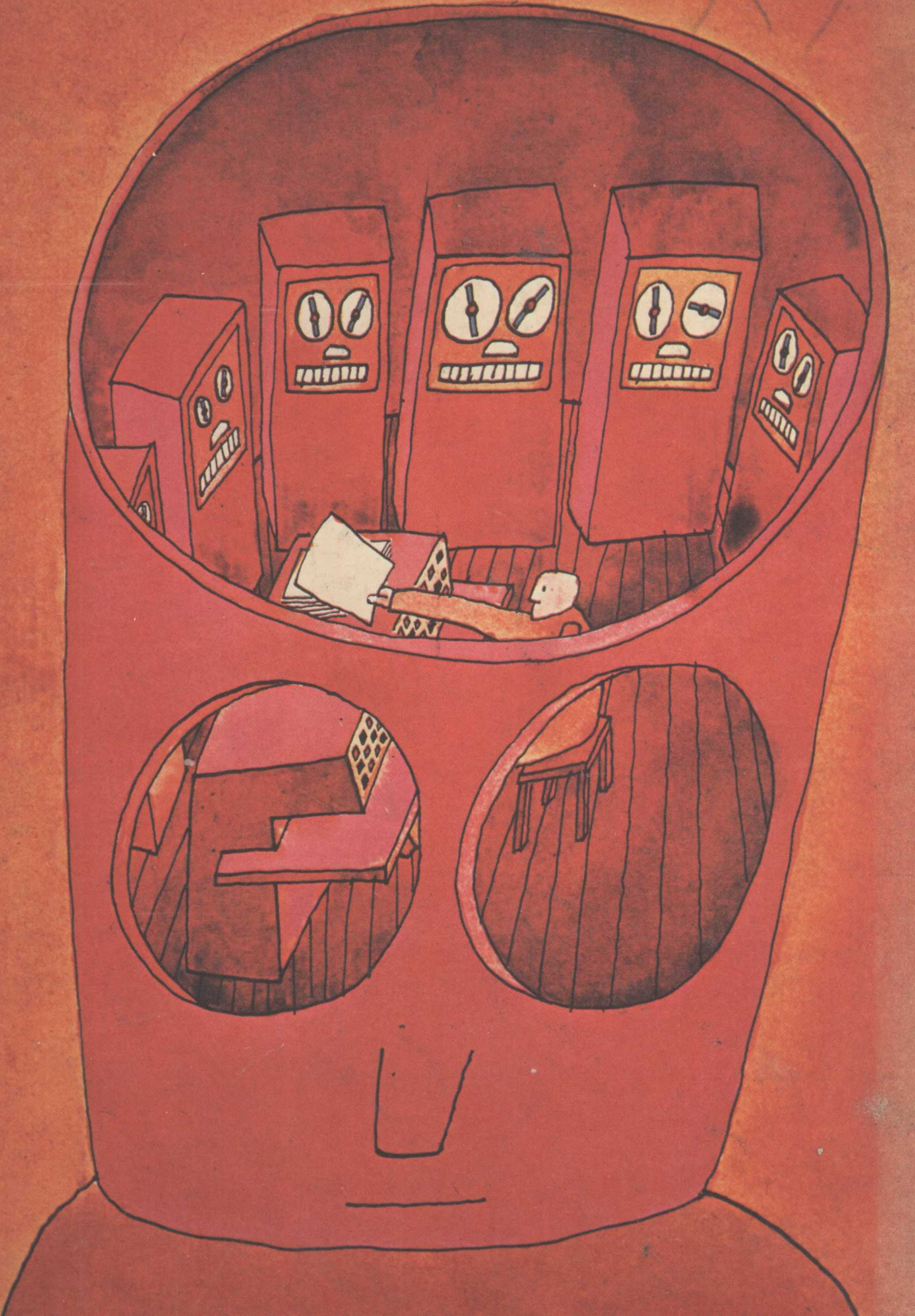

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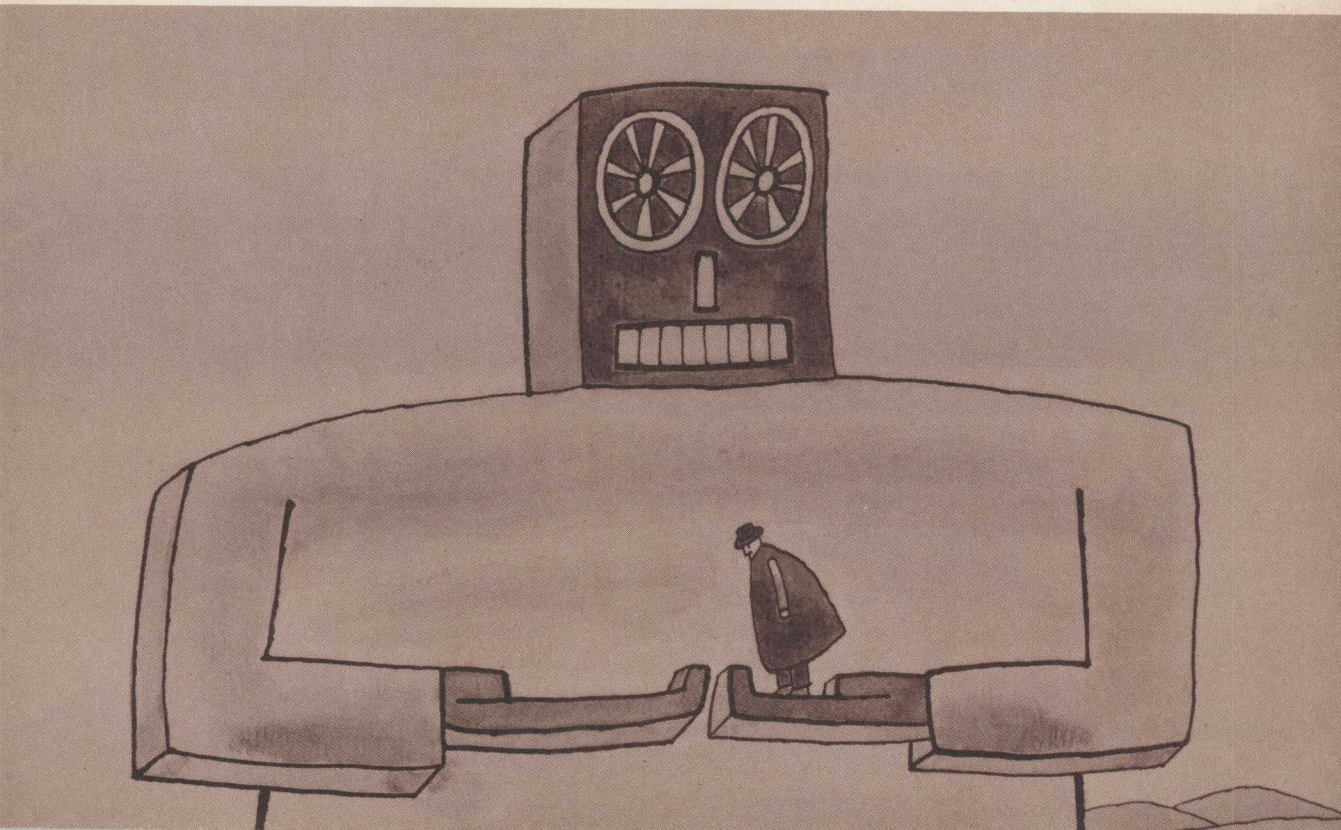
Data Processing



Introduction to Computer Data Processing
Margaret S. Wu

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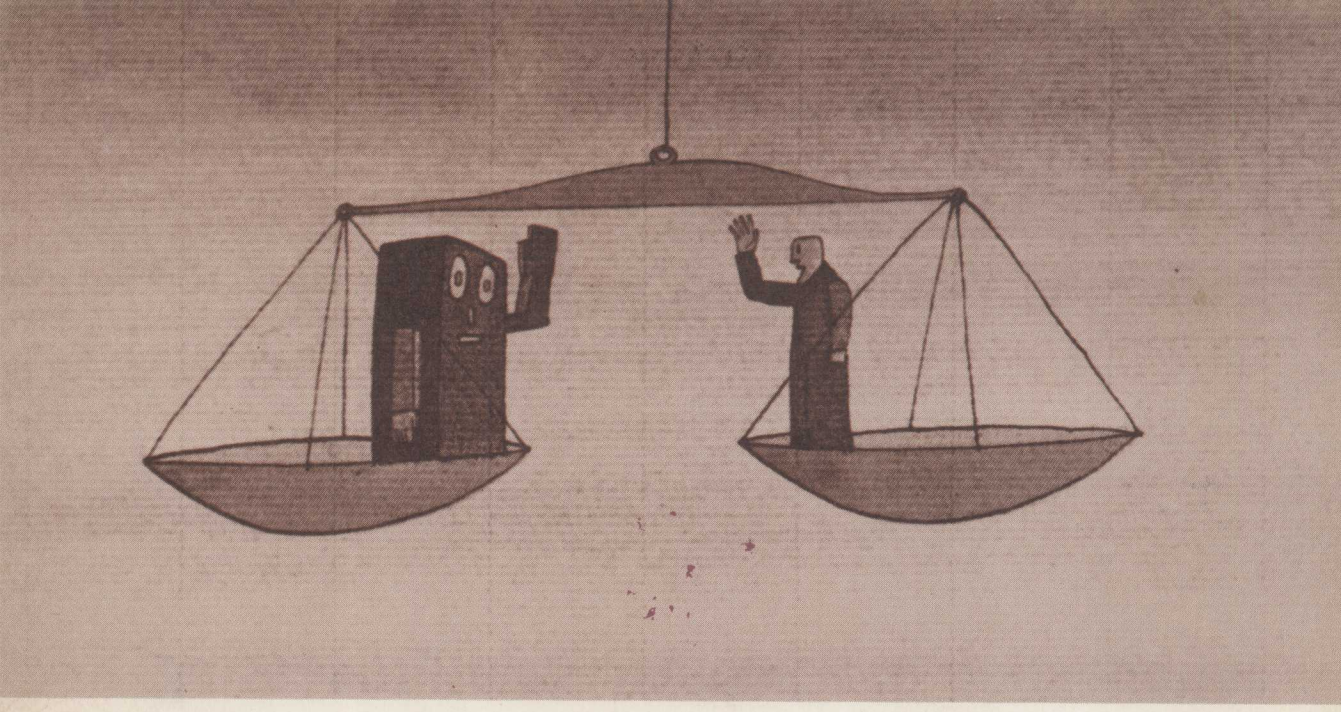

Introduction to Computer

Harcourt Brace Jovanovich, Inc.
New York Chicago San Francisco Atlanta

To Shih Yen, Jennifer, and Gregory

Preface

Today computers touch the lives of nearly everyone. Thus, it is essential that we alert ourselves to the possibilities and implications of this basic tool, which has extended our ability to cope with vast amounts of data and perform repetitive and extensive calculations. Although predictions of the computer's role in our future may, at times, strain our credibility, it is often astonishing to realize even the present degree of involvement of computers in our everyday world.

Introduction to Computer Data Processing is designed for an introductory course in data processing. The book presents an overall view of the computer and its applications, focusing on fundamental concepts of computer hardware and software rather than on detailed descriptions of a particular computer or programming language.

Chapters 1 and 2 place the computer in historical perspective and give its current role in a variety of applications; Chapter 22 discusses the computer's place in our society. Chapter 3 explains the binary, octal, and hexadecimal number systems; Chapter 4 introduces punched card equipment. (Because many small data processing installations are turning to the use of minicomputers rather than punched card equipment, some instructors may wish to omit Chapter 4.) Chapters 5, 6, 7, and 9 introduce the hardware and software of the computer; data input, output, and storage devices are discussed and compared. Chapter 8 presents data entry devices while Chapter 10 discusses minicomputers. Chapters 11 through 18 consider the use of the computer from the start to the finish of a problem: problem design, choice of a language, testing of the programming system, and other elements that must be combined to make a successful computer system. Features of FORTRAN AND COBOL—the two most popular programming languages—are discussed; PL/I is also treated in some detail. COBOL and PL/I are compared with FORTRAN. This wide range of material is not designed to teach the student how to program but to give an appreciation

of the role of high-level languages and the merits of each. Chapters 19, 20, and 21 present information on the management of computer centers and computer personnel. In addition, BASIC and RPG II programming languages are discussed in appendixes. A glossary of data processing terms is also provided for easy reference.

I wish to acknowledge the many people who assisted in the preparation of this book. I wish to thank Captain Grace M. Hopper and Dr. John Atanasoff for supplying information; Professor Thomas G. De Lutis, Ohio State University, and Professor Edwin Towster, University of Southwestern Louisiana, for their careful reading of the initial manuscript; and the representatives of various computer manufacturers, particularly Mr. Howard Soroos of IBM, and Mr. David R. Paul of UNIVAC, for their assistance. I wish to thank Professor Harold Shipton, University of Iowa, for his encouragement in the initial undertaking. This text was begun while the author was employed at the Bioengineering Resource Facility, University of Iowa.

Margaret S. Wu

Introduction to Computer Data Processing

Contents

CHAPTER ONE

The Evolution of Computers

Today we live in a highly developed, sophisticated world where men travel to the moon and bring back samples of moon rock, television pictures are transmitted by satellite to distant locations around the earth, and nuclear plants supply a portion of our electricity. Although we marvel at these human achievements, we ignore the complexity and wonder of our everyday existence. At the click of a switch, we turn on the lights in a room. Our houses are comfortably heated by fuel and the internal temperature regulated by a thermostat. The cars most of us drive were manufactured on assembly lines many miles from where we live. The gasoline for their engines was refined at a distant location and transported to a gas station near our home. These are among the numerous instances of services and goods supplied to us by others. The outstanding attribute of modern society consists in such interdependence.

These technological accomplishments would be for naught without the modern miracle of marketing and the distribution of goods and services. And this massive handling of products would not be economically possible without the use of modern data-processing techniques. To function successfully, a modern business firm must record, process, and analyze large amounts of information. For example, an electric company must bill its customers for their use of electricity; a bank must maintain accurate records of all customer accounts and issue monthly statements for checking accounts. All levels of government—local, state, and federal—are similarly involved with the retention of data and its manipulation. The federal government, for example, must process income-tax returns, verify the accuracy of calculations, check the truth of statements made by taxpayers, and issue any refunds due. Data processing encompasses all these activities. We can define *data processing* as the manipulation of data, the retention of data, and its subsequent retrieval. The term *data* means any meaningful facts or figures. A list of data pertinent to an individual, for example, may include:

name,
Social Security number,
birthdate,
place of birth,
street address, city, and state of residence,
citizenship,
marital status,
height, and
weight.