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# *DATA BASE DESCRIPTION*

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Data Base Description

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## Editors preface

In Wépion, a tiny village along the river Meuse, in Belgium, an IFIP-TC2 Special Working Conference was held from January 13-17, 1975.

Some 60 invited participants from 12 different countries have actively contributed to "A technical in-depth evaluation of the CODASYL DDL", which was the theme of the conference.

Implementors, users and language designers including some members of CODASYL committees have jointly tried to analyze the DDL, in order to preserve the strong points, and, if needed, to propose improvements for weak points.

The papers included in this book are arranged according to the sequence of presentation. At the end of some papers, a summary of the relevant discussion is given. The summaries are produced by participants of the conference, acting as technical secretaries.

About 40 percent of the time was spent on discussion. Several panel discussions are summarized at the end of the proceedings. A major result of all discussions is a list of recommendations to be presented to the CODASYL DDLC; the editors present a summary of the justifications which lead to acceptance of the recommendations.

The editors would like to express their indebtedness to Miss Maria Briers, who so smoothly organised the local arrangements in such a short time period and to Miss Ardi Grefhorst who managed to keep her head above water in the flood of paperwork; she very competently supervised the organisation of the preprints volume.

The editors hope that these proceedings will lead to a better understanding of the DDL and timely acceptance of a standard in database description.

Apeldoorn      February 17, 1975      B.C.M. Douqué  
Brussels      G.M. Nijssen

BIBLIOTHEQUE DU CERIST



SET AND CODASYL SET OR COSET

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Abstract

The aim of this paper is to evaluate the most salient construct, proposed in the CODASYL DDLC 1973 report, the DBTG-1971 report and DBTG-1969 report, namely the CODASYL set type.

The main function of a CODASYL set type is to serve as data structure building block. Other functions of a CODASYL set type are to provide ordered or unordered access paths or navigational routes and integrity constraints.

A complete data structuring capability is in this paper defined as a facility which permits to describe any structure, which consists of a finite number of sets (of n-tuples) and functions, both in their set-theoretical sense. The CODASYL set type (combined with record types) is not complete in this sense, while it also contains an unnecessary structuring facility.

We will propose a much simpler construct called coset which, combined with record types, is necessary and sufficient in providing data structuring completeness.

Access paths "out of the blue", for which sometimes the LOCATION MODE CALC or a SYSTEM owned CODASYL set is used, can better be described with a separate clause in the record entry.

One integrity constraint provided by the CODASYL set type is a functional constraint. This may optionally be included in the coset. All other constraints now offered by the CODASYL set type, can much better be described in the record entry, or data item entry.

One chapter contains the complete specifications for the major parts of an improved DDL.

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## 1. Introduction

In recent years more and more organizations have started with information systems based on the database concept.

As working definition of the concept database in this paper, we quote a definition as presented in reference 25.

"A database is

- a collection of data,
- which is used by several individuals
- and which is associated with a model".

CODASYL (COntference on DATA Systems Languages), the organization which started COBOL, and still maintains COBOL, has started several years ago with the specification of languages to describe and manipulate data in a database (references 11,12,13)

In the preface of the CODASYL DDL report of 1973 (reference 13) (DDL = Data Description Language) the following is stated: "We must also point out that this report constitutes but a first step in the development of a common data description language, independent of, but common to, many other high-level programming languages".

Many people refer to the analogy of the development and standardization of COBOL and the DDL.

"The computer field is reaching a branch in the data base management road. One branch of this road is the use of a common approach, which may yield the same type of benefits that COBOL has been giving..... Data Base Management will then evolve just as COBOL has evolved. Perhaps some day a standard ANS data base management architecture will emerge, just as ANS COBOL has emerged". (reference 7 , page 13,14)

"A common data base language that is easy and convenient to use and that has a reasonable degree of flexibility would be of considerable help to our users. At present, a language proposed by CODASYL is the only one that comes close to meeting such requirements (CODASYL DBTG 1971)"  
(reference 20 , page 123)

"We believe that the data base management facility, as an enhancement to COBOL, will develop in much the same way that COBOL itself developed."  
(reference 9 , page 13)

"At this point, certain parts of the approved CODASYL proposal are being designed, but implementation in a standard ANSI Cobol compiler is at least a few years off. But the signs are quite clear, the DBTG's effort should have the same impact on data bases and GDBMS as COBOL has had on applications programming".  
(reference 31, page 13)

The first step in the development (reference 13, preface) is however for many DDL supporters already the candidate for a possible industry standard.

"Why not standardize" (reference 18, page 32)

"... currently these specifications represent the only proposal of stature for a common architecture for data base management systems". (reference 8 , page 653)

We are convinced that it is necessary to evaluate the "first step" (reference 13, preface) very carefully, by several methods, one being prototype implementations, (reference 7 , 9 ) another one being the check whether the proposed language specifications (reference 13) do satisfy the functional requirements that were listed in the DBTG 1971 report (reference 12, page 6)

In the preface to the DDLC 1973 report (reference 13) we further find the following: "The CODASYL organization and its Data Description Language Committee is fully committed to sustained improvement of these specifications through maintenance and extensions as user and implementor alike learn more about the field of integrated data structures and their impact upon the information processing industry. Because of this commitment, we invite your comment, and participation in this endeavour..."

In this paper we will partly answer the CODASYL invitation on "improvement" by analyzing the data construct, which is made central in the "great debate" (see reference 1 ) namely the CODASYL set type. We will do this as a user and implementor of a DDL-DML type system.

In this sense, we have followed the advice of R.G. Canning, put forward in reference 7 .

"... we would like to see the DBTG proposals implemented. ... After these initials systems have been developed, debugged, and put to field use, it will be possible to find out what changes are needed". (reference 7 , page 13)