

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

Are computers ready for the checkless society?, F. Backman (DPD Gaithersburg, MD), *AFIPS Conference Proceedings, 1976 National Computer Conference* 45, 147-156, AFIPS Press, Montvale, NJ (1976). Apart from the legal and regulatory issues of electronic funds transfer, there are technical complications in the development of a systems architecture suitable for implementing a nationwide system. In addition to the interface difficulties presented by the equipment and software designs of competing manufacturers, there are complications to the control of such a system that merit the attention of the data processing industry. This paper is intended to stimulate the exchange of opinions on how the industry should cope with differences in end-user protocols, different routing techniques, different methods of controlling terminal devices, the value of various communication line disciplines, and the overall management of a nationwide network.

Automatic programming through natural language dialogue; a survey, G. E. Heidorn (RES Yorktown Hts., NY), *IBM Journal of Research and Development* 20, No. 4, 302-313 (July 1976). This paper describes and compares four research projects whose goal is to develop an automatic programming system that can carry on a natural language dialogue with a user about his requirements and then produce an appropriate program. It also discusses some of the important issues in this research area.

Abstracts

Cache system design in the tightly coupled multiprocessor system, C. K. Tang (SPD Endicott, NY), *AFIPS Conference Proceedings, 1976 National Computer Conference* 45, 749-753, AFIPS Press, Montvale, NJ (1976). The principle and design considerations of the cache system in the tightly coupled multiprocessor environment are discussed. System requirements in the multiprocessor environment as well as the cost-performance trade-offs of the cache system design are given in detail. The possibility of sharing the cache system hardware with other multiprocessing facilities (such as dynamic address translation, storage protection, locks, serialization, and the system clocks) is also discussed.

Computer prehistory and history in Central Europe, H. Zemanek (IBM Vienna, Austria), *AFIPS Conference Proceedings, 1976 National Computer Conference* 45, 15-20, AFIPS Press, Montvale, NJ, (1976). This study divides the history of calculating devices into three periods. The period of programmed automata is rich in the development of programmed clocks and musical instruments beginning in the 14th century and continuing through the 18th. The period of programmed weaving to punched cards ranges from the Jacquard loom to the Hollerith card. The third period is that of programmed calculation. The computer is the product of two streams of development, calculating devices and programmed calculation, and contributions from Central Europe are prominent in both streams.

Conceptual graphs for a data base interface, J. F. Sowa (IBM Systems Research Institute, NY), *IBM Journal of Research and Development* **20**, No. 4, 336-357 (July 1976). A data-base system that supports natural language queries is not really natural if it requires the user to know how the data are represented. This paper defines a formalism, called conceptual graphs, that can describe data according to the user's view and access data according to the system's view. In addition, the graphs can represent functional dependencies in the data base and support inferences and computations that are not explicit in the initial query.

Design issues for mixed media packet switching networks, D. Huynh (University of Hawaii), H. Kobayashi (RES Yorktown Hts., N.Y.), and F. F. Kuo (Department of Defense, Washington, D.C.), *AFIPS Conference Proceedings, 1976 National Computer Conference* **45**, 541-549, AFIPS Press, Montvale, NJ (1976). Presented are some of the design issues for packet switching networks with both satellite and terrestrial components—called *mixed media* packet switching networks. Satellite packet switching has considerable promise for low-cost, high-bandwidth data communications. However, there is inherent delay in satellite links which does not appear in ground links. Therefore, a mix of the two communications media offers the advantages of low cost/high bandwidth together with low-delay communications where required. This paper examines a number of trade-offs which offer guidelines for the design and optimum utilization of mixed-media networks.

Expanding the solutions of implicit sets of ordinary differential equations in power series, A. C. Norman (RES Yorktown Hts., NY), *The Computer Journal* **19**, No. 1, 63-68 (February 1976). Given a general analytic set of implicit ordinary differential equations, the method described here will find an algorithm for expanding solutions to the equations in power series. The method is entirely mechanical, and does not have to rely on its user for prompting about the order, degree, or form of the equations.

Integrity aspects of a shared data base, E. B. Fernandez and R. C. Summers (IBM Scientific Center, Los Angeles, CA), *AFIPS Conference Proceedings, 1976 National Computer Conference* **45**, 819-827, AFIPS Press, Montvale, NJ (1976). A simple model is formulated to represent integrity constraints and to describe the evaluation and enforcement of these constraints in a shared data-base environment. The proposed model is applied to define the integrity facilities of a relational data base. The types of integrity rules incorporated in this system, their description, their evaluation, and the propagation of changes to views in the shared data base, are discussed.

On natural language based computer systems, S. R. Petrick (RES Yorktown Hts., NY), *IBM Journal of Research and Development* **20**, No. 4, 314-325 (July 1976). Some of the arguments that have been given both for and against the use of natural languages in question-answering and programming systems are discussed. Several natural language based computer systems are considered in assessing the current level of system development. Finally, certain pervasive difficulties that have arisen in developing natural language based systems are identified and the approach taken to overcome them in one system is described.

Operating systems principles, S. A. Kurzban (DPPG Poughkeepsie, NY), T. S. Heines and A. P. Sayers (DPD Dearborn, MI), Petrocelli/Charter, New York, New York (1975). This book provides an introduction to the concepts and technology of computer operating systems. Operating systems are discussed in terms of their evolution, the objectives to be met by their design, their components, the methods employed in their design and development, and the relationships between their design and the designs of the computers on which they execute. They are categorized with respect to their facilities for multiprogramming, multiprocessing and interactive processing.

Several aspects of operating systems are covered including recovery; support for language processors, utilities, and applications; and accounting. The components of an operating system to which greater attention is given are job and task management components, the data management component, and the control language processors. A final chapter deals in some detail with the process of developing an operating system.

This book is intended for use as a text for advanced undergraduate or beginning graduate students or as a self-study guide for technicians and executives.

Supplementary contents include a glossary, a survey of operating systems, a list in outline form of operating systems' facilities, and a comprehensive briefly annotated bibliography. 572 pp.

Quality control in software development, F. Tsui and L. Priven (IBM Gaithersburg, MD), *AFIPS Conference Proceedings, 1976 National Computer Conference* 45, 443-449, AFIPS Press, Montvale, NJ (1976). The authors argue that, through the use of quality control techniques in software development, one can achieve a low error rate, ease of maintenance, and low total cost. A philosophy of the development process called Continuous Integration is introduced. Quality control is integrated into this process through inspections of design, code, and documentation. Justification for this approach is given.

Query-by-Example—operations on hierarchical data bases, M. M. Zloof (RES Yorktown Hts., NY), *AFIPS Conference Proceedings, 1976 National Computer Conference* 45, 845-853, AFIPS Press, Montvale, NJ (1976). Query-by-Example is a high-level, nonprocedural data-base language that provides the end user with a simplified unified interface for querying, updating, defining, and maintaining the data base, as well as embedding various integrity and authority constraints. As demonstrated in previous work, when the data base is relational, skeleton tables are used. This paper shows that the Query-by-Example operations are in fact independent of the structure of the data base.

Relational data-base management systems, D. D. Chamberlin (RES San Jose, CA), *ACM Computing Surveys* 8, No. 1, 43-66 (March 1976). This tutorial paper describes the essential concepts of the relational data model. Advantages and implementations of relational systems are discussed. This paper appears in a special issue on data-base management systems containing five introductory papers, which describe the relational, CODASYL, and hierarchical models.

REQUEST: A natural language question—answering system, W. J. Plath (RES Yorktown Hts., NY), *IBM Journal of Research and Development* **20**, No. 4, 326–335 (July 1976). REQUEST is an experimental Restricted English Question-answering system that can analyze and answer a variety of English questions, spanning a significant range of syntactic complexity, with respect to a small *Fortune*-500-type data base. The long range objective of this work is to explore the possibility of providing nonprogrammers with a convenient and powerful means of accessing information in formatted data bases without having to learn a formal query language.

System R: relational approach to database management, M. M. Astrahan, M. W. Blasgen, D. D. Chamberlin, K. P. Eswaran, J. N. Gray, P. P. Griffiths, W. F. King, R. A. Lorie, P. R. McJones, J. W. Mehl, G. R. Putzolu, I. L. Traiger, B. W. Wade, and V. Watson (RES San Jose, CA), *ACM Transactions on Database Systems* **1**, No. 2, 97–137 (June 1976). This paper describes the overall architecture and design aspects of an experimental prototype data-base management system called System R, which is currently being implemented and evaluated at the IBM San Jose Research Laboratory. System R provides a high-level relational data interface. The system provides data independence by isolating the end user as much as possible from underlying storage structures. The system permits definition of a variety of relational views on common underlying data. Data control features are provided, including authorization, integrity assertions, triggered transactions, a logging and recovery subsystem, and facilities for maintaining base consistency in a shared-update environment.