

Contents

Author Biography	xv
Introduction.....	xvii

CHAPTER 1 What is Information Security?..... 1

Introduction.....	2
What is security?	3
When are we secure?.....	4
Alert!	4
Models for discussing security	5
The confidentiality, integrity, and availability triad.....	5
The Parkerian hexad.....	7
Alert!	8
Attacks	9
Types of attack payloads	9
Threats, vulnerabilities, and risk	11
Risk management	12
Incident response	16
Defense in depth.....	19
Layers.....	20
Information security in the real world	21
Summary.....	21
Exercises	22
References.....	22

CHAPTER 2 Identification and Authentication 23

Introduction.....	24
Identification.....	24
Who we claim to be	24
Identity verification	25
Falsifying identification.....	25
Authentication.....	26
Factors	26
Multifactor authentication	28
Mutual authentication	29
Passwords.....	30
Biometrics	31

Additional resources	31
Hardware tokens	34
Alert!	35
Identification and authentication in the real world.....	36
Summary	37
Exercises	37
References.....	38
CHAPTER 3 Authorization and Access Control	39
Introduction.....	40
Authorization	40
Principle of least privilege	41
Access control.....	42
Access control lists.....	43
Alert!	45
Capabilities	47
Alert!	48
Access control methodologies.....	49
Access control models.....	49
Physical access controls	52
Authorization and access control in the real world	54
Summary	54
Exercises	55
References.....	56
CHAPTER 4 Auditing and Accountability.....	57
Introduction.....	57
Accountability.....	58
Security benefits of accountability.....	60
How we accomplish accountability	62
Auditing	62
What do we audit?.....	63
Alert!	63
Logging	64
Monitoring	65
Assessments	65
Accountability and auditing in the real world	66

Summary	67
Exercises	68
References.....	68
CHAPTER 5 Cryptography	69
Introduction.....	70
History.....	70
Caesar cipher	71
Cryptographic machines	71
Additional resources	75
Kerckhoffs' principle.....	75
Modern cryptographic tools	75
Symmetric versus asymmetric cryptography	76
Hash functions	79
Digital signatures.....	80
Certificates	80
Protecting data at rest, in motion, and in use	81
Protecting data at rest	81
Alert!	83
Protecting data in motion	84
Protecting data in use	85
Cryptography in the real world.....	85
Summary	86
Exercises	87
References.....	87
CHAPTER 6 Laws and Regulations	89
Introduction.....	89
Laws and regulations.....	90
US laws applicable to computing	91
Laws outside of the United States.....	91
Compliance	94
Regulatory compliance	94
Industry compliance	95
Privacy	95
The concept of privacy	96
Privacy rights	96
Privacy and business.....	98

Summary	98
Questions.....	99
References.....	99
CHAPTER 7 Operations Security.....	101
Introduction.....	102
Alert!.....	102
Origins of operations security	102
Sun Tzu	103
Additional resources	103
George Washington	103
Vietnam War.....	104
Business	106
Interagency OPSEC support staff	106
The operations security process	107
Identification of critical information.....	107
Analysis of threats	107
Analysis of vulnerabilities.....	110
Assessment of risks	110
Application of countermeasures.....	111
Haas' Laws of operations security	111
First law	112
Second law.....	112
Third law.....	113
Operations security in our personal lives.....	114
Alert!.....	114
Operations security in the real world.....	115
Summary	116
Exercises	117
References.....	117
CHAPTER 8 Human Element Security	119
Introduction.....	119
Humans: the weak link.....	120
Security awareness	120
Protecting data	121
Passwords.....	121
Social engineering	122
Network usage	125

Malware	126
Personal equipment.....	126
Clean desk.....	127
Policy and regulatory knowledge.....	127
The security awareness and training program	127
Effectively reaching users	128
Summary.....	128
Exercises	129
References.....	129
CHAPTER 9 Physical Security.....	131
Introduction.....	132
Alert!	132
Additional resources	133
Physical security controls.....	134
Deterrent	134
Detective	135
Preventive	135
How we use physical access controls	136
Protecting people	136
Physical concerns for people.....	136
Safety	137
Evacuation	138
Administrative controls	139
Protecting data	140
Physical concerns for data.....	140
Availability	141
Residual data.....	142
Backups.....	143
Protecting equipment.....	143
Physical concerns for equipment	144
Note.....	144
Site selection.....	145
Securing access.....	146
Environmental conditions.....	146
Physical security in the real world.....	147
Summary	148
Exercises	149
References.....	149

CHAPTER 10 Network Security	151
Introduction.....	152
Protecting networks	152
Security in network design.....	153
Firewalls.....	153
Network intrusion detection systems	157
Protecting network traffic.....	158
The impact of intercepted data.....	158
Virtual private networks.....	159
Wireless network security	159
Secure protocols	160
Mobile device security	161
What is a mobile device?	161
Mobile device management	162
Bring your own device	162
Network security tools.....	163
Wireless	164
Port scanners.....	164
Packet sniffers.....	165
Alert!	165
Honeypots	165
Additional resources	167
Firewall tools	167
Network security in the real world	167
Summary	168
Exercises	168
References.....	169
CHAPTER 11 Operating System Security	171
Introduction.....	172
Operating system hardening	172
Remove all unnecessary software	173
Remove all unessential services.....	174
Alter default accounts.....	175
Apply the principle of least privilege	176
Perform updates	177
Turn on logging and auditing.....	178
Protecting against malware	178

Additional resources	179
Anti-malware tools	179
Executable space protection	180
Software firewalls and host intrusion detection.....	180
Software firewalls.....	181
Host intrusion detection.....	181
Operating system security tools	181
Scanners	182
Alert!	183
Vulnerability assessment tools	183
Exploit frameworks	183
Operating system security in the real world	185
Summary	185
Exercises	186
References.....	186
CHAPTER 12 Application Security	189
Introduction.....	190
The TJX breach	190
Software development vulnerabilities.....	191
Additional resources	191
Buffer overflows.....	192
Race conditions.....	192
Input validation attacks	193
Authentication attacks	193
Authorization attacks.....	194
Cryptographic attacks	194
Web security	195
Client-side attacks.....	195
Server-side attacks.....	197
Alert!	196
Database security	198
Protocol issues	199
Unauthenticated access.....	200
Arbitrary code execution	200
Privilege escalation.....	201
Additional resources	201
Application security tools.....	202

Sniffers.....	202
Web application analysis tools.....	202
Alert!.....	203
Fuzzers.....	204
Application security in the real world	206
Summary	207
Exercises	208
References.....	208
Index	209