Data Base Management Systems

Data Base Management Systems

Proceedings of the SHARE Working Conference on
Data Base Management Systems
Montreal, Canada, July 23-27, 1973

edited by

Donald A. Jardine

Department of Computing & Information Science
Queen's University
Kingston, Ontario, Canada

NORTH-HOLLAND PUBLISHING COMPANY – AMSTERDAM · OXFORD
AMERICAN ELSEVIER PUBLISHING COMPANY, INC. – NEW YORK

Library of Congress Catalog Card Number: 74 80110

North-Holland ISBN: 07204 2804 I
American Elsevier ISBN: 0444 10672 3

PUBLISHERS:
NORTH-HOLLAND PUBLISHING COMPANY – AMSTERDAM
NORTH-HOLLAND PUBLISHING COMPANY, LTD. – LONDON

SOLE DISTRIBUTORS FOR THE U.S.A. AND CANADA:
AMERICAN ELSEVIER PUBLISHING COMPANY, INC.
52 VANDERBILT AVENUE, NEW YORK, N.Y. 10017

1st edition: 1974
2nd printing: 1976

PRINTED IN THE NETHERLANDS

INTRODUCTION

Data bases originated in the early 1960's when the first working examples, properly called data base systems rather than file handling systems, were developed. Among the earliest of these was the Integrated Data Store (IDS), developed by General Electric Company and with which the name of Cnarles W. Bachman is so closely associated, and the formatted file systems developed for the United States Air Force and other defence agencies.

Although these were not as complex as today's data management systems, they showed the basic concepts: an attempt to separate the structure of the data from the program and thereby institute the beginnings of data independence, and the ability to set up data structures which were not strictly linear physical sequential file organizations. These made extensive use of pointers or tables to describe the data structure. The data structure was then interpreted by software interposed between the physical data structure and the application program.

Shortly after the development of IDS, CODASYL recognized that list processing capabilities would be needed if existing languages were to handle he data structures made possible by large scale directly addressable auxiliary storage. In late 1965, CODASYL established the List Processing Task Force which later became the Data Base Task Group (DBTG). This group carried out extensive investigation, codification, and publication of a number of reports on the subject of incorporating into COBOL a facility for handling complex data structures. This work was extensively influenced by both IDS and the work of Charles Bachman, and by the Associative Programming Language developed by George G. Dodd and his colleagues at the General Motors Research Laboratory. In 1969, the CODASYL DBTG produced a proposal for the inclusion of data manipulation and data definition facilities into a host language, using COBOL as the example.

During this same period, 1967 to 1970, a group from the GUIDE and SHARE organizations were working on a set of requirements for future data base management systems, the result of which was the GUIDE/SHARE Data Base Management Systems Requirements document of November 1970.

The CODASYL DBTG document and the GUIDE/SHARE Report presented two different approaches to data base architecture. The DBTG view was that of a design and a specification, whereas the GUIDE/SHARE document contained a set of requirements, many of which went substantially beyond those specified in the CODASYL report, and indeed, went substantially beyond the foreseeable commercial state of the art at that time. The CODASYL report was the subject of considerable controversy. A number of users and a few manufacturers felt that it did not provide sufficient separation of the application program from the data structure and did not, in the view of the opponents, provide a well-considered route for user migration from existing linear file handling systems. Furthermore, the CODASYL report did not consider important problems such as the role of the data base administrator and some of the technical aspects of concurrent update and the maintenance of data integrity in a data base system.

Following the production of a revised report in April 1971 by the CODASYL Data Base Task Group, the CODASYL activity was reorganized and separated into two working groups, one which is concerned with defining a suitable data definition language, and the other with defining a data manipulation language based on COBOL, together with the syntax and semantics of an application program schema or data definition. At the time of writing, the data manipulation facility had been released and was still open for comment, while the data definition language description was close to being released.

In spite of the considerable activity by influential user groups, by CODASYL itself, and by most of the hardware and software vendors, no meeting had ever been held which would bring together various interested parties to discuss the long range implications of data bases and their architecture. Although the Association of Computing Machinery, through its Special Interest Group on File Description and Translation, had held three annual conferences, these had concerned themselves mostly with research papers in the field.

The SHARE Working Conference on Data Base Management Systems was organized to bring together, on an invitation-only basis, the most informed people in the data base management area. The attendance of over one hundred people for five days of study of this important problem attests to the enthusiasm with which the conference was received. All the papers presented at the conference were invited, so as to provide a focus on certain areas of data base technology which the organizing committee felt were important at the time. These included user experience, the presentation of user requirements, discussion on problems of migration, growth, and data independence, and an opportunity for the major software and hardware vendors to reply to the attendees on their view of data bases and what they had heard during the week. Representatives from different manufacturers, from different machine users, from a variety of corporations both in North America and Europe, from the user community and the research community gathered together to discuss mutual problems in a completely non-political and non-competitive environment, and the results were most gratifying. The success of the conference was made evident by the uniform reaction of the representatives who found that their counterparts in competitive organizations had the same problems, the same concepts, the same desire for knowledge and understanding of the way which people were using data base management systems. If the conference accomplished nothing else during its five days at the Hotel Bonaventure in Montreal, it created an opportunity for people to meet, to talk, and to discuss both formally and informally their respective problems in an atmosphere of cooperation and genuine desire to see the technology progress.

The members of the organizing committee were drawn from members of SHARE Incorporated who sponsored the conference as part of SHARE's continuing responsibility for the development and dissemination of technical information on computers and their use. The committee members were:

Thomas B. Steel, Jr., Chairman,
Donald A. Jardine, Program Chairman and Proceedings Editor
Frank Kirshenbaum, Secretary
Stuart W. Trask, Local Arrangements and Transcription
Jon A. Turner, Manager, SHARE Data Base Project.

D. A. Jardine,
Kingston,
November 1973.

ACKNOWLEDGEMENTS

These proceedings of the 1973 SHARE Workshop on Data Base Management Systems incorporate written papers as provided by the authors and edited versions of verbal discussion.

The discussions on each paper and the panel presentations were tape recorded at the conference in their entirety, and were transcribed in full during the conference itself. The detail typing was carried out by staff from Sun Life Assurance Company of Canada Limited under the supervision of Stuart W. Trask of Sun Life, to whom special thanks are due for both conference local arrangements and discussion transcription.

The individual papers and edited discussions were organized and re-typed by Mrs. Heather Ventrudo and Mrs. Alma Moore of Queen's University. Without their superb help in editing, typing, and handling a myriad of administrative duties, these proceedings could not have been produced. Diagrams were prepared by D. P. Goldring.

Final production of camera-ready copy was done by Miss Debbie Foulds of The Equitable Life Assurance Society of the United States.

CONTENTS