

Index

A

- access control, 21, 23, 67-72, 89-100
 - Extensible Access Control Markup (XACML) and, 70, 72
 - fine-grained (entitlement management) and, 71-72, **71**
 - identities and, 68
 - identity stores (multiple) and, 70
 - Lightweight Directory Access Protocol (LDAP) and, 70
 - policy administration points (PAPs) in, 72
 - policy decision points (PDPs) in, 71-72, 107, **107**
 - policy enforcement points (PEPs) in, 71-72, **71**, 106-107, **107**
 - privacy and, 13
 - provisioning and, 75
 - regulatory oversight/compliance and, 117
 - Role-Based (RBAC), 89
 - roles in, 89-100. *See also* roles
 - Security Assertion Markup Language (SAML) and, 70
 - single sign-on (SSO), 68-70
 - user accounts, 23
- Active Directory, 24, 54, 76, 80, 102
- agents, for single sign-on (SSO), 106, **107**
- aggregated data, privacy and, 13
- anonymity, privacy and, 13
- assurance levels, authentication and, 65
- attributes of identity, 11, 28-29, 196
- auditing and reporting, 139
 - best practices for, 121-126, **124**, **125**, 125*t*, **126**, 126*t*
 - federated authentication systems and, 126-127
 - links analysis and, 123-126, **124**, **125**, 125*t*, **126**, 126*t*
 - pattern reporting in, 118-120
 - pattern-based, 117-118
 - regulatory oversight/compliance and, 116
- auEduPerson, 114
- Australia, national identity card scheme in, 3
- Australian Access Federation (AAF), 114
- authentication, 2, 10, 57-67
 - access control and, 67-72. *See also* access control
 - assurance levels for, 65
 - authorization vs., 22, 58-59, **59**
 - biometrics in, 61, 63
 - challenge response systems in, 60-61
 - choosing correct methodology for, 63-64
 - combining methods of, 61
 - definition of, 57-58
 - digital certificates and, 15-16, 61, 196-197
 - evidence of identity (EoI) process in, 15-16, 59
 - Extensible Access Control Markup Language (XACML) and, 197
 - federated, 109-114, **111**, 139, 197. *See also* federated authentication

authentication, *continued*
 fine-grained access control and, 7, 197
 identification and, 59-60
 importance of, 57
 Integrated Windows Authentication (IWA)
 and, 105, 139
 integration/unification of, 139
 levels of, 4, 64-65, **64**
 methods of, 59-64
 one-factor, 61-62
 passwords and, 59-62
 protection of data through, 60-61
 public key infrastructure (PKI) and, 197, 203,
 203-204*t*
 registration assurance levels for, 66-67, 66*t*, **67**
 repudiation and, 60
 risk levels vs. level of, 65, 65*t*
 roles/RBAC and, 98
 Security Assertion Markup Language
 (SAML) and, 197
 shared secret methodology in, 61-62
 single sign-on (SSO) and, Windows systems,
 105, 108
 single-level, 4
 standards for, 196-197
 three-factor, 4, 63
 trusted third parties and, 14-16
 two-factor, 4, 62-63
 validation and, 58-59, **59**
authentication directory identity store, 24
authoritative sources of identity, 47-48
authorization, 22
 authentication and vs., 58-59, **59**
 authoritative sources and, 47-48
 parallel, 87
 provisioning and, 87
 sequential, 87
authorization database identity store, 24

B

best-of-breed vs. vendor-suite solutions, 133
biometrics, 4, 61, 63
breaches of security, 1-2, 5-6
browsers and SSO, 102
budgeting for identity management, 141-142

Business at the Speed of Thought (Gates), 57
business needs evaluation, 131
business policy, regulatory
 oversight/compliance and, 120-121. *See also*
 policies, policy enforcement

C

case study, 179-193
Central Authentication Service (CAS), in single
 sign-on (SSO), 104, 104*t*
central directory server, 25-26, **25**
central directories, 52-55
certificate authority (CA), 150-158, **159**, 172, 205
certificate policy document, 156
certificate practice statement (CPS), 153-154, 157
certificate revocation list (CRL), 155-156, 161, 164*t*
certificate server, PKI and, 150
certificate. *See* digital certificates
challenge response systems, 60-61
cleansing. *See* data cleansing
client-side PKI, 153
Code Division Multiple Access (CDMA),
 smartcards and, 168
collator, smartcards and, 173
collection of data vs. privacy, 12
“collectors” and roles, 119
compliance. *See* regulatory
 oversight/compliance
components of a person’s identity, 10-11
confidentiality, 2
consent for use of data, privacy and, 14
contact smartcards, 175
cookies, in single sign-on (SSO) and, 105-106
corporate structure and governance model,
 142-143
cost/efficiency, roles/RBAC and, 30, 92, 95
cross-domain single sign-on (SSO), 108
CRUD approach, 23
cryptography standards, 203, 203-204*t*
cryptographic message syntax standard, 203*t*

D

data cleansing, 121-126, **124**, **125**, 125*t*, **126**, 126*t*
 cost vs. accuracy curve for, 145, **145**

- data integrity, 2
- data security. *See* security
- databases vs. directories, 37-38, 38*t*, 48-49
- DB2, 24
- de-provisioning, 48, 75-76. *See also*
- provisioning
 - actions associated with, 76
 - “collectors” and, 119
 - directories and, 48
 - roles and, 84
- delegated administration, 32
- delta updates, in provisioning, 86
- Diffie-Hellman key agreement standard, 203*t*
- digital certificates, 15-16, 61, 196-197. *See also*
- public key infrastructure (PKI)
 - certificate authority (CA) in, 150, 151, 153, 154, 156, 158, **159**, 205
 - certificate policy document for, 156
 - certificate practice statement (CPS) for, 153-154, 157
 - certificate production in, in-house vs. third-party, 161-162, 162*t*
 - certificate revocation list (CRL) for, 155-156, 161, 164*t*, 205
 - certificate server in, 159
 - encryption and, 161
 - extensions for, X.509 standard, 206
 - hardware security modules (HSM) in, 154-155
 - issuer name for, 205
 - issues related to, 161
 - issuing process in, 153-155, **154**
 - key generation for, 160, 162-163, 163*t*
 - Lightweight Directory Access Protocol (LDAP) and, 159
 - management of, 160
 - OCSP responder for, 156, 161, 164*t*
 - public key certificates in, 151
 - public key infrastructure (PKI) and, 197
 - registration authority (RA) in, 153, 154
 - relative distinguished name (RDN) and, 151
 - revocation process for, 155-156, 161, 163-164, 164*t*
 - serial number of, 205
 - signature algorithm identifier for, 205
 - soft vs. hard, 151-152
 - subject name for, 205-206
 - subject public key information in, 206
 - token storage for, 164-165, 165*t*
 - validity period of, 205
 - version of, 205
 - X.500 standard for, 206
 - X.509 standard for, 156, 157-158, 196-197, 205-206
 - Digital Signature Algorithm (DSA), 207
 - digital signatures, PKI and, 148
 - directories, 37-56, 130, 138
 - access protocols for, 196
 - agility of, 37
 - attributes in, 196
 - authoritative sources for, 47-48
 - central directory configuration for, 52-55
 - configuration for, 52-55
 - databases vs., 37-38, 38*t*
 - de-provisioning of, 48
 - design of, 48-49
 - Directory Access Protocol (DAP) and, 43, 196
 - directory information tree (DIT) for, 39, 46, 195
 - distinguished names in, 41
 - distributed configuration for, 52-55
 - dynamic abilities of, 37
 - groups within, 54
 - inetOrgPerson schema for, 39, 196
 - issues associated with, 46-47
 - legacy systems and, 49
 - Lightweight Directory Access Protocol (LDAP) and, 43, 44-45, 47, 50, 196
 - logical topology for, 53-54, **54**
 - meta-, 51
 - names within, 39, 41, **42**
 - namespace for, 39, **39**, 42-43
 - object classes in, 39-40
 - organizational units (OUs) in, 41, 42, 43
 - physical topology of, 54-55
 - provisioning of, 48
 - relative distinguished names (RDNs) in, 41, **42**
 - replication in, 52-53
 - requirements of, 37
 - Resource Access Control Facility (RACF), 50
 - schema for, 38-41
 - searches in, allowing for fuzzy/soundex, 46

- directories, *continued*
- security and, 37
 - speed of access/response in, 37
 - standards for, 195-196
 - synchronization in, 52-53
 - views of organization through, 45, **45**
 - virtual directories and, 49-51
 - virtual, 138-139
 - X.500 standard and, 40-41, 40*t*, 43, **44**, 195-196
- Directory Access Protocol (DAP), 43, 196
- directory information tree (DIT), 39, 46, 195
- disclosure of data vs. privacy, 13
- distinguished names, 41
- distributed directories, 52-55
- distributed repositories, 26-27, **26**
- DIT. *See* directory information tree (DIT)
- diversified provisioning models, 78-81, **79**, **80**
- domains of identity, 11
- Domino, 102
- duplication/errors in identity data, 18
- E**
- eDirectory, 24, 102
- eduPerson, 196
- efficiency. *See* cost/efficiency
- electronic forms packages, for provisioning, 84-85
- electronic funds transfer point of sale (EFTPOS) terminals, 168
- Electronic Health Signature Authority (Australia), 157
- electronic identity (eID) schemes, smartcards in, 167, 169, 170
- Elliptic Curve DSA (ECDSA), 207
- encryption and PKI, 148, 161
- Enron, 115
- Enterprise Resource Planning (ERP) systems vs. roles/RBAC, 95
- enterprise single sign-on (ESSO), 102-105, 138. *See also* single sign-on (SSO)
- entitlement management, 71-72. *See also* fine-grained authentication
- errors in identity data, 18
- Europay, Mastercard, Visa (EMV) standards, 168
- evidence of identity (EoI) checks, 15-16, 59, 171-172
- exercises/university case study, 179-193
- existing IT environment evaluation, 131-132
- extended-certificate syntax standard, 203*t*
- Extensible Access Control Markup Language (XACML), 70, 72, 197
- F**
- facial recognition, 4, 61. *See also* biometrics
- federated authentication, 109-114, **111**, 139, 197
- auditing of systems using, 126-127
 - identity providers (IdPs) in, 109-111, 127
 - inetOrgPerson schema for, 114
 - Lightweight Directory Access Protocol (LDAP) in, 113-114
 - pitfalls of, 113-114
 - Security Assertion Markup Language (SAML) and, 113
 - service providers (SPs) in, 109-111
 - Shibboleth credentialing in, 113
 - Where Are You From (WAYF) server systems for, 112-113, **112**
- financial sector
- and increasing regulatory issues, 115
 - and smartcard use, 168
- fine-grained authentication (entitlement management), 7, 71-72, **71**, 197
- fingerprints, 4, 61. *See also* biometrics
- Firefox, 102
- forms, for provisioning, 84-85
- future developments in identity management, 4-7
- fuzzy searches, 46
- G**
- gap analysis, 132
- Gates, Bill, 57
- generic attributes of identity, 10-11
- Global Platform alliance and smartcards, 169, 171
- Global System for Mobile Communications (GSM) and smartcards, 168
- governance, 115-116, 142-143
- governance, risk, and compliance (GRC), 115-128. *See also* regulatory oversight/compliance
- groups, 54, 118

GroupWise, 76
 Guilloche patterns on smartcards, 174

H

hackers, 1
 hard certs, 151-152
 hardware security module (HSM), 154-155, 172-173
 Health Insurance Portability and Accountability Act (HIPAA), 115
 HR-centric vs. diversified provisioning models, 78-81, **79**, **80**
 HTTP and single sign-on (SSO), 105, 106, 107

I

IBM, 143
 IBM i systems, 69
 identification papers/cards, 2-3
 identifiers, 13-14
 identity, 9-20

- access control and, 68
- attributes of, 11, 28-29
- authentication of, 10
- authoritative sources of, 47-48
- components of, 10-11
- data cleansing and, 121-126, **124**, **125**, 125*t*, **126**, 126*t*, 145
- defining, 9-10, 11
- domains of, 11
- duplication/errors in data for, 18
- generic attributes in, 10-11
- identity stores and, 27-28
- multiple, within one environment, 17-18
- privacy and, 11-16
- registration assurance levels for, 66-67, 66*t*, **67**
- roles and, 16-17
- source of truth for, 47-48
- specific attributes in, 10-11
- trust in establishing, 10
- user accounts and, 22-23
- X.500 standard and, 40-41, 40*t*, 195-196

 identity management, 21-35

- access control in, 21, 23
- applications of, 5

authentication in, 22
 authorization in, 22
 automated processes in, 3-4
 cleansing, data cleansing for, 121-126, **124**, **125**, 125*t*, **126**, 126*t*, 145
 CRUD approach in, 23
 definition of, 2
 delegated administration and, 31-32
 duplication and errors in, 18
 federated authentication and, 109
 future developments in, 4-7
 government control of citizens and, 4-5
 history and development of, 2-3
 identity stores in, 21-35. *See also* identity stores
 implementation of, 129-146. *See also* implementation and roadmap
 levels of identity data needed in, 6
 links analysis and, 123-126, **124**, **125**, 125*t*, **126**, 126*t*
 multiple identities for one person and, 17-18
 pitfalls of, 5-6
 regulatory oversight/compliance and importance of, 23, 116
 self-service approach to, 5, 31-32
 separation of duties (SoD) policies and, 21, 93, 127, 120-121
 state of the industry in, 3-4
 user accounts and, 22-23
 identity providers (IdPs), for federated authentication, 109-111, 127
 identity stores, 21-35, 131-132

- access control and, 70
- attributes of identity in, 28-29
- authentication directory type of, 24
- authorization database type of, 24
- central directory server for, 25-26, **25**
- definition of, 23-24
- delegated administration for, 31-32
- directory provisioning in, 29-30
- distributed repositories for, 26-27, **26**
- identities in, 27-28
- joins and, 26
- legacy applications and, 25

- identity stores, *continued*
 - Lightweight Directory Access Protocol (LDAP) and, 25
 - multiple, 24-30, 70
 - multiple, management strategies for, 27-30
 - provisioning of, 29, 75-88. *See also* provisioning
 - role management in, 30, **31**
 - role modeling for, 32
 - types of, 24
 - virtual directories and, 26-27
 - implementation and roadmap, 129-146
 - budget management for, 141-142
 - business needs evaluation for, 131
 - challenges to, 141-145
 - components that may be required in, 138-139
 - corporate structure and governance model for, 142-143
 - data cleansing cost vs. accuracy curve in, 145, **145**
 - directories in, 130
 - existing IT environment evaluation for, 131-132
 - gap analysis in, 132
 - identity stores in, 131-132
 - physical infrastructure/implementation in, 135-136
 - political landscape and, dealing with, 140-141
 - pre-implementation tasks in, 130-135
 - project management for, 145
 - project structure for, typical, 136-138
 - request for proposal (RFP) process for 133-135
 - risk analysis for, 132-133, 137-138, 137*t*
 - roadmap creation for, 133, 135
 - sample roadmap for, 138-140, **139**
 - skilled resources needed for, 142
 - sponsor and stakeholders in, 131, 140-141
 - technical solution evaluation for, 132
 - vendor churn and, 143
 - vendor strategies used in, 143-145
 - vendor-suite vs. best-of-breed solutions in, 133
 - implementing a PKI certificate system, 161-165
 - iNetOrg Person (Microsoft), 196
 - inetOrgPerson schema, 39, 114, 196
 - Infocard, 16
 - integrated authentication, 139
 - Integrated Windows Authentication (IWA), 105
 - Internet Explorer, 102
 - Internet Information Services (IIS) for SSO, 108
 - Internet Taskforce RFC 2798, 39
 - Internet, business use of/connection to, 57
 - iris scans, 4, 61. *See also* biometrics
 - ISO 24727 standard, 169, 174
 - ISO 7816 standard, 169, 174
 - IT controls, regulatory oversight/compliance and, 120-121
 - IT environment evaluation, 131-132
- J**
- Java 2 Platform, Enterprise Edition (J2EE) for SSO, 108
 - Java Authentication and Authorization Service (JAAS) for SSO, 104, 104*t*
 - Java Card, 169, 174
 - joins, 26
- K**
- Kerberos, 103-104, 104*t*
 - key generation, in PKI, 160, 162-163, 163*t*
 - key lengths, PKI, 207
 - key pairs, 148
- L**
- legacy systems, 25, 49
 - levels of authentication, 64-65, **64**
 - Lightweight Directory Access Protocol (LDAP), 144
 - access control and, 70
 - digital certificates and, 159
 - directories and, 43, 44-45, 47, 50, 196
 - federated authentication and, 113-114
 - identity stores and, 25
 - PKI and, 159
 - Resource Access Control Facility (RACF) directories and, 50
 - virtual directories and, 50
 - links analysis, 123-126, **124**, **125**, 125*t*, **126**, 126*t*
 - locking a smartcard, 176
 - logical directory topology, 53-54, **54**
 - Lotus Notes, 50, 76, 102

M

managing identity. *See* identity management
 mapping roles, 82-83, **82**, 90-91, 90-91*t*
 meta-directories, 51
 micro-printing on smartcards, 174
 Microsoft, 196
 Active Directory, 24
 Exchange Server, 69
 Exchange, 76, 105
 Infocard, 16
 Outlook, 105
 SharePoint, 87
 Windows. *See* Windows
 mobile phones and smartcards, 168
 modeling roles, 32
 MOTO rules, 60
 multiple identities for one person, 17-18
 multiple identity stores, 24-30. *See also* identity stores
 MVS, 24

N

names, 39, 41, **42**
 directory, 39, 41, **42**
 distinguished, 41
 relative distinguished (RDNs), 41, **42**
 namespace, 39, **39**, 42-43, **44**
 national identification papers/cards, 2-3
 National Institute of Standards and Technology (NIST), 207
 .NET, 24
 Netscape, 196
 non-repudiation, 2
 Novell, 18, 76
 eDirectory, 24, 102
 GroupWise, 76

O

object classes in directory, 39-40
 OCSP responder, 156, 161, 164*t*
 Omada Identity Manager, 89
 OpenSSO, 104, 104*t*
 Oracle, 24, 50, 69, 76, 143, 144
 Federation Server, 144

 Internet Directory, 144
 organizational units (OUs), 41, 42, 43
 organizationalPerson, 196
 orphan accounts, 118

P

parallel authorization, 87
 password-based cryptography standard, 203*t*
 passwords, 53, 59-62
 pattern reporting, 118-120
 pattern-based auditing, 117-118
 physical infrastructure/implementation, 135-136
 PIN numbers, 4, 62, 63, 171
 pitfalls of identity management systems, 5-6
 policies, policy enforcement
 regulatory oversight/compliance and, 120-121
 restriction table sample for, 120, 121*t*
 single sign-on (SSO) and, 108-109
 policy administration points (PAPs), in access control, 72
 policy decision points (PDPs), 71-72, 107, **107**
 policy enforcement points (PEPs), 71-72, 106-107, **107**
 printing a smartcard, 173, **173**
 privacy, 11-16. *See also* security
 access and transparency of data vs, 13
 aggregation and anonymity in, 13
 breaches of, 1-2, 5-6
 collection of data and, 12
 consent for use of data and, 14
 digital certificates and, 15-16
 identifiers and, 13
 increasing protection of, 12
 PKI and, 149-150
 quality of data and, 13
 regulatory oversight and importance of, 23
 rules for protecting, 12-14
 security and, 13
 sharing data and, 14
 smartcards and, 170-171
 trust vs., 11
 trusted third parties and, 14-16
 use and disclosure of data vs, 13
 private key, 148
 private-key information syntax standard, 203*t*

- productivity and roles/RBAC, 92, 95
 - project management in implementation, 145
 - provisioning, 29, 75-88
 - access control/access rights and, 75
 - Active Directory and, 80
 - authorization in, sequential and parallel, 87
 - automation of, 29, 84-87
 - business system issues to confront in, 78-81
 - “collectors” and, 119
 - de-, 48, 75. *See* de-provisioning
 - definition of, 75
 - delta updates to, 86
 - directories and, 48
 - directory level, 29-30
 - electronic forms packages for, 84-85
 - HR-centric vs. diversified models for, 78-81, **79, 80**
 - minimal data entry criterion for, 76
 - public key infrastructure (PKI) and, 85
 - robustness of, marks of, 76-78, 76
 - role mapping in, 82-83, **82**
 - roles/RBAC and, 81-84, 98
 - security and, 78-79
 - self- self-service approach to, 77
 - signatures in, 85
 - synchronization, data synchronization and, 86-87
 - workflow engine for, 81, 85-86
 - zero-day start goal for, 78
 - proxies in single sign-on (SSO), 106, **107**
 - public key, 148
 - public key certificates in, 151
 - public key cryptography standards, 203, 203-204*t*
 - public key infrastructure (PKI), public key infrastructure (PKI), 148-166, **149**, 197. *See also* digital certificates
 - certificate authority (CA) in, 150, 151, 153, 154, 156, 158, **159**
 - certificate management and, 160
 - certificate policy document for, 156
 - certificate practice statement (CPS) for, 153-154, 157
 - certificate production in, in-house vs. third-party, 161-162, 162*t*
 - certificate revocation list (CRL) for, 155-156, 161, 164*t*
 - certificate server in, 150, 159
 - client-side, 153
 - components of, 153-159
 - cryptography standards for, 203, 203-204*t*
 - digital signatures and, 148
 - encryption and, 148, 161
 - hardware security modules (HSM) in, 154-155
 - implementation considerations for, 161-165
 - important uses of, 149-150, 152-153
 - issues related to certificates and, 161
 - issuing process in, 153-155, **154**
 - key generation for, 160, 162-163, 163*t*
 - key lengths in, 207
 - key pairs in, 148
 - Lightweight Directory Access Protocol (LDAP) and, 159
 - OCSP responder for, 156, 161, 164*t*
 - privacy and, 149-150
 - private key in, 148
 - process of using, 148-149, **149**, 150-152, **150**
 - provisioning and, 85
 - public key certificates in, 151
 - public key in, 148
 - registration authority (RA) in, 153, 154
 - relative distinguished name (RDN) and, 151
 - revocation process for, 155-156, 161, 163-164, 164*t*
 - security and, 149-150
 - server-side, 152-153
 - smartcards and, 148, 151, 174
 - soft vs. hard certs in, 151-152
 - storage device production for, 165, 165*t*
 - strength of certificate in, 151
 - terminology of, 151-152
 - token storage for, 164-165, 165*t*
 - USB devices and, 151
 - X.509 standard for, 156, 157-158
- Q**
- quality of data vs. privacy, 13
- R**
- registration assurance levels, authentication and, 66-67, 66*t*, **67**

- registration authority (RA), 153, 154
 registration system for smartcards, 171-172
 regulatory oversight/compliance, 23, 115-128
 access control and, 117
 auditing and reporting in, 116
 business policies and, 120-121
 “collectors,” 119
 compliance defined for, 116
 data cleansing and, best practices for,
 121-126, **124**, **125**, 125*t*, **126**, 126*t*
 federated authentication auditing and, 126-127
 financial sector and, 115
 governance and, 115-116
 groups in, 118
 Health Insurance Portability and
 Accountability Act (HIPAA) and, 115
 identity management’s role in, 116
 increasing levels of, 115
 IT controls and, 120-121
 links analysis and, 123-126, **124**, **125**, 125*t*,
 126, 126*t*
 orphan accounts and, 118
 pattern reporting in, 118-120
 pattern-based auditing in, 117-118
 risk management and, 116
 roles and role management for, 30, 95, 118
 Sarbanes-Oxley Act and, 115
 separation of duties (SoD) policies and,
 120-121, 127
 relative distinguished name (RDN), 41, **42**, 151
 replay attacks vs. SSO, 106
 replication, 52-53
 repository, distributed, 26-27, **26**
 repudiation, 2, 60
 request for proposal (RFP) process 133-135
 Resource Access Control Facility (RACF), 50,
 102, 118
 restriction table sample, 120, 121*t*
 reverse proxy server for SSO, 106
 revocation process, digital certificates and PKI,
 155-156, 161, 163-164, 164*t*
 risk analysis, 132-133, 137-138, 137*t*
 risk management, 116
 authentication and levels, 65, 65*t*
 impact, mitigation, risk owner in, 137
 implementation and, 132-133, 137-138, 137*t*
 registration assurance levels for, 66-67, 66*t*, **67**
 residual risk in, 138
 risk level matrix in, 137-138, 137*t*
 roles use and, 30
 severity, likelihood, and level in, 137
 roadmap. *See* implementation and roadmap
 role-based access control. *See* roles and
 role-based access control (RBAC)
 roles and role-based access control (RBAC),
 16-17, 89-100
 access control using, 89-100
 access rights and, 98
 authentication and, 98
 basic process of, 90
 benefits of, in provisioning, 83-84
 bottom up vs. top down planning for use of, 17
 business process improvement using, 95
 change, speed of response to, 94
 “collectors” and, 119
 cost savings of, 30
 data cleansing and, 121-126, **124**, **125**, 125*t*,
 126, 126*t*, 145
 de-provisioning and, 84
 defining, 97
 delegated administration of, 31-32
 discovery of, 97-98
 efficiency and, 92, 95
 Enterprise Resource Planning (ERP) systems
 vs., 95
 exceptions for, 97
 heterogeneous system management through, 94
 identity and, 16-17
 identity stores and, 30, **31**
 implementation of, 95-97
 importance of, 92
 links analysis and, 123-126, **124**, **125**, 125*t*,
 126, 126*t*
 management of, 30, **31**
 mapping of, 82-83, **82**, 90-91, 90-91*t*
 modeling of, 32
 multiple identities for one person and, 17-18
 number of, 96
 overlapping, 123-126
 pattern reporting in, 118-120

- roles and role-based access control *continued*
 - pattern-based auditing of, 118
 - planning for use of, bottom up vs. top down, 17
 - productivity and, 92
 - provisioning and, 81-84, 98
 - regulatory oversight/compliance and, 30, 95, 118
 - Resource Access Control Facility (RACF), 118
 - restriction table sample for, 120, 121*t*
 - risk management and, 30
 - Role-Based Access Control (RBAC) and, 89
 - SAP-defined, 118
 - scalability of system and, 94-95
 - security and, 93, 94, 97-98
 - separation of duties (SoD) policies and, 21, 93, 120-121, 127
- RSA cryptography standard, 203*t*, 207

- S**
- SAP, 18, 89, 118
- Sarbanes-Oxley Act (SOX), 23, 115
- schema for directory, 38-41
- searching a directory, 46
- Secure Sockets Layer (SSL) and SSO, 106, 108
- security, 1. *See also* privacy
 - authentication and, 60-61
 - breaches of, 1-2, 5-6
 - digital certificates and, 15-16
 - directories and, 37
 - Extensible Access Control Markup (XACML) and, 70, 72
 - hardware security modules (HSM) in, 154-155
 - PKI and, 149-150
 - privacy and, 13
 - provisioning and, 78-79
 - regulatory oversight and importance of, 23
 - roles/RBAC and, 93, 94, 97-98
 - Secure Sockets Layer (SSL) and, 106, 108
 - Security Assertion Markup Language (SAML) and, 70, 104, 104*t*, 108, 113, 197
 - Security Assertion Markup Language (SAML), 70, 197
 - federated authentication and, 113
 - single sign-on (SSO) and, 104, 104*t*, 108
 - selected attribute types standard, 203*t*
 - self-service approach to identity management, 5, 31-32
 - self-service approach to provisioning, 77
 - separation of duties (SoD) policies, 21, 93, 120-121, 127
 - sequential authorization, 87
 - server-side PKI, 152-153
 - servers
 - central directory, 25-26, **25**
 - certificate, in PKI systems, 150, 159
 - PKI on, 152-153
 - reverse proxy, 106
 - Where Are You From (WAYF), for federated authentication, 112-113, **112**
 - service providers (SPs), federated authentication and, 109-111
 - session cookies, SSO, 106
 - session time-outs, SSO, 106
 - sessions, SSO, 103-104
 - SHA-1/SHA-2, 207
 - shared data and privacy, 14
 - shared secret methodology in authentication, 61-62
 - SharePoint, 87, 102
 - Shibboleth credentialing, 113
 - signatures, 85, 148. *See also* digital signatures
 - single sign-off, 104
 - single sign-on (SSO), 68-70, 101-109
 - agents in, 106, **107**
 - Central Authentication Service (CAS) and, 104, 104*t*
 - challenges of, 101-102
 - cookies and, 105-106
 - cross-domain, 108
 - enterprise (ESSO), 68-70, 102-105, 138
 - HTTP and, 105, 106, 107
 - Internet Information Services (IIS) and, 108
 - Java 2 Platform, Enterprise Edition (J2EE) and, 108
 - Java Authentication and Authorization Service (JAAS) for, 104, 104*t*
 - Kerberos and, 103-104, 104*t*
 - need for, 101
 - OpenSSO for, 104, 104*t*
 - policies and policy enforcement for, 108-109
 - policy decision points (PDPs) in, 107, **107**

- policy enforcement points (PEPs) in, 106-107, **107**
- proxies in, 106, **107**
- replay attacks vs., 106
- reverse proxy server in, 106
- Secure Sockets Layer (SSL) and, 106, 108
- Security Assertion Markup Language (SAML) and, 104, 104*t*, 108
- session cookies in, 106
- session time-outs and, 106
- sessions in, 103-104, 105-106
- single sign-off and, 104
- standards development for, 104, 104*t*
- tokens/smartcards and, 106
- Trusted Platform Modules (TPMs) and, 106
- virtual private networks (VPNs) and, 108
- Web browser use of, 102
- Web, 68-70, 105-109, **107**, 138
- Windows and, integrated authentication (IWA) for, 105, 108
- skilled resources needed for implementation, 142
- Smartcard Management System (SCMS), 172
- smartcards, 151, 167-177
 - card keys vs. certificate keys in, 172
 - certificate authority (CA) for, 172
 - Code Division Multiple Access (CDMA) and, 168
 - collator for, 173
 - components of system using, 171
 - contact vs. wireless cards in, 175
 - data structure of, 174-175
 - deployment issues for, 171-176
 - electronic funds transfer point of sale (EFTPOS) terminals for, 168
 - electronic identity (eID) schemes using, 167, 169, 170
 - Europay, Mastercard, Visa (EMV) standards for, 168
 - evidence of identity (EoI) process for, 171-172
 - financial sector use of, 168
 - Global Platform alliance and, 169, 171
 - Global System for Mobile Communications (GSM) and, 168
 - hardware security module (HSM) for, 172-173
 - history of, 166-167
 - identification sector use of, 169
 - interoperability issues for, 169-170
 - ISO 24727 and, 169, 174
 - ISO 7816 standard for, 169, 174
 - issuance of, 176
 - Java Card and, 169, 174
 - key generation for, 160, 162-163, 163*t*
 - lifecycle of, 175-176
 - locking of, 176
 - manufacturing of, 175
 - mobile phone sector use of, 168
 - personalization of, 175-176
 - physical layout and design of, 173-174
 - PKI and, 148
 - printing of, printers for, 173, **173**
 - privacy issues and, 170-171
 - public key infrastructure (PKI) and, 174
 - registration system for, 171-172
 - single sign-on (SSO) and, 106
 - Smartcard Management System (SCMS) for, 172
 - standards for, 169, 174
 - storage device production for, 165, 165*t*
 - Subscriber Identity Module (SIM) cards and, 168
 - termination of, 176
 - ticketing sector use of, 168-169
 - token storage in, 164-165, 165*t*
 - “touch-and-go” technology and, 169
- soft certs, 151-152
- soundex searches, 46
- source of truth, 47-48
- specific attributes of identity, 10-11
- SQL, 24
- stakeholders in implementing identity management systems, 131, 140-141
- standards, 195-197
 - authentication, 196-197
 - digital certificates and, 196-197
 - Directory Access Protocol (DAP) and, 196
 - directory, 195-196
 - Europay, Mastercard, Visa (EMV), 168
 - Extensible Access Control Markup Language (XACML) and, 197
 - fine-grained access control, 197

standards, *continued*

- Lightweight Directory Access Protocol (LDAP) and, 196
- public key cryptography, 203, 203-204*t*
- Security Assertion Markup Language (SAML) and, 197
- single sign-on (SSO) and, 104, 104*t*
- smartcards and, 169, 174
- storage device production, PKI, 165, 165*t*
- Subscriber Identity Module (SIM) cards, 168
- Sun Identity Manager, 144
- SunONE directory, 24, 76, 144
- synchronization
 - directories and, 52-53
 - provisioning and, 86-87

T

- technical solution evaluation, 132
- terminating a smartcard, 176
- Thawte, 15
- ticketing sector use of smartcards, 168-169
- token storage, PKI, 164-165, 165*t*
- “touch-and-go” technology and smartcards, 169
- transparency of data, 13, 23
- trust, 10, 11, 14-16
- trusted identifiers, 14
- Trusted Platform Modules (TPMs), 106
- trusted third parties and, 14-16

U

- unified authentication, 139
- University case study, 179-193
- USB devices
 - key generation for, 160, 162-163, 163*t*
 - PKI and, 151
 - storage device production for, 165, 165*t*
 - token storage in, 164-165, 165*t*

- use of data vs. privacy, 13
- user accounts, 22-23

V

- validation, 33, 58-59, **59**
 - authentication and vs., 58-59, **59**
- vendors, in implementation and management, 143-145
- vendor-suite vs. best-of-breed solutions, 133
- VeriSign, 15
- virtual directories, 26-27, 49-51, 138-139
 - identity stores and, 26-27
 - legacy systems and, 49
 - Lightweight Directory Access Protocol (LDAP) and, 50
 - limitations of, 27
 - meta-directories vs., 51
- virtual private networks (VPNs) and SSO, 108

W

- Web browsers and SSO, 102
- Web SSO, 105-109, **107**, 138. *See also* single sign-on
- Where Are You From (WAYF) server systems, 112-113, **112**
- Windows and SSO, integrated authentication for, 105, 108
- wireless smartcards, 175
- workflow engine, in provisioning, 81, 85-86
- WorldCom, 115

X

- X.500 standard, 40-41, 40*t*, 43, **44**, 195-196, 206
- X.509 standard, 15, 156, 157-158, 196-197, 205-206

Z

- zero-day start goal for provisioning, 78