Contents

Quotation . . . vii

Preface . . . ix

Introduction . . . xiii

Part 1 . . . 1

Chapter 1. Development Chain . . . 3

1.1. Layers of languages, stages of development and tools . . . 3
1.1.1. Levels of languages . . . 4
1.1.2. Development stages . . . 6
1.1.3. Mixed-language programming . . . 8
1.1.4. Compatibility and software interfaces . . . 10
1.2. Fundamental software tools for development . . . 13
1.2.1. Assembler . . . 13
1.2.2. Linker . . . 19
1.2.3. Loader/launcher . . . 21
1.2.4. Disassembler . . . 22
1.3. Assembly language . . . 22
1.3.1. Software development methodology . . . 25
1.3.2. Standardization of assembly language . . . 25
1.3.3. Structure of a program . . . 25
1.3.4. Macro-instructions . . . 30
1.3.5. Addressing . . . 32
1.4. Conclusion . . . 32

Chapter 2. Debugging and Testing . . . 33

2.1. Hardware support . . . 33

2.1.1. Generic electronic boards . . . 33
2.1.2. Programmers . . . 36
2.2. Debugging . . . 38
2.2.1. Evolution . . . 39
2.2.2. Functionality . . . 39
2.2.3. Hardware emulators . . . 43
2.2.4. Software debugging . . . 45
2.2.5. Hardware support and debugging interfaces . . . 51
2.2.6. Remote debugging and virtualization . . . 59
2.2.7. Summary . . . 60
2.3. Testing . . . 66
2.4. Conclusion . . . 66

Part 2 . . . 69

Chapter 3. Changes in the Organization of the Earliest Microcomputers . . . 71

3.1. Apple II . . . 71
3.2. IBM PCs . . . 75
3.2.1. The original PC . . . 76
3.2.2. The XT . . . 79
3.2.3. The AT . . . 81
3.3. Chipset . . . 87
3.3.1. Definition . . . 88
3.4. Motherboard architectures . . . 100
3.4.1. Form factors . . . 100
3.4.2. Current motherboard architecture . . . 103
3.5. Evolution of microcomputer firmware . . . 104
3.5.1. Definition . . . 104
3.5.2. Apple II . . . 104
3.5.3. PC BIOS . . . 105
3.5.4. Open firmware . . . 109
3.6. Conclusion . . . 109

Conclusion of Volume 5 . . . 111

Exercises . . . 113

Acronyms . . . 115

References . . . 135

Index . . . 143