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

Abstracts

An algorithm for combining truck trips, B. Gavish (Technion University, Haifa, Israel) and P. Schweitzer (RES Yorktown Heights, NY), *Transportation Science* **8** No. 1, 13–23 (February 1974). This paper presents a method of combining truck trips to reduce total costs. Demands are scheduled weekly. Constraints are placed on the solutions; for example, trucks must arrive on time, certain cargoes cannot be combined, and excessive waiting times are forbidden. The key result is the development of a method of combining truck trips subject to strong operational constraints. Other results include improvements in the classical transportation problem algorithm.

Effects of serial programs in multiprocessing systems, W. F. King III (RES, San Jose, CA), S. E. Smith, and I. Wladawsky (RES, Yorktown Heights, NY), *IBM Journal of Research and Development* **18,** No. 4, 303–309 (July 1974). A model of a multiprocessing, multiprogramming computer system with serially reusable programs was developed to study the effect of serial programs on system performance. Two strategies for implementing serially reusable programs were investigated, a wait strategy in which the processor waits until the serial program is available, and a switch strategy, in which the processor is freed to do other work. Relative performances and asymptotic conditions as functions of the number of processors, processes, serially reusable programs, and the fraction of time each process executes serially reusable programs were obtained. Quantitative results are presented showing that the switch strategy is superior. The wait strategy causes quick saturation when the number of processes is increased.

Evaluation and measurement techniques for digital computer systems, M. E. Drummond, Jr. (SDD, San Jose, CA), Prentice-Hall, Inc., Englewood Cliffs, New Jersey (1973). A comprehensive study of measurement and evaluation methods, including techniques of systems analysis, simulation, software monitoring, and hardware measurement. Analysis includes relative system throughput, formula timing, system profile conversion, and synthetic models. Simulation includes both trace-driven and probabilistic methods. Programmed techniques depend either on interception or sampling. The evolution of hardware measurement instruments is presented in detail.

Optimal pricing for an unbounded queue, D. W. Low (DPD Scientific Center, Los Angeles, CA), *IBM Journal of Research and Development* **18,** No. 4, 290–302 (July 1974). The author wishes to use pricing to maximize reward, rather than simply to control queue lengths. For a system with a finite queue, the optimal price to advertise has been shown to be a nondecreasing function of the number of customers in the system. Here a system with unlimited queue capacity is controlled by dynamically changing the price charged for the facility's service in order to encourage or discourage the arrival of customers.

Predictive simulation of the subsidence of Venice, G. Gambolatti (IBM Italy, Venice Scientific Center), P. Gatto (National Research Council, Venice, Italy), and R. A. Freeze (RES Yorktown Heights, NY) *Science* **183,** No. 4127, 849–851 (March 1974). The land subsidence of the city of Venice is studied using a two-step mathematical model. First, a hydrologic model was calibrated with known data on pumping schedules in the area. Second, a subsidence model was calibrated via a test hole. Predictive simulations show that, at current pumping rates, Venice will subside another three centimeters. Reduced pumping rates could arrest subsidence. A complete shutdown of all wells studied would provide a rebound of perhaps 2 cm in the next 25 years.

Security, accuracy and privacy in computer systems, James Martin (Systems Research Institute, New York, NY), Prentice-Hall, Inc., Englewood Cliffs, New Jersey (1973). This book discusses the prevention of unauthorized access to computers and data banks, embezzlement, sabotage, and the invasion of privacy. Four layers of controls on such data are discussed. From the inner-most layer to the outer-most layer they are technical controls, physical controls, administrative controls, and societal and legal controls. The book offers a detailed explanation of techniques for achieving security and for controlling accuracy in computer systems. An 88-page checklist for designers, systems engineers, and auditors is included at the end.

A status report on computing algorithms for mathematical programming, W. W. White (DPD Scientific Center, Philadelphia, PA), *Computing Surveys* **5,** No. 3, 135–166 (September 1973). An examination of some of the computational aspects of mathematical programming, surveying the current state of the art. The principal features of modern linear programming systems are covered, with sections on differing implementations and extension areas. A general status report on nonlinear and integer programming is included.

String path search procedures for data base systems, S. P. Ghosh (RES San Jose, CA), and M. E. Senko (RES Yorktown Heights, NY) *IBM Journal of Research and Development* **18,** No. 5, 408–422 (September 1974). When a user is free to query a data base without knowledge of the access structure imbedded in the data base, the computer has to analyze the query and reduce it to a parametric form such that the parameters can be used to select the proper access paths for retrieving the subsets of the data relevant to the query. The major part of this paper is devoted to studying access path structures that can be constructed from three basic types of string structures. The properties of these string structures can be used to construct efficient algorithms for answering queries based on entity set concepts.