

Listed are abstracts from recent papers by IBM authors. Inquiries should be directed to the publications cited.

APLGOL, an experimental structured programming language, R. A. Kelley, *IBM Journal of Research and Development* 17, No. 1, 69-73 (January 1973). An experimental programming language called APLGOL adds structured programming facilities to the existing framework of APL. The conventional semantics of APL is unaltered and only minor changes are incorporated in the syntax. The advantages of the proposed interstatement structuring and control are outlined.

Computer interference analysis, W. Chang, *IBM Journal of Research and Development* 17, No. 1, 13-26 (January 1973). This paper describes a single-server queuing model with Erlang input, which can be used for computer congestion analysis. The model is intended primarily for small computer systems in which the CPU is needed for input/output operations, which aggravates the interference problem. The model provides such information as the queuing time distribution for channel requests and the CPU delay due to channel interference. The model is illustrated by numerical examples, and procedures for the analysis are shown.

Abstracts

Cryptography and computer privacy, H. Feistel, *Scientific American* 228, No. 5, 15-23 (May 1973). There is growing concern that computers now constitute, or will soon constitute, a dangerous threat to individual privacy. Since many computers contain personal data and are accessible from distant terminals, they are viewed as an unexcelled means of assembling large amounts of information about an individual or a group. It is asserted that it will soon be feasible to compile dossiers in depth on an entire citizenry, where until recently the material for such dossiers was scattered in many separate locations under widely diverse jurisdictions. It will be argued here, however, that a computer system can be adapted to guard its contents from everyone but authorized individuals by enciphering the material in forms highly resistant to cipher-breaking.

Experimental study of deadline scheduling for interactive systems, D. D. Chamberlain, H. P. Schlaeppli, I. Wladawsky, *IBM Journal of Research and Development* 17, No. 3, 263-269 (May 1973). This paper outlines a resource allocation strategy called deadline scheduling, which is intended for use in interactive systems. Experiments are reported in which simplified versions of deadline scheduling and two time slicing strategies are modeled and compared under identical conditions. Results suggest that deadline scheduling, primarily by reducing paging overhead, provides faster response and supports more interactive users concurrently than do the two time slicing methods.

An interactive system for aiding evaluation of local government policies, E. J. Cris-tiani, R. J. Evey, R. E. Goldman, and P. E. Mantey, *IEEE Transactions on Systems, Man, and Cybernetics* SMC-3, No. 2, 141-146 (March 1973). An interactive system designed to study the spatial aspects of urban growth in Santa Clara County, San Jose, California; is described. The system is built around a mathematical model of urban growth and provides hands-on control of input, operation of the model, and data display.

Management science and gaming in waste management, P. N. Wahi and T. I. Peterson, *Journal of the Sanitary Engineering Division, Proceedings of the American Society of Civil Engineers* 98, No. SA5, 693-706 (October 1972). Administrators, planners, and those generally involved in ecology are seeking tools to solve the complex problems they face. Much has been written about the potential of management science techniques in this area, and more is continually appearing concerning: (1) Actual problems that can be solved using such tools; and (2) methods appropriate for introducing management science to those in ecology. This paper describes solutions to three specific problems which are based on conventional management science techniques. More important, it stresses an approach, hopefully natural and challenging, for training and education through the device of gaming.

Optimum storage allocation for initial loading of a file, J. A. van der Pool, *IBM Journal of Research and Development* 16, No. 6, 579-586 (November 1972). When a file is loaded into a direct access storage device using key-to-address transformations, the number and size of storage blocks can be selected. In this study, a selection that minimizes the combined cost of storage space and accesses to the storage device is determined for the case where no record additions or deletions occur after loading. The analysis is based on the assumption that for a given set of keys, a transformation exists that gives a uniform probability distribution over the available addresses. Under this assumption, formulas are derived for the average number of overflow records and for the average number of accesses required to retrieve a record. Given these formulas, the costs are expressed as a function of storage used, number of accesses, cost per unit of storage, and cost per access. Minima are computed for a range of block sizes and operational conditions. The results seem to indicate that current file design practices are abundant with storage space. Finally, the results are condensed in an easy to use approximate formula.

Optimum storage allocation for a file in steady state, J. A. van der Pool, *IBM Journal of Research and Development* 17, No. 1, 27-38 (January 1973). A file of fixed-length records in auxiliary storage using a key-to-address transformation to assign records to addresses is considered. The file is assumed to be in steady state, that is that the rates of additions to and of deletions from the file are equal. The loading factors that minimize file maintenance costs in terms of storage space and additional accesses are computed for different bucket sizes and different operational conditions.

A video display system for image processing by computer, N. H. Kreitzer and W. J. Fitzgerald, *IEEE Transactions on Computers* C-22, No. 2, 128-134 (February 1973). A core-refreshed video display system that can display gray-scale images of 32 intensity levels on a standard monochrome video monitor will be described. The system can also display flicker-free black and white images of more than 800,000 picture elements. There are special features that allow overlaying black and white images on 16-level gray-scale images and manual cursor control via an X-Y tablet. Multiple reduced size images can be accommodated by features that allow independent manipulation of images in separate areas on the display screen. This permits simultaneous display of images before and after processing.