Structured Information Files

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A Wiley-Becker & Hayes Series Book

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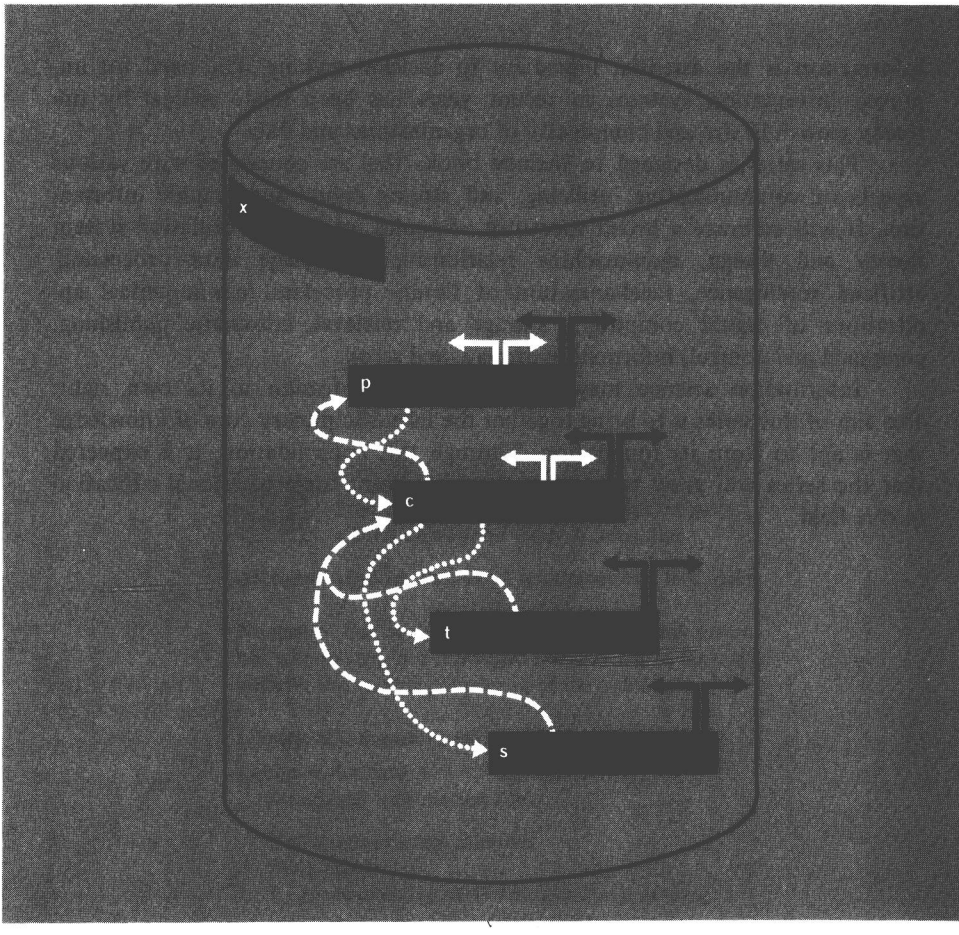
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Preface

A reader of any reference or text should be concerned about where the book will take him. Hopefully, this preface will answer that question.

Computing has come a long way since the early 1950's when the computer was first introduced on the commercial scene. In the early 1960's, IBM introduced the mass market model 1401 (and later the 1410 and 1440). Both business data processing computer accounting departments and manufacturing departments adopted it. But the applications were different. Accounting was largely the task of processing transactions against a master file of data—time-consuming but relatively straightforward.

Manufacture and production required the storage of the component structure or bill of materials of each product as a data base. Requirements planning, shop routing, and dispatching could be performed from this base. These tasks required a data processing operation that could store and retrieve pieces of data in a disorganized, nonsequential fashion. It was termed *direct access* or *random access processing.*

Since many users were doing approximately the same data processing tasks, the vendors developed software packages as an aid and a marketing inducement. Thus by the time the IBM System 360 series was announced in 1964, these packages had reached a fairly sophisticated level.

These programs served a valuable function by eliminating the necessity of completely replicating programs with each user. But there was a negative effect. The design and development of random access files was slowed considerably. After all, why learn how to do it when all you had to do was learn how to use it.

With the 1970's, computing had reached a crisis. Companies claim they are not receiving a sufficient payoff from their computer investment. There are claims that the computer is idle 50% of the time. There are claims that the manufacturers oversold the product.

To appreciate these relationships, perhaps we should return to a basic understanding of computers. With a thorough grounding in basic concepts, the programmer and systems analyst will be in a position to increase the operating and use efficiency of the key commercial data processing systems and applications of the 1970's.

Therefore, this book on structured information files provides the basics in one aspect of computing. It focuses on how to design a random access file. Yet we do examine two key elements. First, how to get into the file or data base and, second, how to operate within the file to achieve the desired results.

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Milwaukee, Wisconsin *Richard A. Kaimann*

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One

Introduction

A. PURPOSE OF THIS BOOK

Information files are a major concern to all corporations. They represent the storehouse of the lifeblood of the organizational body. Without adequate data, the body dies, albeit slowly. With adequate data, the body grows and reaches for maturity and organizational continuity.

These information files reach enormous size. As they grow, the management loses the perspective of what the information was created for, how and where it is kept, and most importantly, what to do with it.

Data processing, with the particular emphasis on computers has added to the complexity. These machines, and the personnel resources that support them, are expensive and often mis-understood. Under the pressures of cost-benefit analyses, the data processing team must produce results.

The key element to producing substantive results is to integrate specific categories of data, judiciously manipulate them, and then feed the management team with meaningful information. The integration of data in a realistic, meaningful situation requires that these data file categories exist. They do exist in the business environment. They also took years and large sums of moeny to develop.

Systems analysts and programmers in the business environment have these data available to them as they develop integrating management information systems. At the same time this is usually the first exposure to computer applications that requires such integration. But, the company has both the data and large scale hardware and storage to handle the task.

Conversely, the student seldom has either the data or large scale data storage capabilities available to him. Therefore, the student is limited to learning just those applications that are either purely computational (such as engineering tasks) or to investigating those information processing techniques where the data are sequential in nature.

The basic purpose of this book is to transcend this learning and conceptual gap. Contrasts will be drawn between typical sequential processing concepts and those where random processing is essential to manipulate a *structured information file.*

A structured information file is a set of categories of data which are related to one another within the category and between categories. These relationships or linkages are constructed to permit logical manipulation in an economic and efficient fashion. The data and their categories are all stored in a random access device.

The method for organizing these data has two very distinct prongs. The first is concerned with entering the file, i.e., how to identify a particular piece of data. The second prong is the movement inside the file. Concepts in the book are presented in a specific context, in terms of actual computer programs. Included are the results of their operation on illustrative applications. The text therefore provides experimental verification of the validity of several of the propositions concerning information files.

The purpose of this book is not an overall view. It is limited to the selection and description of one method and demonstrates that it is feasible. Thus other topics with a global view must be left untreated. The typical user of this book should have had programming exposure—perhaps at this time interested in enlarging his scope of knowledge in the field of data processing by focusing on the area of information files.

Naturally, the audience is not the experienced, high level systems analyst. Indeed, they might be disturbed at some of the omissions. But it should bridge a gap that exists in EDP education between early exposure and practical applications of third generation hardware. Greater degrees of specific information develop as the reader progresses. Those interested in casual study of the subject will do well to read the introductory materials and to follow what others have done in this field. They should not be concerned with the detailed results described in later chapters.

B. THE NEED FOR INFORMATION

Executives and administrators of industry and technology in the last twenty years have faced the problem that with technological progress has come a flood of new information for professionally trained personnel to absorb.[1] Correspondingly, diversity and growth of organizational activity created a mass of administrative data for the manager. Although necessary to translate executive

[1] S. Stuart, "Crystal Balling: New Challenges for Chief Executives," *Infosystems,* January, 1973, p. 22.

duties into action, the vast magnitude of data has surpassed the human processing capability.

Control systems have been established to consolidate data within a firm and to meet the complex needs of management. Multiliferation and elaboration of these systems has been precipitated by human limitations in dealing with great volumes of information. Until the recent past, this problem was usually solved by organizational changes. People and work were organized in such a way that a balance could be set between the data to be processed and the human capabilities to do it.

The application of technology to information processing has been rapidly advanced, both in theory and hardware, since World War II, with the most common manifestation the electronic computer.

Early approaches to the solution of management information needs by computer were simply individual applications converted to automatic data processing. Examples of the piecemeal approach included inventory and material control, accounting and payroll, personnel, sales analysis, etc. More recently, attempts have been made to integrate such fragmented operations into a single computer-based "total information system" for monitoring the activities of the firm.

The total system philosophy has been criticized partly because the approach is inadequate and can lead to additional management problems. The total system approach is not a panacea and one should not assume that system analysis is the most important or only approach. The entire scope of management information requirements cannot be encompassed in one system.[2] The tremendous gap between planning and reality may mean that management is without an information system over a period of years and yet there is no assurance that the system will ever be satisfactory.

In an administrative environment, certain dimensions and features of information requirements cannot be subordinated to the total information system's view. One dimension is the need for varying degrees of data specificity for different functional aspects of management. A more adequate view of management information systems should revolve about a meaningful segregation of these functions. A leading authority has categorized the management functions in three levels, each with significantly different information requirements.

1. Strategic planning which consists of (a) determining corporate policies and objectives, (b) deciding on any changes in these policies and objectives, and (c) deciding on the resources to be devoted to attaining these objectives.

2. Management control, which consists of (a) dividing the strategic plans into logical subdivisions, (b) providing the funds to carry out the subdivisions of

[2] J. Dearden, "MIS is a Mirage," *Harvard Business Review*, January-February, 1972, pp. 90–99.

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