Workshop I: Computer System Performance Evaluation Summary

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With the growing complexity and sophistication of computing systems, one no longer can discuss systems' cost/performance in terms of mere hardware speed and complexity, nor predict the performance based on a simple calculation. Construction of more sound quantitative techniques for system performance evaluation is thus more important than ever. Recently experimental design, statistical inference, time series analysis and other statistical techniques have been increasingly applied to measurement and performance analysis of computing systems.

This workshop was intended to appraise the use of statistical methodology in computer system performance evaluation. Both tutorial and research papers were presented on statistical techniques, case study reports on measurement and evaluation, characterization of program behavior, performance of data base, simulation techniques, etc. The panel discussion of Session 5 focused on the future direction of research in computer system performance evaluation.

The number of attendees in Workshop I was over 60 throughout all the sessions. We had very stimulating presentations and discussions during these two days.

In Session 1, *Data Base and File Organization*, S. P. Ghosh described the structure of a data base using an entity set model. He also reviewed some recent work relating to performance of data base system. The paper by A. L. Goel and Y. Liu was a case study report in which factorial design methods are applied to a simulator of indexed sequential file organization.

Session 2, *System Measurement and Performance Analysis*, included three papers. The paper by R. Gimbel and H. Schwetman reviewed the state-of-the-art in measurement tools, both hardware and software. The paper by H. A. Anderson, M. Reiser and G. Galati discussed how to characterize and classify jobs (or transactions) in such a system as TSS/360. They demonstrated the use of principal component analysis method in clustering observed data of a TSS/360 system. G. R. Sager's paper is concerned with characterization of program behavior in a paging environment. A method of synthesizing page reference strings was reported.

In Session 3, *Application of Statistical Method*, P. Bryant and M. Schatzoff gave an expository paper on the use of regression methods in system performance evaluation. The sensitivity due to multicollinearity, the relationship between response surface and regression method was also outlined. H. Friedman and G. Waldbaum addressed the question of how to appraise the effect of System change under uncontrolled workload conditions. F. Baskett described the regeneration point method for simulation analysis and showed an application of the method of establishing confidence intervals in simulation estimate through an example of buffer pool model. The paper by L. A. Belady and R. F. Tsao proposed a dynamic memory sharing algorithm that selects a program to release a page when a new page frame is demanded in a multiprogrammed system.

In the *Evening Session*, J. E. Savage discussed a complex-theoretic approach to the performance problem. The notion of space-time tradeoff is represented in terms of computational inequalities. The session included some other contributed papers. H. Beilner could not attend the workshop, but his paper is included in this proceedings.

Session 4, *Computer System Models*, on the morning of the second day included three papers. T. Lo presented a paper coauthored by G. L. Lassetter, K. M. Chandy and J. C. Browne which discusses the effect of serial dependency of CPU execution intervals between successive I/O executions. He showed that CPU scheduling based on prediction of such CPU burst patterns improved the system's throughput. J. P. Buzers discussed the problem of determining the optimal distribution of I/O traffic when different speed devices are connected to each channel. Y. Bard discussed a method of characterizing program paging based on a notion, "page survivor index". The dynamic parachor curve introduced here is more relevant to dynamic partition of memory than the conventional static parachor curve.

Session 5, *Panel Discussion*, was chaired by R. Fletcher and P. Denning, D. Gaver, P. Kiviat and R. Tsao were panelists. The panelists gave their own views concerning on what the future research in system performance evaluation should focus. The panel session was recorded on a casette tape and it will be available for a short term loan by request from the Symposium Chairman.