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Computer Organisation and Architecture

An Introduction

B.S. Chalk

*School of Computing Information Systems and Mathematics
South Bank University, London*

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10	9	8	7	6	5	4	3	2	1
05	04	03	02	01	00	99	98	97	96

Contents

Preface	viii
Acknowledgements	ix
1 Introduction	1
1.1 The von Neumann Computer Model	1
1.2 A Microcomputer System	2
1.3 Representing Memory	4
1.4 High and Low-Level Languages	5
1.5 The Operating System	5
1.6 Answers to Text Questions	6
1.7 Exercises	6
2 Digital Logic Circuits	8
2.1 Logic Gates	8
2.2 Combinational Logic Circuits	10
2.3 Sequential Logic Circuits	13
2.4 D-type Flip-Flop Circuits	17
2.5 Answers to Text Questions	21
2.6 Exercises	22
3 Data Representation and Computer Arithmetic	23
3.1 Bits, Bytes and Words	23
3.2 Binary Codes	24
3.3 Number Systems	25
3.4 Negative Numbers	28
3.5 Binary Arithmetic	30
3.6 Binary Coded Decimal (BCD)	34
3.7 Floating Point Representation	34
3.8 Summary	37
3.9 Answers to Text Questions	38
3.10 Exercises	39

4	Fetching and Executing Instructions	40
4.1	Processor-Memory Interconnection	40
4.2	Fetching Instructions	41
4.3	Instruction Format	46
4.4	Executing Instructions	48
4.5	Summary	52
4.6	Answers to Text Questions	53
4.7	Exercises	53
5	The Motorola MC68000	55
5.1	Programmer's Model of the 68000	55
5.2	Instruction Types	60
5.3	Addressing Modes	64
5.4	Instruction Formats	70
5.5	Assembly Code Examples	72
5.6	Supervisor Mode	78
5.7	Trace Mode	79
5.8	Summary	79
5.9	Answers to Text Questions	80
5.10	Exercises	81
6	Computer Memory	83
6.1	Memory Hierarchy	83
6.2	Semiconductor Technology	84
6.3	Semiconductor Memory Chips	88
6.4	Processor-Memory Bus	95
6.5	Cache Memory	98
6.6	Secondary Memory	105
6.7	Summary	115
6.8	Answers to Text Questions	115
6.9	Exercises	116
7	Input-Output	118
7.1	Types of Interface	118
7.2	Parallel IO	119
7.3	Serial IO	122
7.4	IO addressing	127
7.5	Modes of IO Transfer	128
7.6	Summary	134
7.7	Answers to Text Questions	135
7.8	Exercises	136

8	Operating Systems	137
8.1	Overview	137
8.2	Multiprogramming	138
8.3	The Process Concept	139
8.4	Process Management	140
8.5	Process Scheduling	142
8.6	Inter-Process Communication	143
8.7	Memory Management	147
8.8	Summary	153
8.9	Answers to Text Questions	154
8.10	Exercises	155
9	Reduced Instruction Set Computers	156
9.1	CISC Characteristics	156
9.2	Instruction Usage	157
9.3	RISC Architectures	158
9.4	The Control Unit	163
9.5	Pipelining	167
9.6	Microprocessor Performance	176
9.7	Superscalar and Superpipelined Architectures	177
9.8	Summary	178
9.9	Answers to Text Questions	178
9.10	Exercises	179
10	Parallel Architectures	181
10.1	Classifying Parallel Architectures	181
10.2	SIMD Array Processors	183
10.3	Dataflow Computers	184
10.4	MIMD Systems	186
10.5	Amdahl's Law	196
10.6	Summary	198
10.7	Answers to Text Questions	198
10.8	Exercises	199
	Appendices	
1	ASCII Table	201
2	Answers to Exercises	202
	Index	207
	Acronyms	213

Preface

A computer is a versatile machine, capable of performing a wide range of tasks. At the heart of the machine lies a primitive language processor, which is interconnected with other functional units to provide a hardware platform for running programs. Computer organisation is a term used to describe the operation and interconnection of these functional units while computer architecture describes how the hardware platform appears to a machine language programmer.

The aim of this book is to provide a sufficiently detailed coverage of computer organisation and architecture to meet the needs of students on first year degree and HND courses in Computer Studies, Information Technology, Software Engineering and related areas of study. The material is also suitable for students taking conversion courses in areas such as Advanced Information Technology, Computer Science or for anyone wishing to gain a basic understanding of how a computer works. Apart from a rudimentary understanding of high-level language programming, no other prior level of knowledge is assumed.

The book adopts an interactive approach and supports self-study, by including an extensive number of Text Questions (TQs) for self-assessment purposes. Answers to TQs are given at the end of each chapter, together with a set of further exercises. Selected answers to these exercises are given at the back of the book.

Because of its widespread use as a teaching tool, I have adopted the Motorola 68000 as a vehicle for explaining the principles of processor operation and assembly language programming. Readers familiar with Intel or other processors should have no difficulty in adapting the concepts and program examples to other machines.

The book is divided into ten chapters. Chapters 1 to 7 include the basic core material we use at South Bank University for teaching one semester units in Computer Systems Architecture, Computer and Communication Architecture and Computer Systems Technology. Chapter 8, which provides an introduction to operating systems, is included to bridge the gap between Computer Architecture and System Software – a unit normally undertaken shortly afterwards. Chapters 9 and 10 introduce the more advanced topics of RISC and Parallel architectures. These topics have been included to illustrate the current trend in architectural development and to provide a foundation for second level units in subjects such as Microprocessor Technology and Concurrent Systems.

B.S. Chalk

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