

DATA
BASE
MANAGEMENT
WITH
dBASE II

CHARLES W. McNICHOLS

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Data Base Management with dBASE IITM

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To my dad, a first generation systems analyst

Preface

The statement has been repeated so many times that it has become a cliché: the best way to build a microcomputer-based business system is to find computer programs (software) to satisfy information-processing requirements, then buy hardware which will run that software. Three software acquisition strategies are available to business owners and managers following this advice. General purpose or *horizontal* packages support functionally oriented activities, such as mailing list maintenance and general ledger accounting, at a low cost. Because these systems must appeal to a broad market to keep their cost down, they often are not a good fit to the particular needs of a specific business.

More specialized requirements are often satisfied with packaged software developed for a specific industry or profession, such as insurance, medical, real estate, and so forth. These are called *vertical* systems. They are less widely sold, and thus are usually more expensive than the general purpose or horizontal category, but are often provided with some installation assistance and a limited amount of customizing for the specific business organization.

The third alternative is custom software development, involving detailed analysis of the information requirements of a business, followed by design and programming of a system specifically tailored to that business's needs. In many cases, this alternative is out of the question because of its high cost. Analysis, design, and implementation of software is a labor-intensive process—and the laborers in this field do not labor cheaply.

There is a lower-cost alternative to custom development for situations which cannot be adequately treated with horizontal or vertical software packages. This alternative involves user-performed or user-assisted analysis of information needs, followed by software implementation using data base management systems. This alternative is explored in detail in the following chapters.

This book is intended for three major groups of readers. First, business users of dBASE II who are willing to serve as their own systems

analysts and designers will find advice on performing these functions, along with dBASE II software examples from a number of functional areas that can be adapted to a specific business's needs. In some cases, the potential business user of an automated system may find it effective to employ the services of a computer consultant rather than learning to perform analysis and design functions. Such consultants define the second group who should find useful material in the dBASE II software examples.

The third group addressed consists of students in an introductory course in systems analysis and design, particularly those with an inclination toward developing small business systems. To use this book effectively, these students need only an introductory knowledge of computer terminology, basic hardware concepts, and some introductory business courses—but not computer-programming expertise. The application-development approach represented by dBASE II makes possible the production of relatively sophisticated data-processing systems with much less programming and debugging effort than is required with languages like BASIC or COBOL. A systems design course taught to students who have access to a microcomputer and dBASE II could require development of a more realistic business system than could reasonably be implemented with a conventional programming language during a single term. With the use of student teams, analysis, design, and implementation of a comprehensive system for an actual small business situation would be possible. Thus, dBASE II or other systems like it could prove to be a more efficient tool for training business systems analysts than exercises based on BASIC or COBOL. The usual approach to information systems education separates applications programming, systems analysis/design, and data base topics into different courses because of the extent of the material to be covered in each. With dBASE II and a small business systems application environment, it is feasible to integrate an introduction to all of these topics in a single quarter or semester.

The book has four major objectives:

1. Presentation of systems analysis and design techniques suitable for microcomputer-based business systems. Topics in this section represent a subset of material usually covered in entry-level system design courses, with emphasis on CRT-based systems.
2. Introduction of data base management systems (DBMS) as a software development alternative for business systems. The advantages of the DBMS approach, as well as material helpful in selecting a specific microcomputer DBMS, are covered.

3. Teaching the effective use of a specific DBMS—dBASE II. An application-oriented presentation of this system's capabilities is provided, building to a high level of sophistication in dBASE II usage.
4. Presentation of typical business subsystems, their design and implementation in dBASE II. An integrated business system is developed using dBASE II as the implementation medium. Enhancement and customization suggestions are provided to assist business users in adapting the software to their needs, and to provide project examples for student readers.

dBASE II is available for almost all computers using the CP/M-80 or CP/M-86 operating system, or MS-DOS, and its derivatives, such as IBM PC-DOS or Zenith Z-DOS. The example programs have been developed under PC-DOS on the IBM Personal Computer, but dBASE II's high degree of portability should allow their implementation on most other systems for which dBASE II is offered. Version 2.4 of the DBMS is the latest available at the time of writing. For the benefit of users who have not upgraded to the latest version, Version 2.3 capabilities have been assumed in developing the examples. All of the example programs have been run under Version 2.4, and modifications to the file repacking programs that will make them operate more efficiently when this version is available are noted in comments in these program listings. Enhanced capabilities, inclusion of help files, and correction of a number of errors from earlier versions make the nominal cost of acquiring the latest version a worthwhile investment.

The author would like to thank his editor, Ted Buchholz, and the book's three reviewers for their thoughtful suggestions. Sins of omission or commission remain, however, the responsibility of the author.

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chapter one

MICROCOMPUTER- BASED INFORMATION SYSTEMS

THE MICROCOMPUTER REVOLUTION

Microcomputers—are they just a fad or do they foreshadow a revolution in our personal and work lives that will equal the industrial revolution in significance? This chapter examines the question through an introduction to microcomputer capabilities as they relate to the maintenance of data bases in personal, professional, and business applications.

Microcomputer Capabilities and Limitations

Small business and personal computers and the Pac-Man machine at the local game room have more in common than meets the eye; and this kinship, along with the compactness of microcomputer equipment, causes speculation that they may be little more than toys, not suitable for serious business work. A look at performance capabilities of three classic business data processing computers representing mini-, main-frame, and microcomputer examples, helps dispel this concern (Figure 1.1).

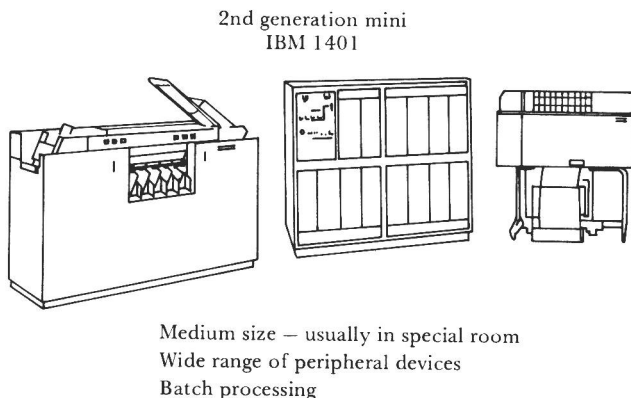
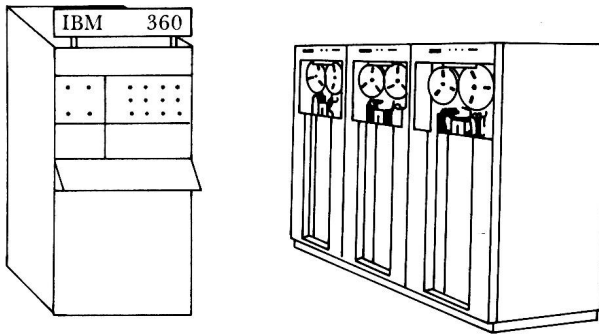


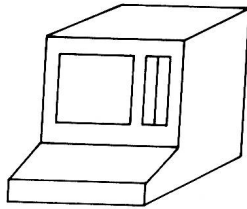
Figure 1.1. Attributes of three classic business computers.

3rd generation main-frame
IBM 360/40



Large physical size — special room required
All peripheral devices
Most applications batch oriented
Faster than microcomputer

Contemporary micro using
“Z80” microprocessor



Desk-top size — ordinary office environment
Much faster computations than 1401
Very inexpensive — cost less than 1 month's
360 rental
Interactive processing orientation — narrower
range of peripherals

Figure 1.1 (continued). Attributes of three classic business computers.

We need not go all the way back to the first vacuum tube systems to make our comparisons—the size and cost of early machines limited their use almost exclusively to very large government and business organizations. By the second (transistorized) generation, however, smaller systems were sold in large quantities, and became practical for medium-sized business applications. The most popular of such machines was the IBM 1401, which opened up a significant part of the smaller business automation market. Many 1401s were sold with only 4,096 characters of memory, punched card input and printer output,