

Third Edition

# *Computers and Information Processing*

WILLIAM M. FUORI — LOUIS V. CIOIA





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Third Edition

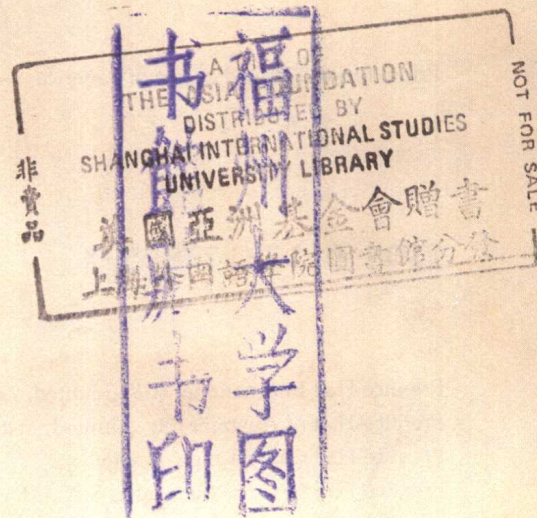
# COMPUTERS AND INFORMATION PROCESSING



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# PREFACE

## GENERAL PURPOSE

Today's educator must prepare each student to enter a world that has become heavily dependent on computers for its very survival. There can be little question that automation and the use of computers in every area of human endeavor is the driving force for change today. Educators at all levels, from the high school to the community college to the university, have recognized the impact of the computer and have had the foresight not only to recommend but, in many instances, to require that all students be instructed in the nature and uses of computers as an integral part of their formal education. To quote Dr. R. L. Bright, when he was Associate Commissioner for research of the United States Department of Health, Education, and Welfare, ". . . [anyone who graduates from a college or university] without being instructed in the use of computers has been severely cheated."

We have written from the premise that each student is a potential user of computers and will benefit from an understanding of computers. Students soon come to realize that with a little knowledge and understanding, the mystery and awe with which they might have viewed the computer will disappear, and the computer can begin to serve them as the useful and essential tool that it was intended to be. Therefore, this text provides a basic understanding of what a computer system is, what it can do, where and how it is currently being used. Perhaps more importantly, this book can help the student learn how to use a computer.

The first two editions of this text were a huge success. They were adopted by universities, two-year colleges, and vocational schools nationally and internationally. We feel the attraction was in a large part from the option the books

provided the instructor to offer hands-on computer experience. Through the use of tutorials and other computer exercises, students became excited and encouraged as they learned the magic and power of a computer first hand. Therefore, in this third edition, we enhanced the hands-on aspect of our package by providing increased tutorial coverage in the companion applications book. This companion book, entitled, *Applications for Computers and Information Processing*, contains four tutorials that guide a student, step by step, through the popular microcomputer operating system DOS, and applications software such as Lotus 1-2-3, WordPerfect, and dBASE.

This text is recommended for use in a one-semester survey course or in an introductory computer course for general education, or for the business, computer science, or information processing student. Once the student has completed this one-semester course, he or she will be prepared to function effectively in our computerized world or pursue more advanced studies in the field of computers.

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## ATTRIBUTES OF THE TEXT

In addition to a thorough and comprehensive treatment of the subject matter, you will find the text contains the following attributes:

### **Hands-on Approach**

Recognizing the importance of knowing how to use a computer, we have included four tutorials on the use of DOS, WordPerfect Versions 5.0 and 5.1, Lotus 1-2-3 Versions 2.01, 2.2, and 3.0, and dBASE III PLUS. Hands-on computer activities are provided at the end of each tutorial.

### **Currency**

With new developments taking place daily in information processing, it is essential that the material presented in a textbook represent the state of the art. Current topics that are given extensive treatment in this edition are operating systems, artificial intelligence, expert systems, networking, wide area distributed data processing networks, local area networks, communications systems, the automated office, the integration of micros with mini- or mainframe computers in business and industry, lap-top microcomputers to mainframe supercomputers, fourth-generation languages, fifth-generation computers, and robotics! In addition, the *Third Edition* features new coverage of supermicros and workstations, the graphic user interface (GUI), computer assisted software engineering (CASE), desktop publishing, computer viruses, RISC computers, and the latest developments in microcomputer technology.

### **Readability**

From the outset, we have tried to keep the student's needs and interests in mind. Realizing this material can sometimes seem dry and irrelevant to some, we have written in a lively and engaging manner. We want this edition of the text to be as meaningful and enjoyable to its readers as was the previous edition. Concepts, no matter how technical or complex, are explained in a simple, down-to-earth style with many references to real-life situations. When students see how computers can relate to their world, whether it's on the job or at home, they become interested; often, they get downright excited.

## **Flexibility**

A top-down structured approach was used throughout that provides the instructor with the flexibility to alter the order of presentation of topics or modules within a chapter or unit, or to skip a particular topic or module altogether, without affecting the continuity and effectiveness of the overall presentation. This was accomplished by introducing concepts when needed to support a particular topic or module and not in a predetermined or set order. Terms are defined when they are introduced into a discussion. In the rare event that a term or concept that has not been adequately defined or explained in a previous topic or module, or covered in the instructor's presentation, is used in a module, an unprecedented glossary (of more than 450 terms) and index (in excess of 2000 entries) is at the student's disposal and should provide the needed assistance.

## **Integration of Microcomputers Throughout**

The personal computer or microcomputer is no longer an interesting plaything for the computer hobbyist. It is fast becoming a familiar sight in homes and offices across the land. Many small businesses rely exclusively on microcomputers for their processing needs, while a number of larger companies continue to employ mini- or mainframe computers exclusively. The trend today is to network computers. Microcomputers are being hooked up to terminals and other micros in various networking schemes. Personal computers are being integrated into mini- and mainframe configurations to form more useful and powerful systems. Consequently, we have devoted an entire chapter to microcomputers and have emphasized micro-to-micro and micro-to-mainframe connections throughout.

One of the most asked questions today is, "What's the best microcomputer to buy?" The answer naturally depends on your needs. Realizing the need for help in this area, we have presented material concerning microcomputers in such a way that by the time the reader completes the book, he or she will be well prepared to go out and make a wise selection.

---

## **FEATURES OF THE TEXT**

### **Tutorials**

Recognizing the importance of prewritten, or packaged, commercial software like operating systems, word processing, electronic spreadsheets, and database management systems, we treat this all-important topic in three chapters in the text and in four complete tutorials (DOS, WordPerfect Versions 5.0 and 5.1, Lotus 1-2-3 Versions 2.01, 2.2, and 3.0, and dBASE III PLUS) in the companion applications book. From our own experiences as well as from research and comments received from instructors, business professionals, and students from all over the country, knowing how to use the computer as a tool has become at least as important as knowing about computers. This text is a response to that need.

We have spent much time and effort researching the topic and feel our treatment and presentation of prewritten software tutorials to be the most thorough of any introductory computer book yet published. Extra care was taken to present this material in a clear, natural, and easy-to-follow manner. Our writing assumes the reader has little or no prior knowledge of the subject matter. Teacher and student alike will find this timely information to be particularly interesting and of great practical value.

If a computer or software package is not available, each tutorial can still be used profitably and effectively. Because the illustrations shown in each tutorial are the computer screens produced by the actual software package, reproduced in exact detail, reading the step-by-step, keystroke-by-keystroke tutorial will be like looking over a friend's shoulder and directing him or her as to the steps to take—only the excitement of using the computer and the sensation of actually depressing the keys will be missing.

## **Boxed Features**

To a degree, most books of this type are obsolete the day they are published. With this in mind, virtually every chapter contains boxed features composed of current material from a recent article or book. These materials were carefully selected to keep the reader informed about the latest computer-related topics and issues. Written in a motivational and entertaining manner, information of this type enriches the text material and relates the book's contents to the student's real world.

## **Computer Trivia**

Most students enjoy reading about computer lore, culture, and fancy. We have included a number of tantalizing tidbits both to inform and to enliven and amuse. Readers will learn about the world's most expensive computer equipment, tips on computer safety, the greatest computer crime on record, the first computer "bug," some word about Elvis' whereabouts, and more.

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## **UNIQUENESS**

This book is different from others that appeal to students in the data processing, computer science, information processing, and related areas in several ways:

1. Understandably, instructors enjoy having the freedom to skip certain topics and to teach others out of order while maintaining continuity and cohesiveness in their overall presentation. This text affords instructors this capability to the greatest extent possible by virtue of its modular construction. Concepts are presented only as needed to support a particular topic or module and not in any arbitrary order.
2. As mentioned earlier, there is currently a nationwide outcry for people to learn how to use computers to perform all kinds of commercial and personal tasks. Chapters 12 and 13 provide a broad overview of word processing, desktop publishing, electronic spreadsheets, database management, computer graphics, and communications software. The tutorials presented in the applications book are designed to be used with a computer and corresponding software package. They will guide you step by step through the major functions of the software package in a simple, easy-to-follow manner. As we pointed out earlier, if a computer or the needed software is not available you will still reap most of the benefits of the tutorial, but only as an observer and not as a player.
3. The material presented in this text has been successfully field tested at Nassau Community College. The enthusiastic response has convinced the authors that the material is interesting, informative, and easy to understand.
4. The text includes a substantial number and variety of exercises at the end of each chapter. Included in these exercises are two different types of short answer questions (true/false, fill-in, multiple-choice, or matching), problems, research projects, and a crossword puzzle to reinforce the reader's understanding of the concepts and vocabulary presented in the chapter in a challenging and enjoyable

manner. The answers to the even-numbered short answer questions are included. The page number in the text where the correct information can be found is provided after each false answer.

5. Current and related topics are presented in highlighted boxes to acquaint the student with some of the more practical aspects of the subject matter as well as to stimulate interest in exploring the subject matter in greater depth.
6. Timely and related cartoons are integrated throughout the text. These have proven to be both interesting and informative in the authors' field testing of the material.
7. Amazing but true facts concerning the people and events surrounding the fascinating world of computers—a believe-it-or-not of computer trivia—are noted.

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## STRUCTURE OF THE TEXT

The text is organized to facilitate the student's comprehension of the relevance of information processing in business, science, and industry. To accomplish this end, we have divided the text into units as follows:

### Unit I

In this unit, the brief but spectacular evolution of the computer is outlined and the impact of computers on business, science, and industry is graphically illustrated. This will help clarify why this study is being undertaken. Additional materials presented in this unit will prepare the student to begin a study of programming or to work with available software packages. Upon completion of this first unit, the instructor may freely choose if, when, and in what depth these topics will be presented.

### Unit II

This unit describes the machines that comprise a data processing system and the programs that control them. A thorough and complete treatment of micro-computer and mainframe systems is provided. Particular attention is paid to the numerous conceptual and architectural similarities between the micro- and mainframe computer systems. In addition, this unit will focus on data-entry, input/output, file-processing, and data communications. The concepts and inter-relationship of distributed data processing including local area networks, multi-user systems, and bulletin boards are explained in detail.

### Unit III

Unit III is devoted to an in-depth discussion of data structures and databases, operating systems, computer languages, program preparation, and problem solving concepts. Here we discuss the functions of an operating system and examples of operating systems used with the smallest microcomputers to the largest mainframes. Then we discuss structured programming and other top-down programming techniques used to produce clear, efficient, and well documented solutions to problems found in business, industry, and our daily lives. The student will learn how to prepare an application for programming, to logically analyze the problem to determine the sequence of operations that will efficiently solve it by computer, to represent this solution graphically utilizing a program flowchart or pseudocode, and finally to use the flowchart or pseudocode to prepare a computer program.



Today, more than ever before, people are relying on packaged software to produce the greatest possible return from their computer for a minimum investment of time, effort, and money. These packages fall into certain distinct areas, namely word processing, desktop publishing, spreadsheet analysis, database design and implementation, computer graphics, and integrated software packages. We discuss each of these generally in Chapters 12 and 13. Tutorials on the three most popular of these packages (WordPerfect Versions 5.0 and 5.1, Lotus 1-2-3 Versions 2.01, 2.2, and 3.0, and dBASE III PLUS) are provided in the applications book.

## **Unit IV**

In this unit we explore the more sophisticated topics of systems analysis and design and information systems. Application areas discussed include electronic mail, teleconferencing, videotext, telecommuting, and public utility services like THE SOURCE, PRODIGY, and CompuServe.

## **Unit V**

In Unit V, we answer many of the questions asked by students in an introductory computer course. We answer such questions as "What careers are open to me if I pursue my studies in information processing? Where is this field headed? What lies ahead? Is HAL in Kubrick's production of 2001 or in 2010 a possibility? What is artificial intelligence? Can computers think and learn? Will I be able to carry on a conversation or speak to a computer in normal everyday English in the next decade or two?" We shall summarize what the experts see for our futures in their crystal balls.

## **Tutorials**

The DOS, WordPerfect, Lotus 1-2-3, and dBASE tutorials contained in the applications book can be used by the instructor as a practical illustration of the software packages most commonly used in business today. How better can one understand the use of prepackaged software than by studying the biggest sellers in each respective area?

## **Appendixes**

The appendixes include a discussion of computer number system and data representations, an extensive glossary of computer related terms, and answers to even exercises (including for each false answer a page reference(s) to where the correct information can be found).

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## **INSTRUCTOR'S RESOURCE PACKAGE**

### **Instructor's Resource Manual**

To aid the instructor in structuring the course to fit the interests and backgrounds of his or her students, a teacher's resource manual is available. The manual is divided into four units.

Unit I includes, for each chapter:

- detailed guide to be used as a lecture outline
- discussion questions and class activities
- answers to the end of chapter activities

Unit II provides suggestions and outlines for presenting DOS, wordprocessing, electronic spreadsheets, and database software.

Unit III consists of suggestions for presenting BASIC.

Unit IV consists of a guide to the color transparencies with lecture hints on employing them effectively in the classroom.

## **Test Item File**

Completely revised for the third edition, the test item file contains nearly 3000 test questions. The test bank is divided among multiple choice, fill-in, and essay questions. Each question has been rated according to level of difficulty. In addition, the corresponding text page is provided for each question to facilitate reference.

## **Test Bank**

The Test Item File described above is provided on Prentice Hall's Test Manager. This computer program allows maximum flexibility in designing your tests. The Test Manager will allow you to construct tests using questions that you specify or draw at random from Prentice Hall's question files, or you can create your own question files containing test items keyed to each chapter in the text. You can print up to nine versions of the test using today's most popular wordprocessing programs.

## **Prentice Hall/New York Times Contemporary View Program**

When the text is adopted, instructors and their students will receive a complimentary newspaper "student supplement" containing recent articles. These articles bring classroom topics to life and help expand a student's knowledge beyond the textbook and into the world in which we live.

## **The New Literacy: An Introduction to Computers**

Developed by the Annenberg Foundation, this video series presents a comprehensive overview of the computer, data processing terminology, computer applications, and typical computing environments. In total, there are 26 segments contained on 13 video cassettes. Each institution is entitled to one video cassette per every 50 copies of the text adopted.

## **Video Professor Series**

The Video Professor Series is a series of microcomputer software videos that provide step-by-step instructions on how to use today's most popular software programs. Adopters are eligible for these videos as an alternative to the *The New Literacy: An Introduction to Computers* series.

## **The ABC News/Prentice Hall Video Library**

The Library offers high-quality feature and documentary-style videos from any or all of the six programs included in this exclusive Prentice Hall agreement: *Nightline*, *World News Tonight/American Agenda*, *Business World*, *The Health Show*, *On Business*, and *This Week with David Brinkley*.

## **Study Guide**

To assist the student in understanding and learning the material presented in the text, and to make the learning experience more enjoyable, a study guide is available and can be used. The study guide is subdivided into three units:



Unit I provides the following for each chapter:

A summary which emphasizes the main points of each chapter. Sufficient border space is available for student note taking during class lectures.

A vocabulary drill

Matching exercises

True/false exercises

A crossword puzzle utilizing chapter related terminology

Projects to be completed outside of class. These can be specifically assigned by the instructor or used as voluntary extra-credit assignments for the more enterprising students.

Unit II contains exercises that require the student to use the software packages of the type presented in the tutorials. Each exercise is designed to reduce anxiety, increase motivation, and provide a useful and meaningful experience for the student on a self-paced independent-learning basis. The exercises are of two types:

*Performance exercises*—distinct and clearly delineated tasks that can be carried out using the data files provided.

*Project descriptions*—descriptions of complete projects that can be fun to complete and of immediate benefit to the student.

Unit III contains answers to selected exercises in the Study Guide as well as solutions to the crossword puzzles.

## Transparency Acetates

One hundred twenty full color transparencies are provided upon adoption of the text. Sixty of the acetates come directly from the text and the other 60 are from outside sources. The Instructor's Manual contains a complete guide to each transparency and how to use them effectively in the classroom.

## Applications for Computers and Information Processing, 3/e

Written for the beginning student, *Applications for Computers and Information Processing, 3/e* will take you step by step through DOS, WordPerfect 5.1/5.0, Lotus 1-2-3, and dBASE III PLUS. This two-color, highly visual text introduces the student to the major skill areas in each package, skills which are then reinforced by a series of hands-on activities.

## Basic Supplement

This supplement deals exclusively with the BASIC language. The BASIC instruction set presented is universal and is available in virtually every version of BASIC. This material is provided in five distinct lessons; the instructor can choose the most appropriate point(s) in the course to present the lessons.

## A CONTEMPORARY VIEW

THE NEW YORK TIMES and PRENTICE HALL are sponsoring A CONTEMPORARY VIEW: a program designed to enhance student access to current information of relevance in the classroom.

Through this program, the core subject matter provided in the text is supplemented by a collection of time-sensitive articles from one of the world's most distinguished newspapers, THE NEW YORK TIMES. These articles demonstrate the vital, ongoing connection

between what is learned in the classroom and what is happening in the world around us.

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# ACKNOWLEDGMENTS

It is with great pleasure and gratitude that we acknowledge the many people whose expertise and encouragement contributed immensely to the creation of this book. A project of this magnitude could not have been completed without the help of many talented and committed people.

We were indeed fortunate to have worked with the same extraordinary team of Prentice Hall publishing professionals who distinguished themselves throughout the production of the first edition of this book. The enthusiasm with which they accepted the challenge to create an even better third edition was truly inspiring. The cooperation, dedication, and perseverance of our friends and colleagues at Prentice Hall has been unwavering. Because of their collective efforts, this experience has been as rewarding and enjoyable as the previous editions. Our heartfelt thanks to all.

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the book. We have been extremely fortunate as recipients of her creative genius. Karen Fortgang, production editor, is to be congratulated for her exceptional efforts to coordinate the many facets of this project. Again, Karen was faced with a monumental coordination problem with the many books in the package being in different stages of production from raw manuscript to film proofs at one time. But, as the finished product attests, a true professional like Karen will always rise to the occasion. Thanks again for doing a great job of keeping the project together and on schedule. Kathy Marshak, copy editor, brought a personal commitment to the copy editing of this manuscript. Perhaps this is because Kathy will always have a place in her heart for this project, having been production editor on the first edition. Now her energies are principally directed to raising little David Marshak (born as the first edition was completed) and his sister Emma. Lorraine Abramson, Ron Weickart, and John Hargreaves from Network Graphics (Hauppauge, New York) deserve applause for their sophisticated yet exciting art renditions. Without question the best team of artists we have ever worked with, they are absolutely in a class by themselves. In a book of this type, sudden changes and new ideas are not unusual. They welcomed our ideas and were quick to respond to our suggestions. As you can see, the drawings and line art are simply beautiful. We were fortunate to have their services.

A special word of thanks to our colleagues at Nassau Community College for their contributions, helpful suggestions, and encouragement. We are especially indebted to Tony D'Arco, Joe Pacilio, Larry Aufiero, Mauro Cassano, Frank Avenoso, Stephen Solosky and Thomas Taylor, each of whom contributed their unique talents to the success of the project.

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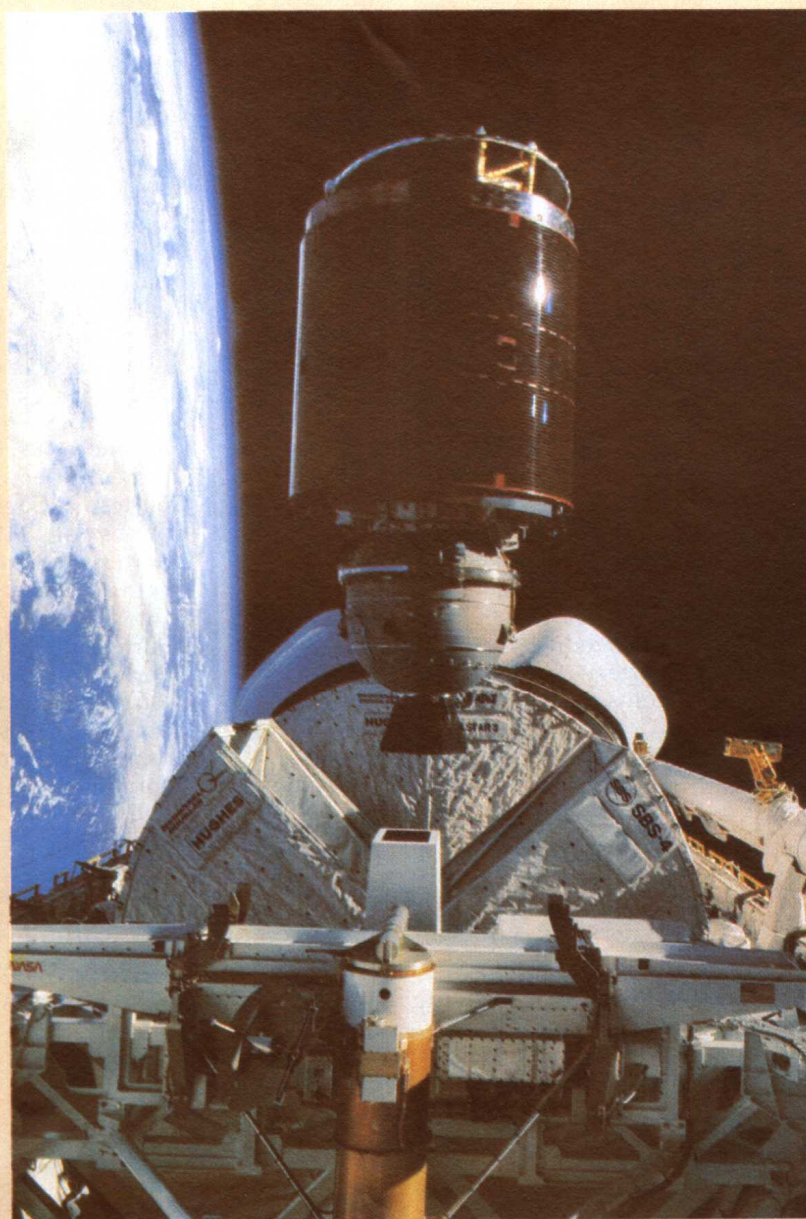
To those of you who will be reading and learning the many facts and concepts in our book, we hope you find the material exciting and challenging. Suggestions for improving the text or any of the supplemental materials will always be welcomed. Send them to:

Dr. William M. Fuori and Louis V. Gioia  
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 Stewart Avenue  
 Garden City, N.Y. 11530

We will respond to all correspondence.

*William M. Fuori*  
*Louis V. Gioia*





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