micro COMPUTER books

Computer Consciousness

SURVIVING THE AUTOMATED 80s

H. DOMINIC COVVEY • NEIL HARDING McALISTER

COMPUTER CONSCIOUSNESS: SURVIVING THE AUTOMATED 80s

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This book is dedicated to
Bill Gruener, Mary Clare McEwing,
and Debbie Schreiber . . . without whom, nothing!

Foreword

By 1984, computer systems will in each year record thousands of details on the activities of every individual. By 1984, computer systems may transfer funds automatically from a consumer's bank account as soon as he or she makes a purchase. By 1984, many assembly lines will be almost totally automated, with only a few residual employees remaining to monitor the machines. By 1984, many businesses with five or more employees will manage their finances and produce their documents with the aid of computers. By 1984, many working professionals — doctors, lawyers, accountants, architects, scientists, engineers — will be using computers to enhance their creativity and productivity in daily work. By 1984, stories in most North American newspapers will have been typed into a computer, edited with the aid of a computer, and typeset by a computer program. By 1984, many upper middle class and upper class homes in North America will have computers, which will be used for entertainment, for education, for the retrieval of facts, and for household management. By 1984, even many animated films will be produced with the aid of computers, which will ink character outlines, paint their interiors with solid colors, and perform crude in-betweening from key frame to key frame.

These are not blue-sky predictions. They do not depend upon whether those active in the field of "artificial intelligence" succeed in the construction of intelligent robots. Rather, the statements are conservative projections from trends and conditions that exist today.

There is significant disagreement about whether some of these changes are for good or for evil. There is significant disagreement about the pace of change that we should expect. There is some

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disagreement about whether this change can be controlled, although most people feel that it cannot be controlled. However, there is little disagreement with the statement that most people are fearful of these changes, that they feel intimidated by computer technology, that they feel they do not understand computers, and, even worse, that they *cannot* understand computers.

This is a pity, because as Theodor Nelson puts it so well, "Any nitwit can understand computers; and many do." Nelson has coined the term "cybercrud" to denote "putting things over on people using computers." Some of the most insidious fiction perpetrated by the computer priesthood of the 1960s and 1970s was that computers are mysterious and that only mathematical geniuses can understand them. And these notions have been swallowed hook, line, and sinker by a public mistrustful of this new technology, alientated by other technologies, and generally too accustomed to abrogating their judgment to specialists.

Dominic Covvey and Neil McAlister have produced for a lay audience a document that presents and explains clearly many of the fundamentals of modern computer technology. It is written in plain English, in a style that is forceful but unassuming, technically precise but not intimidating. It is particularly valuable in that it presents a far more comprehensive treatment of the computer as part of a *system* of humans and machines than do most books of its kind. It is written with a sensitivity for the nonspecialist that is characteristic of their professional work, which has been spent in applying computers to cardiovascular research, in relating advances in computer technology to problems in medicine, and in interpreting these advances to those in the medical profession. In writing this book, Dominic and Neil have struck their own blow in behalf of computer literacy for all and against the further spread of cybercrud. We are grateful to them for doing so.

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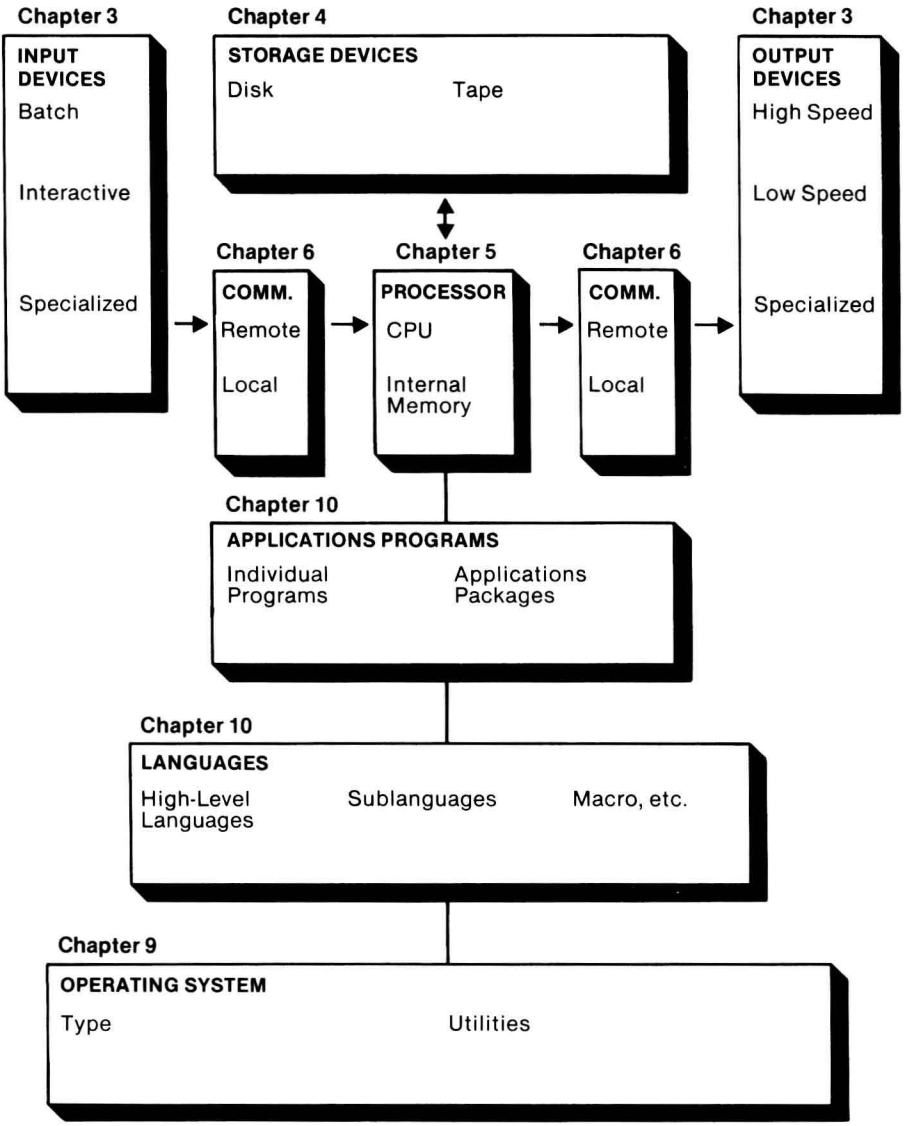
PART I

PRELIMINARIES



1

Introduction

Keeping Up With the Babbages

Computers have become an all-pervasive influence in everyday life. Whenever you do business with a bank, use a credit card, make an airline reservation, or place a long-distance telephone call, there is a good chance that a computer is involved somewhere in the transaction. Should illness strike you, your doctor may use a computer to help diagnose your illness, monitor your vital signs, and perhaps in the near future, treat you as well.

Inexpensive microcomputer systems are being aggressively marketed, and eagerly purchased, for everything — from accounting in small businesses to inventory control in the corner grocery. On a personal level, large numbers of hobby computer enthusiasts are buying their own microcomputer systems; often they program these machines themselves. Most scientists, mathematicians, and engineers own at least one programmable calculator.

The computer revolution is old news, and as with other profound changes that have affected modern life, there was no official starting gun; the revolution overtook us while we were busy doing other things.

A decade ago, a computer in the office was something to talk about. Today, such equipment is commonplace. University students routinely use computers as tools to assist their work in other fields. Our children will soon be studying computer programming in school — if they are not doing so already.

Is there any question about whether computers will play a part in your life? For better or for worse; for richer, for poorer; in sickness and in health, computers are here to stay. The choice facing us is simple: Will we let automation affect us, or will we affect automation? Those who learn how to cope with computers will be able to avoid many of the drawbacks, and enjoy more of the benefits.

In the 1980s, understanding computers is no longer a mere problem of prestige, or keeping up with the Babbages, or even keeping up with your children. Survival on the job, survival in the classroom, and survival in society depends on it.

Relatively few of the people who will be called upon to make decisions about computer systems — even big, expensive decisions — will have the time or interest to do advanced study in this field. Those decision makers will call upon computer specialists to implement their decisions. Just as you the user don't totally understand the computer, these specialists cannot be expected to understand your business, institution, or personal interests as well as you do. Therefore, the first step in coming to grips with automation is communication: communication between user and implementor.

But where do you begin? Although libraries are full of computer science textbooks and professional journals, most of this literature is written for computer scientists — or at least for people who want to know how to program. What about the person who simply needs a reasonable overview of a very complicated subject; who has no ambition to become a computer technologist? What about the person who hasn't the time to sift through thousands of books and articles to glean the relatively few pieces of information that are relevant to a nontechnical computer user?

WHAT THIS BOOK IS

This book is an attempt to compile — in one volume— a large amount of general introductory material from widely dispersed sources. The goal is to provide a simple but adequate introduction to computer machinery and programming concepts to people who have no previous knowledge of the subject. Explanations are given at the "overview" level suitable for noncomputer scientists, as opposed to the level of technical detail that would be appropriate for student computer scientists or electrical engineers. There are no circuit diagrams in this book — just functional explanations of how the "black box" works, from the user's point of view. This book is conceived as an aid to help people acquire sufficient background to think about computers on a general level. This information should enable those who become involved in computing projects to ask the proper questions of systems developers and to observe and monitor the progress of their computing projects, while figuratively looking over the shoulders of those who are supposedly working on their behalf.

You will be led into a working knowledge of computer jargon. Key words are printed in bold face, and at the end of each chapter all such key words are listed. There is a glossary at the end of the book that defines all key words.

Throughout, an effort has been made to present the wide variety of modern computing hardware and software as a spectrum of alternatives from which appropriate selections can be made for different computing applications.

A TWO-EDGED SWORD

It is reasonable to want to keep up with the leading edge of technology, but one must realize that the edge is sharp and can cut both ways. While computer science has made possible many important improvements in the human condition, there can still be significant problems even when things go relatively well for a computer application. In industry, for example, the computer has drastically changed the way we do business. This transformation has had some positive effects, but it has also been accompanied by maddening difficulties: incorrect billings, late shipments, cancelled subscriptions.

Now that computers have become an inevitable and increasingly-prevalent part of our lives, ever more vigilance is required to ensure that mistakes are not perpetuated and multiplied.

To do this, we must separate computer fact from computer fantasy. The first step in coping with computers is to recognize them for what they are and to dispel unwarranted fears.

THE REAL COMPUTER

If we view the computer as capable of intelligent – or "people-like" – thought, then when something goes wrong conveniently we blame "computer error." If we see the computer as a conceptual cornucopia containing all possible solutions to all possible problems, then we will use it indiscriminately and with a high rate of failure. If we think of the computer as the ultimate vehicle to transport us into the future, then we may blindly climb aboard this technology as an agent of "progress" without knowing precisely where we want it to take us. If we feel that the computer represents the pot of gold at the end of the scientific rainbow, then its existence will soon become an

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