HEYDEN ADVANCES LIBRARY IN EDP MANAGEMENT

Advances in DISTRIBUTED PROCESSING MANAGEMENT

Volume 1

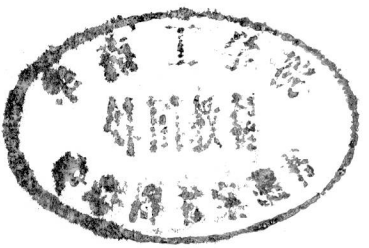
Editor: Thomas A. Rullo

HEYDEN

Advances in Distributed Processing Management

VOLUME 1

Edited by
THOMAS A. RULLO



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PREFACE TO THE HEYDEN ADVANCES LIBRARY IN EDP MANAGEMENT

During the past few years the rapid advances in EDP technology have been more than matched by a flood of published materials. It would be impossible to absorb all this new material and still be able to function in a working environment. Because of the information manager's plight, the HEYDEN ADVANCES LIBRARY IN EDP MANAGEMENT has been developed to provide a more useable information system.

A unique concept in the EDP information management field, the Library consists of six individual series, each dealing with a different area of information processing.

ADVANCES IN DATA PROCESSING MANAGEMENT
ADVANCES IN DATA BASE MANAGEMENT
ADVANCES IN COMPUTER PROGRAMMING MANAGEMENT
ADVANCES IN DISTRIBUTED PROCESSING MANAGEMENT
ADVANCES IN DATA COMMUNICATIONS MANAGEMENT
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These series focus on the most current topics of interest across a broad spectrum. They are not, however, merely collections of papers or readings. Rather, each series presents chapters which have been selected with a specific information need in mind and developed by authors chosen for their expert knowledge and experience. This combination of breadth of material and depth of author knowledge results in a unique and concentrated information management program.

We intend to review the EDP information management field regularly and add to each series so that managers can gain insights into the latest developments. We will also be researching new areas of potential impact. The HEYDEN ADVANCES LIBRARY IN EDP MANAGEMENT is a continuing and expanding effort, and we would welcome any suggestions or guidance from our readers.

THOMAS A. RULLO
Editor

PREFACE

The rapid growth of distributed processing results from a combination of user needs and technological developments. First, the dispersal of decision making and management process in today's organizations has brought the need for processing power at remote locations. The ability to simply enter data and receive output at these sites is no longer enough; hence, the trend toward distributed processing.

The loss of centralized control over all data processing functions by EDP professionals has both advantages and disadvantages. On the positive side are the wealth of new applications that can be serviced by the system, coupled with the fresh perspective that these primarily non-technical users bring to the system, thus eroding some of the mystique of the computer. Conversely, these new users and new applications can cause control problems unforeseen in a traditional environment.

In this book, we have attempted to deal with these problems and opportunities through the accumulated expertise of some of the most knowledgeable individuals in this emerging field. We have stretched our concerns from the technical side of distributed systems planning and development to the impact on the potential users. Some specific systems and applications are addressed in detail.

In "Management of Distributed Data Processing," John Hemak offers a view of the management problems and opportunities associated with information movement in a distributed environment. While he views the explosive growth of distributed data management as being technology driven, he also believes that the greatest future impact will be organizational. In discussing the issues, he emphasizes the basic difference between "functions," which are things to be done, and "tools," which implement the function. In this context, distributed data processing is a tool, while information management is a functional need. The data processing manager will be most successful if he understands his role in managing the "tools" used to process, store, and move information.

The MIS implications of distributed data processing are discussed by Norman Statland in "The Impending Impact of Distributed Information Systems." He views both the advantages and disadvantages of distributed systems as they relate to management information systems. The specific impact on MIS functions, such as the MIS manager, operations, system development, technical support, and quality

assurance are discussed in detail. He predicts that the MIS function will become more of an in-house consulting group and less of a service bureau/software house as distributed information systems take hold.

In "Staffing Implications of a Distributed System," Brian Dunk deals with the impact of distributed processing on people across all areas of an organization. Since the processing power is now placed directly in the hands of the end user, this individual must now assume functions that were previously the domain of the data processing department. In this chapter, Dunk discusses user staff selection and training with special emphasis on the Network Coordination function. He also provides guidelines for the development of a System Introduction Manual, a System Operation Manual, and a System Training Kit. Through the use of these mechanisms, the users are brought into a closer relationship with the system and formal training requirements are minimized. In discussing the Conversion and Implementation process and ongoing operational support, he again emphasizes close involvement of the end user.

In "Communications Planning for Distributed Processing," August Kelsch stresses that since a corporate data processing system is an integrated system, the planning for a change such as data communications support for distributed processing must consider the entire system. Thus, one must consider the addition of communications as it affects people-related functions such as applications programming, equipment operation, administration, systems programming and planning. He also deals with their effect on the existing host processors, data bases, and application code, as well as their effect on the existing communications systems. Data Security and Pacing are discussed as part of the overall planning process, and special attention is paid to the data communication processor's role. Finally, he looks at the potential of the distributed processor itself to assume some of the communications burden.

Bennett P. Lientz, in "On the Use of Simulation in the Design and Implementation of Distributed Systems," proposes the organized employment of computer-based mathematical and statistical tools in the planning and design process for distributed systems. In this chapter, he presents a general methodology for planning distributed systems using simulation as the major ingredient. He both reviews the simulation model developed to support analysis and presents applications of the methodology.

In "Effects of Distributed Data Entry in the User Environment," Jim Quinton describes the process that Pan American Airlines used to develop their distributed data entry system. In this case study, we are taken through the initial data entry time study to detailed application analysis and user needs studies. Both the successes and the failures in the process are discussed. Specific analyses of available systems are presented as an appendix to this chapter.

The technical evolution of word processing and its impact on how people work are discussed by Frank and Mary Greenwood in "Pitfalls and Potentials of Distributed Word Processing." They have covered standalone word processing, distributed word processing, communications utilities, and electronic mail. In fact,

they view the office of tomorrow as a telecommunications network connecting data processing, word processing, image processing, and reprographics. All of this work will be distributed so that the processing power will be located where it is needed.

In "Architecture Considerations for Local Computer Networks," Ken Thurber surveys this rapidly developing area of interest and provides a definition of LCNs, a taxonomy of LCN architectures, a discussion of currently identified systems from each category, and a motivation for LCNs. The design and operational issues of LCN are discussed in terms of network components (both hardware and software), configurations of these components, network operation, performance and user-oriented concerns. Technical discussions of the different architectures provide insight into both the operational characteristics and system philosophy.

In "The Distributed Data Network," Joseph Springer describes the Distributed Data Network, which is a high-performance, intercomputer communications facility developed by RCA for the upper end of the distributed system scale. This detailed view of a single system provides insight concerning both the technological potential and applications capabilities of this class of system. The technical characteristics and operating parameters discussed provide a reasonable framework for understanding the basic concepts of a system at this level.

While the "Distributed Data Network" deals with the more sophisticated end of the distributed processing field, there is at the opposite end of this continuum another means of supplying processing power directly into the hands of the end user—the desk-top computer. In his chapter on the subject, Ed Bride traces the origin and evolution of these devices, provides some interesting comparisons between them and more sophisticated alternatives, and then describes the key factors in system acquisition. Since the desk-top computer evolved either "up" from the hand-held calculator, or "down" from minicomputers, it draws upon both technologies. The rationale for including this chapter in a book on distributed systems is simply that the technology of this growing field has already begun to merge with the devices used in distributed systems. Moreover, desk-top computers do offer a viable processing alternative to distributed networks for many applications.

Finally, Earl Joseph takes out his crystal ball, looks into the future, and discusses the likely routes for distributed processing beyond the next 5 years and into the 1990s. In "Distributed Processing Futures: Trends Toward Smarter Systems," he sets the stage for this projection by listing all of the major changes in computers during the 1950s, 60s, and 70s, and by viewing the likely developments in the 80s and 90s as they will relate to distributed processing. Considering both the potential technological developments as well as organizational and applications issues, he envisions "smart" DDP machines which will free-up more people in the business world through the impact of "the office of the future" and will revamp the rest of our society as well. This new kind of relationship between people and machines will foster positive societal changes as human interactions are brought into a different plane.

THOMAS A. RULLO

CONTENTS

Chapter 1

MANAGEMENT OF DISTRIBUTED DATA PROCESSING

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Prognosis:

1. Data processing professionals will be giving up control over the tools that process data for their organizations.
2. Data processing users will be giving up control over the data they generate for their organizations.

These predictions are two of the direct results of the increased use of distributed data processing. Do they evoke fear or trepidation? They might, but they need not. They are a natural outgrowth of the increasing speed and complexity required to manage today's organizations. Making the assumption that more timely and accurate information is useful and necessary for the effective operation of today's organizations, this chapter establishes a historical perspective, provides a framework to assist the data processing professional for managing distributed data processing, and outlines some areas of opportunity for both the data processing professional and the data processing user with the increased usage of distributed data processing.

The growth of teleprocessing systems is a well-established fact. What is also commonly recognized is that the marriage of computing and communications (the two elements which have made distributed data processing a reality) will cause profound changes in organizations and industries in the future. A recent *Harvard Business Review* article, which reflects on the growth from the imagined hindsight of a 1990 perspective, states: "How significant was the information revolution of the mid 1980's? . . . the winners were not for the most part merely lucky back in the 1970's. They saw the revolution coming and prepared themselves by forecasting the impact on their organizations and taking appropriate exploitive (or evasive) action. The losers scoffed at the impending changes and perhaps never knew what hit them."

Whether this prediction will come true can be argued.

The fact is that, today, distributed data processing and its associated fields are

the most rapidly growing segment of the data processing industry. These associated areas include word processing, teleprocessing systems, centralized versus decentralized computing, shared voice and data systems, and networking concepts, among others.

There is no question that technology is the driving force behind the current growth of distributed data processing systems. Two of the major technological forces behind the increased cost-effectiveness of these systems are:

1. Basic device technology which is allowing increased densities (and lower costs) of integrated circuit chips for both memory and processors (i.e., cost-effective computing).
2. Increased flexibility and cost-effectiveness of communications systems, e.g., fiber-optics, satellite links, and digitized voice (i.e., cost-effective communications).

It is projected that by 1980, 90% of all data processing systems will have some form of telecommunications. The growth in the marriage of computing and communication technology is the major reason for the growth of distributed data processing.

Other chapters of this book describe in greater detail these technological issues. A wide variety of information is available on the technical aspects of present-day teleprocessing systems. The gap, though, is in any kind of conceptual base to be able to plan for, manage, and make positive decisions relating to distributed data processing end-user organizations.

For all the information related to the use of the technology of distributed data processing, little information considers the impact on the end-user data processing organization, and specifically, on the job of managing the data processing function. It is the intent of this chapter to address that impact.

Some of the questions that data processing managers are asking or should be asking are:

1. "How do I plan for distributed data processing when changes are occurring so fast and I don't really understand distributed processing anyway?"
2. "Will distributed data processing affect my data processing organization? If so, how?"
3. "Are there better ways to manage systems involved with distributed data processing?"

This chapter will also attempt to answer these questions.

The importance of developing an overview of distributed data processing is to be able to clarify the underlying needs, not in technological terms, but in terms of user requirements. This approach is generally not the one taken with today's systems.

Historical Perspective

Distributed data processing is a recent addition to the technical jargon of the data processing industry. As it has been more widely used, it is developing the same