Philip Cornes

UNIX™ and C

A tutorial introduction

H
001.6425
COR

Van Nostrand Reinhold (Internationa

Contents

Acknowledgements ix

Preface xi

Introduction xiii

PART ONE The UNIX operating system

1 UNIX basics 3
- 1.1 Logging in 3
- 1.2 Logging out 4
- 1.3 Correcting errors 4
- 1.4 Stopping a program 4
- 1.5 UNIX file system 5
- 1.6 What is in a file? 5

2 Simple UNIX commands 7
- 2.1 Contacting other users 7
- 2.2 Changing passwords 9
- 2.3 Reading files 9
- 2.4 File system maintenance 11
- 2.5 Command summary 18

3 Shell basics 20
- 3.1 I/O redirection 20
- 3.2 Pipes 22
- 3.3 Multitasking 23
- 3.4 Background processes 25
- 3.5 Shell scripts 26
- 3.6 Executing shell programs 26
- 3.7 Shell variables 27
- 3.8 Metacharacters 32
- 3.9 Summary 32

DR. MAHMUD HUSAIN LIBRARY
KARACHI UNIVERSITY

7. 605.23

4 Editing files 34
4.1 The ed editor 34
4.2 Creating a file 34
4.3 Listing the file 37
4.4 Finding lines 41
4.5 File handling 43
4.6 Substitution 44
4.7 Regular expressions 45
4.8 ed command summary 48
4.9 Editing files with vi 49
4.10 Window movement 51
4.11 Command mode 53
4.12 File commands 54
4.13 vi command summary 55

5 UNIX utilities 57
5.1 Finding strings 57
5.2 Character translation 58
5.3 Sorting file contents 59
5.4 Joining two files together 61
5.5 Finding common lines 63
5.6 General file comparison 64
5.7 Editing inline 64
5.8 Command summary 66

6 Shell programming 67
6.1 Commands in a loop 67
6.2 Testing the exit status 70
6.3 Loops with exit status 71
6.4 Multiple branch construct 74
6.5 Interactive input 75
6.6 Signals 76
6.7 Summary 77

PART TWO The C programming language

7 C program structure 81
7.1 Functions 81
7.2 The first program 82
7.3 Compiling programs 83

8 C basics 86
8.1 Value types 86
8.2 Variables 87
8.3 Constants 88

8.4 Expressions 90
Half-time test! 99
8.5 Expression evaluation 103

9 Functions and arguments 107
9.1 Communicating values 107
9.2 Storage classes 110
9.3 Variable initialization 112
9.4 Standard C functions 112
9.5 Including files 113
9.6 Text substitution 114

10 Program flow control 117
10.1 if statements 117
10.2 while loops 121
10.3 for loops 123
10.4 do–while loops 125
10.5 switch case 128
10.6 goto statements 131

11 Pointers and arrays 135
11.1 Pointers 136
11.2 Arrays 138
11.3 Array initialization 139
11.4 Strings 140
11.5 Pointer arithmetic 140
11.6 Pointers and arrays 143
11.7 Initializing char arrays 145
11.8 String functions 145
11.9 Arrays of pointers 147
11.10 Pointers to pointers 149

12 Input and output 152
12.1 Formatted output 152
12.2 Formatted input 154
12.3 File I/O 156
12.4 Formatted file I/O 158
12.5 Coding a 'more' command 159
12.6 Random access files 160

13 Structures and unions 162
13.1 Structures 162
13.2 Initializing structure elements 165
13.3 Growing trees 166
13.4 Recursion 168

13.5 Storage allocation 170
13.6 Unions 171

PART THREE UNIX and C

14 UNIX system interface 175
14.1 Low-level I/O 175
14.2 Read and write 176
14.3 Low-level random access 177
14.4 Removing files 177
14.5 I/O redirection 177
14.6 Pipes 179
14.7 Named pipes 180
14.8 Executing commands 181
14.9 Signals 184
14.10 Sending signals 185

15 C debugging and program maintenance 187
15.1 Pitfalls in C 187
15.2 C expression problems 188
15.3 Pointer problems 190
15.4 Writing maintainable C 193
15.5 Modularity 194
15.6 Make 196

16 C in action 198
16.1 The TINY BASIC source language 198
16.2 Backus–Naur form (BNF) 201
16.3 Compiler output 208
16.4 Recursive descent 212

17 The SHELL in action 227
17.1 Executing ideal machine code 227
17.2 The Z80 architecture and instruction set 228
17.3 The template library 230
17.4 The translator 234

Suggested further reading 242

Exercises 244

Index 262