Preface	xvii
Acknowledgments	xxv
About the Authors	xxvii
Part I: Background Material	Signatura Kiya. Pininya Jakagrily
Chapter 1 Introduction to Trusted Co	mputing 3
Computer Security Attacks Are Staggeringly Expensive	e számásztálálás 3
The Changing Threats to Computer Security	4 saules la succe.
Vulnerable Programs	amount subject 5
Malicious Programs: Viruses and Spyware/Adwa	are mared algistate how your of 7
Misconfigured Programs	vertence 7
Social Engineering: Phishing and Pharming	7
Physical Theft of Data Electronic Eavesdropping	8 art to Programming
Can Software Be Made Completely Secure?	The Transmit Washington 9
How Can the TPM Help?	9 manufic and some firm
Privacy and Recovery—Special Considerations for Har	
Summary Endnotes	12 Technical Devals
Chapter 2 Design Goals of the Trusted	l Platform Module 13
Securely Reporting the Environment: Platform Status	eliateCf (solindo F)
Storing a Record of the Boot Sequence	verteen) sammar mort seed?
Reporting the Boot Sequence Record	17
Secure Storage	18
Storing Data and Symmetric Keys	eli sanisti dessita
Storing Asymmetric Keys	PERSONAL PROPERTY AND ADDRESS OF THE PERSON NAMED IN CO.
Authorization	20

	Secure Signatures	22
	Secure Identity	23
	Isolation of Users in a Multiple User Environment	23
	Internal Random Number Generation	24
	Features Not Included	25
	Security Analysis	26
	Summary	28
	The first include an about the control of the contr	
Ch	apter 3 An Overview of the Trusted Platform	20
	Module Capabilities	29
	Secure Storage: The Storage Root Key	29
	Migratable Versus Non-Migratable Keys	34
	Types of Keys	35
	Storage Keys	36
	Binding Keys	36
	Identity Keys	36
	Signature Keys	36
	Platform Integrity	37
	Platform Configuration Registers	37
	The Handoff Procedure	39
	Maintenance	39
	Secure Signatures	4(
	Avoiding Exposure	41
	Privacy and Multiple Signatures	41
	Summary Athle 10 to 10 t	42
Pa	art II: Programming Interfaces to TCG	43
-	Alloquite introduction.	
Ch	napter 4 Writing a TPM Device Driver	45
	TCG Device Driver Library	46
	TPM 1.1b Specification Device Interface	47
	Technical Details	47
	Device Programming Interface	48
	TPM 1.2 Specification Device Interface	50
	Technical Details	51
	Device Programming Interface	53
	Summary	58
Ch	napter 5 Low-Level Software: Using BIOS and	
	TDDL Directly	59
	Talking to the TPM Through BIOS	59
	Talking to the TPM Through BIOS Talking to the TPM Through TDDL	62
	The IBM libtpm Package	62
	Enabling and Clearing the TPM	63
	Litaving and Clearing the 11 W	U.

	Talking to the TPM	63
	Getting Started with Some Simple TPM Commands	64
	Taking Ownership	66
	Creating and Using Keys	66
	Checking the TPM Configuration	67
	Summary	68
	A SA MANAGEMENT OF THE PROPERTY OF THE PARTY.	
C	hapter 6 Trusted Boot	69
	Trusted Boot with Static Root of Trust	69
	Dynamic Root of Trust Measurements	71
	AMD's Secure Virtual Machine	72
	Proof of Locality	75
	Summary	76
0	hanton 7 The TCC Soft-ware Stark	
-	hapter 7 The TCG Software Stack	77
	TSS Design Overview	77
	The TCG Service Provider Interface (Tspi)	79
	TSP Object Types	79
	Context Objects	80
	TPM Objects	81
	Policy Objects	82
	Key Objects	85
	Encrypted Data Objects	87
	Hash Objects	88
	PCR Composite Objects	89
	Non-Volatile Data Objects (TSS 1.2)	91
	Migratable Data Objects (TSS 1.2)	92
	Delegation Family Objects (TSS 1.2)	92
	Direct Anonymous Attestation (DAA) Objects (TSS 1.3	92
	TSS Return Codes	93
	TSS Memory Management	94
	Portable Data	94
	Persistent Key Storage	95
	Signing and Verifying	97
	Setting Candack Functions	99
	The TSS Validation Data Structure	101
	Summary	102
C	hapter 8 Using TPM Keys	103
-		
	Creating a Key Hierarchy	103
	Utility Functions	104
	Summary	124

Migration Summary

Ch	apter 9 Using Symmetric Keys	127
	Data Binding	127
	Sample Code	130
	Data Sealing	132
	Sample Code	133
	Encrypting Files	136
	Summary	138
Ch	napter 10 The TSS Core Service (TCS)	141
	Overview of a TCS	141
	How the TCS Manages Finite Resources	142
	Further Abstracting the TCS Abstraction	144
	Why a TCS Is Exposed Locally and Remotely	144
	Utilizing and Implementing a TCS	145
	Getting Started	145
	Why WSDL Was Chosen	146
	Brief Breakdown of the .wsdl File	147
	The Header	147
	The <types> Section</types>	148
	InParms and OutParms in the Complex Types	149
	The Messages	150
	The Operations in portType	150
	The Operations in the Binding	151
	The Service	151
	Summary of the WSDL File	151
	Using the WSDL File	151
	The Ideal Situation	152
	Example Using gSOAP	152
	Using the gSOAP Stubs	153
	Privacy Concerns with the TCS	154
	Addressing Privacy	154
	Grouping Desirable Functions	154
	Summary	155
Ch	napter 11 Public Key Cryptography Standard #11	157
	PKCS#11 Overview	158
	A PKCS#11 TPM Token	158
	RSA Key Types	158
	RSA Key Restrictions	159
	Administration	
	openCryptoki's Design	
	Migration	169
	Summary	178
	The second secon	

	127	Part III: Architectures	79
	127 130	Chapter 12 Trusted Computing and Secure Storage 1	181
	130		181
	133	Encrypting Files to Send to Someone Else on the Net Without a Public Key	183
	136	Encrypting Files to Send to Someone Else on the Net with a Known Public Key	190
	138	Encrypting Files for Storage on Your Hard Disk	191
	1,56	Encrypting Files for Storage on a Group Hard Disk for Group Access	194
	141	Encrypting Files for Storage in a Backup Facility	196
	141	Locking Data to Specific PCs	198
	142	Step 1	198
	144	Step 2	199
	144	Step 3	199
	145	Sten 4	199
	145	Content Protection	200
	146	Secure Printing	201
	147	Intranet	201
	147	Internet English and Control of Additional C	202
	148	Secure Faxing	202
	149	Super Secure Migratable Storage	203
	150	Summary	205
	150	Topi_TPM_CMSCmarkTeact	207
	151	Chapter 10 Trusted Company and Section 1	207
	151	Logon Password Storage	208
	151	VPN Endpoints	208
	151	Delegation of Authority	210
	152	Delegation Without Allowing Further Migration	211
	152	Credit Card Endpoints	211
	153	Multiple Users on a Single System	213
	154	Secure Hoteling	214
	154	Creating a PKI with the Endorsement Key	216
	154	Links to Biometrics	218
	155	Links to Smart Cards	220
mark the Visit and The Control	2	Smart Memory Cards and TPMs	220
#11	157	Smart Signing Cards and TPMs	220
	158	Virtual Dongles	221
		Trusted Endpoints	221
	158	Medical Solutions for HIPAA Compliance	222
	139	COTS Security Solutions for the Military	225
		Working with IP Telephony	226
		Working with IPSec	226
	-	Working with Service Meters	227
	169	Working with Network Switches	228

178

Summary

Contents

xiii

230

Pa	art III: Architectures	179
Cha	apter 12 Trusted Computing and Secure Storage	181
	Linking to Symmetric Algorithms	181
	Encrypting Files to Send to Someone Else on the Net Without a Public Key	183
	Encrypting Files to Send to Someone Else on the Net with a Known Public K	
	Encrypting Files for Storage on Your Hard Disk	191
	Encrypting Files for Storage on a Group Hard Disk for Group Access	194
	Encrypting Files for Storage in a Backup Facility	196
	Locking Data to Specific PCs	198
	Step 1	198
	Step 2	199
		199
	Step 3	199
	Step 4	200
	Content Protection	200
	Secure Printing	201
	Intranet	
	Internet	202
	Secure Faxing	202
	Super Secure Migratable Storage	203
	Summary	205
Ch	apter 13 Trusted Computing and Secure Identification	207
	Logon Password Storage	208
	VPN Endpoints	208
	Delegation of Authority	210
	Delegation Without Allowing Further Migration	211
	Credit Card Endpoints	211
	Multiple Users on a Single System	213
	Secure Hoteling	214
	Creating a PKI with the Endorsement Key	216
	Links to Biometrics	218
	Links to Smart Cards	220
	Smart Memory Cards and TPMs	220
	Smart Signing Cards and TPMs	220
	Virtual Dongles	221
	Trusted Endpoints	221
		222
	Medical Solutions for HIPAA Compliance COTS Security Solutions for the Military	
	Manual B. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	
	Summary	230

Cha	apter 14 Administration of Trusted I	Devices	231
	Secure Backup/Maintenance		231
	Assignment of Key Certificates		235
	Secure Time Reporting		237
	Key Recovery		239
	TPM Tools		240
			241
Cha	apter 15 Ancillary Hardware		243
	Trusted Path		243
	Special Keyboards		244
	Trusted Display		246
	Summary Summary		247
Cha	apter 16 Moving from TSS 1.1 to TS	S 1.2	249
	Certified Migratable Keys	Civipata in dust	249
	Commands		250
	Tspi_TPM_CMKSetRestrictions		250
	Tspi_Key_CMKCreateBlob		250
	Tspi_Key_MigrateKey		251
	Tspi_TPM_CMKApproveMA		252
	Tspi_TPM_CMKCreateTicket		252
	Tspi_Key_CMKConvertMigration		
	Delegation		253
	Tspi_TPM_Delegate_AddFamily		255
	Tspi_TPM_Delegate_GetFamily		256
	Tspi_TPM_Delegate_InvalidateFamily		256
	Tspi_TPM_Delegate_CreateDelegation		257
	Tspi_TPM_Delegate_CacheOwnerDelegation		257
	Tspi_TPM_Delegate_UpdateVerificationCount		258
	Tspi_TPM_Delegate_VerifyDelegation		259
	Tspi_TPM_Delegate_ReadTables		259
	Direct Anonymous Attestation		260
	Tspi_TPM_DAA_JoinInit		262
	Tspi_TPM_DAA_JoinCreateDaaPubKey		263
	Tspi_TPM_DAA_JoinStoreCredential		264
	Tspi_TPM_DAA_Sign		264
	Tspi_TPM_DAA_IssuerKeyVerification		265
	Tspi_DAA_IssueSetup		265
	Tspi_DAA_IssueInit		266
	Tspi_TPM_DAA_VerifyInit		267
	Tspi_TPM_DAA_VerifySignature		267
	Tspi_TPM_DAA_RevokeSetup		268
	Tspi_TPM_DAA_ARDecrypt		268

29	Summary
28	Example Program
28	Tspi_DecodeBER_TssBlob
28	Tspi_EncodeDER_TssBlob
28	Tspi_Context_GetRegisteredKeysByUUID2
28	Tspi_Context_GetRegisteredKeysByUUID
28	Tspi_Context_GetRegisteredKeyByPublicInfo
28	Tspi_GetRegisteredKeyByUUID
28	Tcsi_EnumRegisteredKeys
28	Tspi_TPM_KeyControlOwner
28	Tspi_Context_UnregisterKey
28	Tspi_Context_RegisterKey
28	Tspi_TPM_CheckMaintenancePolicy
28	Tcsi_Admin_TSS_MaxTimePerLocality
28	Tcsi_Admin_TSS_SessionPerLocality
28	Tspi_TPM_RevokeEndorsementKey
27 and 1 and	Tspi_TPM_CreateRevocableEndorsementKey
The second state of the second	Commands
27	Administrative and Convenience Functions
27	Tspi_Context_CloseSignTransport
27	Tspi_Context_SetTransEncryptionKey
27	Transport Session
27	SOAP
27	Tspi_TPM_TickStampBlob
27	Tspi_TPM_ReadCurrentTicks
27	Tick Counter
27	Tspi_TPM_ReadCurrentCounter
27	Monotonic Counter
27	Tspi_TPM_GetAuditDigest
27	Tspi_TPM_SetOrdinalAuditStatus
27	Auditing Functions
27	Tspi_NV_ReadValue
27	Tspi_NV_WriteValue
27	Tspi_NV_ReleaseSpace
27	Tspi_NV_DefineSpace
	Commands
26 27	PCRs—New Behavior NVRAM
26	

Part IV:	Appendixes	291
Appendix A	TPM Command Reference	293
Appendix B	TSS Command Reference	303
Appendix C	Function Library	321
Appendix D	TSS Functions Grouped by Object and API Leve	323
	Index	333