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The authors conducted a benchmark measurement of the Murray Hill Time Sharing System (MH-TSS) running on a Honeywell 6000. The object of the test was to duplicate the load normally present on the Murray Hill production system, and measure the system's behavior before and after a major software release and a major hardware improvement. Five different load levels, from 30 to 90 users, were measured for each configuration.

This paper discusses the methods used in the design of the experiment and in the analysis and interpretation of the results. Several measurement tools were used in this test. The event trace collection facility of MH-TSS was used for the benchmark measurement and for the design and fine tuning of a script representing the normal load at Murray Hill. A commercially available H6000-specific terminal simulator was used to feed these scripts to the system. The batch background system was loaded by a stream of synthetic jobs, matched in resource usage characteristics to a set of jobs chosen at random from the job stream of the production system. The event trace data gathered at various load levels under the three software and hardware configurations were analyzed using two techniques employing a state transition representation of program behavior and system response. The result was a set of data which documents the expected performance improvements for the new software and hardware being installed at Murray Hill, and which suggests the expected growth potential for MH-TSS.

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R76-2—Manteuffel, T. A., "An Interactive Method for Solving Nonsymmetric Linear Systems with Dynamic Estimation of Parameters" (185 pp., Technical Report UIUCDCS-R-75-758, Department of Computer Science, University of Illinois at Urbana-Champaign, Urbana, Illinois)

The subject of this thesis is an iterative method for solving large, sparse linear systems, based upon the scaled and translated Tchebycheff polynomials. It is shown that such an iteration is optimal, in a certain sense, over all polynomial based gradient methods. Further, an algorithm is developed by which the best scaling and translating factors may be found from knowledge of the eigenvalues of the linear system. Since the eigenvalues of the linear system are seldom known, a dynamic procedure is developed to improve the choice of scaling and translating parameters from knowledge obtained during iteration. Finally, experimental results are described which show this method to be of potential value on a large class of problems, especially in conjunction with factorization methods.


The performance of the first digital AM receiver to employ BURST techniques is discussed. Some relevant parameters are evaluated.

R76-4—Spitzen, Jay M., "The Specification of Assemblers" (17 pp., Stanford Research Institute, Menlo Park, California)

This paper considers the problem of applying formal techniques of program specification and verification to large complex programs. It argues that a practical solution requires a variety of techniques, including both procedural and non-procedural specifications, hierarchical program organization, and the use of program transformations. In particular, a case is made for flexible problem-oriented choice of specification techniques and languages. The paper expands on these ideas by specifying a load-and-go assembler in three parts: a transducer grammar describing the correspondence between concrete and abstract syntax for assembly language programs; a set of transformations of the abstract form; and a non-constructive axiomatic specification of the result of core assembly and loading of transformed abstract programs.
R76-5—Bhandarkar, Dileep P., “Cost Performance Aspects of CCD Fast Auxiliary Memories” (5 pp., Technical Report UIUCDCS-R-76-756, Department of Computer Science, University of Illinois at Urbana-Champaign, Urbana, Illinois)

Charge coupled devices (CCD’s) have been mentioned as potential fast auxiliary memories in multiprogrammed computer systems with virtual memory. Declining MOS RAM costs will tend to allow computer designers to put more random access memory in their systems. However, due to program locality only a portion of the memory is actively used. If CCD’s cost R(2-1) times less than RAM’s, the size of the random access main memory can be reduced and a CCD paging store can be provided as a back up. Active program segments can now be brought into the RAM as and when needed. Often the question has been raised in industry as to what value of R is needed to justify this application of CCD’s. A queueing network analysis is presented in this paper. The model developed is used to establish a criterion for cost-effectiveness and a relationship is derived between RAM/CCD cost ratio R and the page exception characteristics of the program environment. A rough rule of thumb is suggested. It states that cost-effectiveness is achieved provided the page miss ratio is less than 0.005 for a = 1.2 to 2.0 which is the ratio of the processor cycle time to CCD block read time. This criterion is applied to known miss ratio characteristics of a computer system running temporarily in random access mode. This indicates that a project cost ratio of two to four can make fast auxiliary CCD memories attractive for block read times ranging from 200 to 500 microseconds.

R76-7—Saxton, Terrence L. and Cheng-Chi Huang, “An Optimal Synchronous Reframing Technique Using an Associative Processor” (21 pp., Systems and Research Center, Honeywell, Inc., Minneapolis, Minnesota)

Data loss resulting from the time to regain frame synchronization following an out-of-frame condition on a synchronous time division multiplexed bus or line, such as the Bell System T1 digital line, can be substantial. Most current sequential schemes require many frame times to separate with high probability the true frame pattern from identical patterns occurring temporally between frames. A parallel search technique and a special purpose associative processor implementation which can reduce the frame time to its minimum value by eliminating the time spent dwelling at false frame positions is presented.

R76-8—Batcher, Kenneth E., “The Multi-Dimensional Access Memory in STARAN” (14 pp., Goodyear Aerospace Corporation, Digital Technology Department, Akron, Ohio)

STARAN has a number of array modules. Each module has a multi-dimensional access (MDA) memory. The implementation of this memory with random-access memory chips is shown. Because data can be accessed in both the word direction and the bit-slice direction, associative processing is possible without the need for costly, custom-made, logic-in-memory chips.

R76-9—Stoffers, Karl E., “On the Order of the Elements in a Compatibility Matrix” (9 pp., Department of Electrical Engineering, California State University, Sacramento, California)

This correspondence discusses several advantages of consecutive I’s ordering in the compatibility matrix. Some techniques for ordering in this way are briefly described. A response to Handoko’s comment on the sequential algorithm for maximum compatibles is given.

R76-10—Embley, David W., “An Experiment on a Unified Control Construct” (55 pp., Technical Report UIUCDCS-R-76-759, Department of Computer Science, University of Illinois at Urbana-Champaign, Urbana, Illinois)

This report describes and gives the results of an experiment designed to investigate the psychological soundness of a proposed unified control construct, the KAIL selecter. The KAIL selecter subsumes several traditional control constructs including if-then-else, case, and while. The experiment compares two sets of control constructs to determine their effect on understanding. One set consisted of the traditional if-then-else, case, and while; the other set consisted of a simplified KAIL selecter. Results showed that subjects understood programs better when they were written using the KAIL selecter.


FORTH is a self-contained programming system that has become popular in specific application areas: interactive control and data acquisition. The system supports a high-level structured language using reverse Polish notation; it contains an incremental compiler, an assembler, and a text editor. FORTH runs on minicomputers, DECTape, or pre-formatted industry magnetic tape. The system can be run in a 16-bit minicomputer with 8K of core, either standalone or under an operating system. The manual describes FORTH versions for DEC PDP-11, PDP-10, and SDS-990 computers.

R76-12—Burkhardt, Walter H., “Systems Implementation Languages, A Brief Survey and ALGOL 68 Examined” (5 pp., Lehrstuhl fur Hardware, Institut fur Informatik, Universitat Stuttgart, Germany)

A brief survey of the history and types of languages for implementing systems programs is given with the requirements for such languages. Some features of the ALGOL 68 language are examined with specific applicability to the task of systems implementation.

R76-13—Burkhardt, Walter H., “Generating Test Programs from Syntax” (21 pp., Lehrstuhl fur Hardware, Institut fur Informatik, Universitat Stuttgart, Germany)

The many faces of programming and systems development demand an increased concern for program testing. The present paper tries to explain some areas where automation of many tasks may be of great help. One special area, where progress seems to lag behind unduly, can be found in debugging, testing, and diagnosing systems. Here we attempted the generation of programs automatically from a definition of a problem and the characteristics of programs for its solution by a software system,
which has been specially designed for this purpose. It has been indicated how the ideas underlying this project may be applied successfully to other areas.

R76-14—Svobodova, Liba, "Computer System Measurability" (28 pp., Project MAC, Massachusetts Institute of Technology, Cambridge, Massachusetts) To ensure efficient and effective performance monitoring, measurability must be included among the fundamental objectives of computer system design. Measurability can be enhanced by adding to the system special hardware and software features. The structure and the utility of various support features for internal and external monitors is discussed in detail.

Hard-to-find specials from the Computer Society Repository

Not generally available elsewhere, this manual provides complete documentation for SURGE717, a non-proprietary computer program which generates appropriate data-processing logic and produces COBOL source programs from simple descriptive parameter cards.
Price, photocopy—$23.30

A BASIC language interpreter has been designed for use in a microprocessor environment. This report discussed the design and elaboration of a table driven interpreter. The entire system, including text editor, interpreter, user test buffer, and full floating point arithmetic routines fits in 16K words.
Price, photocopy—$5.20

Technological advances have made possible the development of advanced hybrid computing systems (AHCS) with cost and speed advantages of at least 30:1 over pure digital systems for solving dynamic problems. This proceedings contains 27 papers examining various aspects of AHCS.
Price, photocopy—$20.80

Faculty Positions: The Department of Computer Sciences of the City College, the City University of New York, has anticipated openings for the academic year beginning September 1976 for persons qualified for professorial ranks. Applicants should have a doctorate and either academic or professional experience in the following areas: Systems programming, and compilers, or hardware description languages and computer architecture. A demonstrated ability to conduct research both in the fundamental and applications areas of computer sciences is also required. The City College is an Equal Opportunity and Affirmative Action Employer. Interested parties should direct their curriculum vitae to: Professor George G. Ross, Chairman, Department of Computer Sciences, The City College of New York, 138th Street and Convent Avenue, New York, New York 10031.

Operating Systems: Assistant or Associate Professor, Ph.D., for undergraduate and graduate teaching and for research in the general area of operating systems, preferably with experience in the design for multiprocessor/multiprocessing computer systems. Send resume and selected recent publications to: Professor Bruce H. McCormick, Head, Department of Information Engineering, University of Illinois at Chicago Circle, Chicago, Illinois 60680. An Equal Opportunity and Affirmative Action Employer.

Digital Communications Systems: Assistant or Associate Professor, Ph.D., for undergraduate and graduate teaching and for research in the general area of digital communication systems, preferably with experience in computerized systems. Send resume and selected recent publications to: Professor Bruce H. McCormick, Head, Department of Information Engineering, University of Illinois at Chicago Circle, Chicago, Illinois 60680. An Equal Opportunity and Affirmative Action Employer.

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