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Mini and Microcomputer Systems

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Preface

In the late 1970s two of the authors of the present work, Martin Healey and Michael Hartley, prepared a text *A First Course in Computer Technology* aimed at first-year university undergraduate students and students in polytechnics and technical colleges.

Over the intervening years, advances have been dramatic. Earlier divisions drawn between mini and microcomputers have now largely disappeared. Store hierarchy has been transformed with the advent of the Winchester Disc Store. Optical-disc storage offers even more exciting possibilities with storage in the Giga-bit range. An enormous selection of special-purpose integrated circuit chips has become available, frequently at low cost. The authors therefore felt that a new book was needed, in which microprocessor-based systems and software engineering would be given greater emphasis. Dr P. G. Depledge of the Application Engineering Organisation, Hewlett-Packard Ltd agreed to join the authors of the previous book and he has contributed specialist coverage of these two important subjects to the present text.

The principal readership of the book is seen as first-year degree course students in universities and polytechnics. The majority would be taking courses in electrical engineering and electronics or in computer science. The coverage will also appeal to students of physics and possibly students of mechanical or civil engineering who require some background in computer technology. Students attempting the examinations of the Engineering Council and, in particular, those preparing for Syllabus 246 'Computer Systems Engineering' should find the book of special interest. For all such students, the book provides a first introduction to more detailed texts specialising in particular aspects of computer architecture, logic design and software engineering.

An integrated approach has been adopted. Overall, computer architecture is seen as a response to both hardware and software considerations. The authors feel that such an approach is essential if students are to have a thorough grasp of their subject.

The book is divided into eleven chapters, all except the first beginning with an initial statement of the objectives of the chapter; each chapter concludes with a summary and in appropriate cases problems (some worked) and references or bibliography.

Chapter 1 gives a very brief outline of the historical background of computers, and mentions some present-day developments and probable future trends. Chapter 2 gives an introduction to the main principles of the digital computer and a short review of applications areas. An introduction to the representation of information, both numerical and non-numerical, is given in chapter 3. Particular emphasis is naturally placed on binary techniques. The basic 'building blocks' used in logic systems, together with a brief review of Boolean algebra, form the subject matter of chapter 4.

Chapter 5 presents a detailed description of the hardware and machine-level programming of a minimal 8-bit serial computer. While the machine is no more than a teaching aid, it displays many of the characteristics of a real computer. Nevertheless it is sufficiently simple for the whole of the design to be considered in detail. Indeed a complete diagram, down to the detailed gating logic, can be provided on a single sheet. Such an exercise is impractical for any real machine.

Practical machine architectures are described in chapter 6. Both a 24-bit machine with a straightforward instruction set and a rather more sophisticated 16-bit machine are discussed. Chapter 7 is devoted to storage considerations. Categorisations of different types of store are attempted and storage hierarchy is described. The treatment is illustrated by reference to current technology.

Chapter 8 complements earlier chapters in that it discusses systematically the software utilities so necessary for a successful computer or microprocessor-based system. In contrast to chapter 6, which emphasised minicomputer systems, chapter 9 attempts an overview of microprocessor-based systems. The pocket calculator is considered in detail as are various applications areas in respect of microprocessor-based products. Chapter 10 provides a systematic look at microprocessor-based architectures, yielding a treatment which complements that of chapter 6. The book concludes with chapter 11 which is a systematic treatment of the important subject of software engineering.

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