' with which many of the workload characteristics can be modified according to predictions.

The study will start with state-of-the-art e-business workloads including current decision support system software, on-line transaction processing applications and web server applications. The workloads will be studied on RS-64-II, Power III and if possible on POWER 4 systems. Predictions of workloads of players such as major banks, retailers, or companies like amazon.com will be gathered and the major artifacts of the expected workloads will be extrapolated.

The deliverable from the project will be an adjustable benchmark which can extrapolate characteristics of future workloads. While a mature benchmark of that sort cannot be expected in one year, improvement in the methodology to develop such a benchmark and a preliminary benchmark can be expected to be created.

## **Long Term Impact**

The proposed project falls under the following key topics identified by the University Relations:

- e-business
- Advanced systems initiatives
- Next generation web

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Another impact will be the training of students in state-of-the-art performance monitoring and evaluation techniques. Collaborations such as this form essential channels for recruiting for IBM. The students working on the project typically come to IBM for summer jobs and are also likely to accept offers of permanent employment once they graduate. The student who worked on the latest IBM award to me (Mr. Pattabi Seshadri) has accepted a job with IBM, illustrating the usefulness of this process for IBM recruiting. Again, these students come in to IBM employment force very well educated and trained for the IBM employment, because the proposed research is closely related with IBM's activities.

The visibility that the IBM collaboration obtains at the University of Texas is another outcome. Mr. Pattabi Seshadri, who worked on my previous IBM project, won a University level undergraduate research award, and was honored by the President of UT in April 2002. His research in the IBM project was what won him the award.

## **References:**

1. L. K. John, P. Vasudevan and J. Sabarinathan, "Workload Characterization: Motivation, Goals and Methodology", pp. 3-14, in Workload Characterization: Methodology and Case Studies, (IEEE Computer Society), 1999, edited by John and Maynard.