

Symbols

@ references 17
@+id notation 113
@id notation 112
@null 133
+ sign 50

Numerics

3D scene 426–427
 view frustum 426
3D shapes, applying textures
 to 433

A

aapt add command 494
aapt tool 33, 35, 369, 492
AbsoluteLayout layout
 manager 109
ACCESS_FINE_LOCATION
 constant 353
ACCURACY_FINE constant 348
ACID 30
action property 185
ACTION_GET_CONTENT
 constant 271, 379
ACTION_SEND 66
ACTION_VIDEO_CAPTURE
 constant 395
ACTION_VIEW 68
activities 14, 43, 51–59
 configChanges attribute 90
 instance state 91–93

layout resources 14–16
layout view tree 104
lifecycle 79–90
lifecycle methods 52
nonconfiguration instance
 state 93–95
resource management 52
root activity 95
selecting media files 378
simulating with
 monkeyrunner 602
testing via
 instrumentation 471
 testing with Robolectric 477
 testing with Robotium 467
unit testing 458–462
Activity class 14, 18, 45
 getActionBar method 559
 MapActivity subclass 356
 onActivityResult method
 271, 379
 onCreateOptionsMenu
 class 558
 onOptionsItemSelected
 method 558
 passing objects to other
 activities 212
 startActivityForResult
 method 271
activity lifecycle
 in action 82–89
 phases 79–82
 when orientation changes 89
 when processes are killed 88
Activity Not Responding
 dialog 190

activity stack 88
 and tasks 96
ActivityInstrumentationTest-
 Case2 class 464
ActivityMonitor class 466
Adapter class, getView
 method 384
Adapter interface 54, 60
adapters 59–63
 basics 59–60
 custom 60–63
AdapterView class 59
adb kill-server command 570
adb shell command 571
adb tool 34, 36, 227
 pull command 264
 shell command 483
adb.device.arg system
 property 537
addHeaderView method 122
addIdleHandler method 222
addMonitor method 466
addPreferencesFromResource
 method 240
address book, looking up data
 from 286–290
ADDRESS constant 289
ADT tool, drawbacks of 490
affine transformations 269
aidl tool 33, 164
AIDL. *See* interface definition
 language
AlarmManager class 177
AlphaAnimation class 381
 animationListener class 383
am instrument command 573

- am start command 573
- Android
 - 3.0 568
 - Action Bar 556
 - and Linux 24–29
 - application framework 8
 - build process 491–495
 - compared to mobile web applications 43
 - core entities 43–44
 - differences from other OSs 6
 - introduction to 5
 - is Android Linux? 24
 - JUnit 3 testing framework 451
 - key components 7
 - message passing 196–199
 - middleware 8
 - operating system 8
 - prerequisites for development 10
 - programming using web development techniques 581
 - without Java 585–588
 - screen sizes 147
 - SDK 8
 - download and installation 10
 - packages and classes 20
 - tools and components 33
 - system logs 575–577
 - technology stack 9
 - virtual devices 512
 - web integration 30
 - what it is 6
- android create command 498
- android create project command 507
- Android Debug Bridge 570
 - shell 571
- Android Development Tools
 - Eclipse Plugin 10
- Android Interface Definition Language 493
 - defining services 276
- Android Market 6
 - checking for required features 365
- android package namespace 32
- Android SDK 19
 - tools and components 33–38
- Android SDK and AVD Manager 352
- android tool 34–35, 498
- android update command 498
- android XML namespace
 - angle attribute 137
 - anyDensity attribute 149
 - cacheColorHint attribute 130
 - centerColor attribute 137
 - centerX attribute 137
 - color attribute 137, 140
 - dashGap attribute 137
 - dashWidth attribute 137
 - drawListSelectorOnTop attribute 136
 - endColor attribute 137
 - gradientRadius attribute 137
 - height attribute 137
 - icon attribute 160
 - installLocation attribute 227
 - largeScreens attribute 149
 - layout_gravity attribute 110
 - layout_marginBottom attribute 108
 - layout_marginLeft attribute 108
 - layout_marginRight attribute 108
 - layout_marginTop attribute 108
 - layout_weight attribute 110–111
 - layout_width attribute 108
 - name attribute 159, 162
 - orientation attribute 110
 - padding attribute 108
 - process attribute 79, 159, 182, 284
 - radius attribute 137
 - shape attribute 137
 - smallScreens attribute 146, 148
 - startColor attribute 137
 - text attribute 15, 108
 - theme attribute 129
 - top attribute 137
 - topLeftRadius attribute 137
 - type attribute 137
 - versionName attribute 456
 - width attribute 137
- Android-specific APIs 32–33
- android.bluetooth package 32
- android.database package 242
- android.database.sqlite package 242
- android.graphics package 32
- android.hardware package 32
- android.jar file 509
- android.location package 32
- android.media package 32
 - android.media.audiofx package 388
- android.net.Uri class 376
- android.opengl package 32
- android.provider package 290
- android.R.attr class 108
- android.R.styleable class 127–128
- android.telephony package 32
- android.test package 475
- android.view package 107
- android.view.animation package 381
- android.view.View class 51
- AndroidHttpClient class 310
- androidVersion property 509
- animation
 - transitions 382
 - TranslationAnimation class 381
 - tweening 384
- animation, applying to views 381
- AnimationListener interface 383
- AnimationUtils class 384
- annotations 480
- anonymous inner classes 56
- ant tool 497
- Apache Ant
 - and matrix builds 537
 - extension points 497
 - lack of dependency management 504
 - private tasks 500
 - running tests on Hudson 527
 - targets 497
 - tasks 497
 - tools folder 501
 - weaknesses 504
- Apache Commons Lang
 - library 498, 503
- Apache Harmony 19, 302
- Apache HTTP Components 303
- Apache HttpClient API 21
- Apache HttpClient package 303–306
- Apache Ivy 504
- Apache Maven
 - alternatives to 517
 - archetypes 505
 - assumptions about app structure 511
 - build phase 514

- Apache Maven (*continued*)
 - building applications 507–517
 - compared to Apache Ant 504
 - dependencies on common libraries 521
 - dependency management 505
 - drawbacks 517
 - Eclipse plugin 517–520
 - failed builds 515
 - goals 505
 - groupId 524
 - lifecycle 515
 - Maven Central 505
 - maven-android-plugin 507
 - maven-help-plugin 506
 - plugins 511
 - Project Object Model 505
 - repositories 505
 - scope 509
 - version attribute 509
 - APK files 95
 - aligning 494
 - build process 491
 - building with Apache Ant 500
 - installing with adb 36
 - installing with Eclipse 19
 - signing 494
 - structure 494
 - apk goal 512
 - Apple Push Notification System 183
 - Application class 54, 69–71
 - StrictMode 578
 - testing 453
 - application framework 43
 - application lifecycle 75
 - applications 8
 - activity interruptions 213
 - ceding control to another app 268–274
 - controlling execution environment 572
 - core 8
 - DealDroid 41, 543–544
 - definition of 74
 - designing for multiple device types 154
 - file explorer 227–235
 - GoodShares 269–280
 - handset-specific 8
 - Hello Ant 497
 - hiding application data 234
 - Hoccer 31
 - image downloader with message passing 197
 - installing on SD card 162
 - legacy applications 145
 - lifecycle 75
 - LifecycleExplorer 83–95
 - location-aware 525
 - look and feel 125–133
 - manipulating system properties 573
 - MediaMogul 364–400
 - MyMovies 102–154, 200, 238–241, 244–262, 298–310, 312–326, 328–332
 - non-open source 8
 - optimizing with ProGuard 589–601
 - permissions 45
 - preventing reverse-engineering with ProGuard 589–601
 - programming with JavaScript 581–585
 - programming without Java 585–588
 - running 19
 - running on external storage 227
 - sharing private data 280
 - simple image downloader 195
 - styles 125
 - themes 127–129
 - user IDs 76–77
 - versus tasks 74
 - ArrayAdapter class 59–60
 - super constructor 121
 - AssertionError 574
 - assertMatchesRegex method 455
 - assertTrue method 452
 - AssetManager class 369
 - /assets directory 371
 - assets directory 47
 - Asynchronous JavaScript and XML 322
 - AsyncTask class 55, 205
 - connecting to HTTP server 299
 - drawbacks 209
 - get method 465
 - implementing jobs 206–209
 - type arguments 207
 - when Activity has been destroyed 211
 - attributes. *See* android XML namespace
 - audio
 - AudioTrack class 388
 - stopping after 15 seconds 386
 - Audio class 377
 - auto-scaling mode 148
 - AutoCompleteTextView class 287
 - avoiding code duplication 121
 - avoiding code repetition with themes 127
-
- B**
- back-face culling 423
 - Background process 78
 - Barcode Scanner application 31
 - BaseAdapter class 61, 565
 - BaseColumns interface 249
 - BasicHttpParams class 309
 - battery life, preserving 180
 - beginTransaction method 261
 - bindService method 168
 - Bionic 24
 - Bitmap class 191, 199, 413
 - and AsyncTask 207
 - BitmapFactory class 412
 - boundCenterBottom method 360
 - BrewMap application 351–361
 - broadcast receivers 43
 - BroadcastReceiver class 161, 330
 - implementing 162
 - onReceive method 278
 - Browser application 30
 - Bubble application 31
 - <build> element 511
 - build management 489–539
 - Apache Maven 504–525
 - automated builds 495
 - build process
 - aligning resources 494
 - assembling the APK file 494
 - compiling Java source code 493
 - converting to Dalvik bytecode 493
 - generating Java source code 492
 - packaging resources 493
 - signing the APK file 494
 - with Apache Ant 501
 - build servers 525
 - broken build notifications 526
 - Hudson 527

build systems 539
 Apache Ant 496–504
 Apache Maven 504
 build.xml file 498
 Bundle class 199
 Button class 85
 bytecode 586

C

C 585
 C++ 585
 caching
 cache time limit 170
 images 374
 updating cache 171
 with Service 169–171
 Calculon, compared to
 Robotium 470
 Callback interface 398
 Camera application
 customized for devices 394
 unlocking 399
 cameras, detecting 365
 Canvas class 403
 color 405
 coordinate system 407
 double buffering 412
 drawText() methods 409
 full screen 405
 getHeight() and getWidth()
 methods 407
 CanvasDemo project 403
 CATEGORY_LAUNCHER 68
 cglib library 476
 characters method 317
 CheckedTextItem class 121
 choiceMode attribute 122
 choosers 65
 Chronometer widget 85
 classes.dex file 493, 519
 ClassNotFoundException 519
 clean target 532
 click events, handling 386
 ClientLogin authorization
 token 186
 ClipData class 565
 clipping planes 426
 Clojure 586
 close method 248
 Cloud to Device Messaging
 ac2dm service 186
 deciding whether to use 187
 registration ID 185–186

 registration messages 184
 required permissions 184
 Coin Flip application 31
 <color> element 134
 color, in OpenGL ES 421
 ColorDrawable class 134
 colors
 ARGB color space 131
 as drawables 132
 transparent 130
 com.google.android.maps
 package key classes 356
 command line, building
 applications at 496–504
 Compass application 31
 compiling
 for Dalvik 22
 just-in-time compiler 24
 concurrency 190, 210
 configuration changes 210–216
 Configuration class 89–90
 <configuration> element 511
 connectContext method 214
 connection managers,
 customizing 310
 ConnectionManager class,
 TYPE_MOBILE 331
 connections, connection
 pooling 308
 ConnectivityManager class
 71, 330
 CONNECTIVITY_ACTION
 331
 ConnManagerParams class 309
 Contacts class 288
 ContactsContract.CommonData-
 Kinds.Phone class 287
 content providers 43
 CONTENT_URL constant 288
 ContentHandler interface
 callback methods 317
 ContentProvider class 245
 testing 453
 ContentResolver class 287, 392
 ContentValues class 254
 Context class 60, 474
 continuous builds, with
 Hudson 533
 convertView 61
 convertView method 121
 <corners> element 137
 create read update delete
 operations 290
 createApplication method
 455, 457

creating an Android project in
 Eclipse 12
 Creator interface 166
 Criteria class 348
 cURL tool 310
 Cursor class 243, 256, 288, 376
 to back Adapter 377
 CursorAdapter class 262, 377
 custom locales 574

D

Dalvik 35, 586
 basic requirements 22
 Dalvik runtime 9
 dalvik.vm.enableassertions
 property 574
 data
 accessing shared data with
 ContentProvider 285–290
 accessing shared data with cus-
 tom ContentProvider
 290–293
 caching 235–236
 common interchange
 format 312
 common shared data
 285–293
 serializing 326
 sharing 266–294
 sharing between
 processes 267
 sharing using asynchronous
 remote procedure
 calls 277–279
 sharing using Context
 class 280
 sharing using intents 268–274
 sharing using remote proce-
 dure calls 274–280
 sharing using synchronous
 remote procedure
 calls 275–277
 Data Access Objects
 243, 252–262
 when to use 253
 wrapper methods 259
 data folders
 /data/app 27
 /data/data 27
 data-level integration 285–293
 databases 29, 241
 creating 244–252
 data access layer 243
 data manager 258–262

databases (*continued*)
 data packages 242
 foreign key mappings 251
 priming with predefined data 248
 DatabaseUtils class 243
 ddms tool 34, 37
 DealDroid application
 71, 548–557
 and Application class 69
 and intents 64
 intent filters 68
 introduction 43
 layouts 49
 permissions 45
 DealDroidTest application 449
 DealDroidWithService
 application 42
 debugEvent method 87
 debugging
 Activity Manager 573
 monkeyrunner tool 602–610
 DecorView class 103
 DEFAULT category 69
 DefaultHandler class 316
 DefaultHttpClient class 306–307
 DefaultHttpRequestRetry-
 Handler class 327
 defining resources 46–48
 delete method 255
 density-independent pixels 154
 dependency injection, and mock
 objects 476
 deploy goal 512
 deploy-dependencies goal 513
 device targeting 516
 dex goal 513
 -dex target 501
 DialogPreference class 239
 dip 152
 directional tags 164
 directories
 common 372
 multimedia 369
 DIRECTORY_DCIM
 constant 372
 DIRECTORY_MOVIES
 constant 372
 DIRECTORY_MUSIC
 constant 372
 DIRECTORY_PICTURES
 constant 372
 disconnectContext method 214
 Document Object Model 21
 parsers 315

doInBackground method 209
 domain-specific languages 467
 DOWN action 606
 DOWN_AND_UP action 606
 drag and drop 560–567
 DragShadowBuilder class 565
 draw() method 428
 draw9patch tool 34, 143
 drawable-hdpi folder 150
 drawables 15, 133–144
 accessing 134
 anatomy of 134
 nine-patch drawables
 141–144
 scaling 134, 148
 shape drawables 134–137
 with state 138
 drawArrays() method 424
 drawing 402
 2D effects 413–416
 displaying bitmaps 412–413
 FILL effect 410
 in 2D 403
 in 3D 416
 Paint class 408
 rendering continuously 408
 simple shapes 406
 text 408–410
 drawShapes() method 410
 Droid-Fu application library 216
 DRY principle 117
 dx tool 34–35, 493

E

EasyMock 476
 Eclipse 10
 build process 491
 build.xml file 498
 do you need to use? 10
 downloading and
 installing 10
 Java Development Tools 10
 Maven integration 517
 signing APK files 494
 Eclipse ADT plugin 518
 developing for tablets
 with 546
 Eclipse JDT plugin 518
 Editor interface 238
 Empty process 78
 emulator tool 34, 36
 emulator-start goal 513
 emulator-stop goal 513

emulators
 debugging with 570
 starting 528
 versus a real device 339
 entire lifetime phase 79
 entity relationship diagrams 245
 env property 512
 Environment class 233
 errors
 Activity Not Responding
 dialog 192
 processing ProGuard error
 reports 600–601
 execSql method 252
 executeInsert method 254
 <execution> element 512
 Executors class 203
 Expanded Menu 58
 external storage
 checking whether
 writable 231
 recommended paths 234
 EXTRA_OUTPUT extra
 393, 395
 EXTRA_STREAM constant 271

F

Fantom 586
 feature phones 364
 features, camera.front 366
 File class 373
 file, everything is a file 27
 FileDescriptor class
 236, 371, 475
 FileOutputStream class
 229, 236, 474
 FileReader class 234
 files
 AndroidManifest.xml 19
 DEX files 22
 external storage 225, 230
 PNG files 142
 reading and writing 225–237
 referencing multimedia
 files 368
 shared preferences file 282
 syncing 236–237
 filesystem 27
 important locations 27
 filesystems
 FAT 226
 journaled 236
 yaffs2 226
 fill_parent setting 108

find method 257
 findPreference method 240
 findViewById method 62, 121, 581
 finish method 274
 first-class functions 587
 FloatBuffer class 423, 428
 foreground lifetime phase 79
 Foreground process 78
 Fragment class, onCreateView method 551
 FragmentManager class 552, 560
 FragmentTransaction class 560
 FrameLayout class 381
 FrameLayout layout manager 109–110
 frames 109
 functional tests 446–447, 462–471
 explained 446
 versus unit tests 446

G

Gallery widget 379
 gen directory 13
 generate-sources goal 513, 515
 geo fix command 349
 Geocoder class 354–355
 network cost of using 355
 geocoding 354
 Google Geocoding API 355
 GeoPoint class 356
 GET command 301
 getActivity method 465
 getApplication method 464
 getCacheDir method 235
 getCheckedItemIds method 122
 getData method 379
 getDefaultSharedPreferences method 238
 getDrawable method 134
 getExternalCacheDir method 234–235
 getExternalStorageDirectory method 234–235
 getExternalStoragePublicDirectory method 372
 getExtra methods 179
 getFromLocationName method 354
 getFrontFacingCamera method 366

getInstrumentation method 461
 immutability 466
 getLastNonConfigurationInstance method 94, 214
 getListView method 123
 getMainLooper method 222
 getOptimalPreviewSize method 398
 getPreferences method 238
 getStartedActivityIntent method 461
 getSystemService method 341
 getTag method 121
 getTargetContext method 462
 getView method 60, 201, 204, 208
 performance 124
 getWritableDatabase method 248
 GL_COLOR_BUFFER_BIT constant 421
 GL_TEXTURE_2D constant 436
 GL_TRIANGLES constant 424
 glBindTextures() method 436
 glClear() method 421
 glClearColor() method 421
 glDrawArrays() method 433
 glEnableClientState() method 423
 glGenTextures() method 436
 glLoadIdentity() method 430
 global persistent state 82
 global positioning service 341, 345
 determining current location 350
 glRotatef() method 432
 GLSurfaceView class 420
 gluPerspective() method 430
 glVertexPointer() method 423, 432
 Google APIs Add-On 352
 Google Guice 476
 Google Maps, proprietary code 521–525
 GPS 31
 gps location provider 341
 checking whether enabled 344
 <gradient> element 135, 137
 graphics processing unit 416
 graphics programming unit, devices without one 417

GridView class 372
 Groovy 586

H

handleMessage method 197, 204, 346
 Handler API 268
 Handler class 196, 204, 299, 346
 postDelayed method 349
 removeCallbacks method 386
 handlers 196
 SAX handler 316
 hardware, differences between devices 367
 HashMap class 120
 HashSet class 386
 header and footer views, avoiding exceptions 123
 height attribute, and fill_content setting 124
 Hello Android! application 9
 hierarchyviewer tool 34, 103
 Home key, lifecycle 87
 HorizontalScrollView class 555
 HttpClient class, execute method 190
 HttpClient package
 AbstractHttpClient class 327–329
 compared to
 URLConnection 305
 execute method 305
 one object per application 304
 thread safety 306–310
 HttpRequest interface 304
 HttpRequestRetryHandler interface 327
 HttpURLConnection class 303
 disadvantages 302
 Hudson
 and Subversion 530
 build configuration variables 536
 installing 529
 Jenkins 527
 jobs 530
 multi-configuration project jobs 535
 starting the emulator 529
 Hypertext Transfer Protocol 296–310
 flexibility 296
 verbs 296

I

Icon Menu 58
 IdleHandler interface 222
 IDs, as resources 113
 Images class 377
 ImageView class 15, 141, 202
 implicit intents 68
 <include> element, when to use
 layout_width and
 layout_height 116
 <include> tag 106
 input parameters and AIDL 164
 InputStream class 305, 373, 393
 install goal 515
 install-file goal 522
 installing, with Apache Ant 502
 instance state
 instance variables 92
 nonconfiguration instance
 state 93–95
 when it's saved and when it's
 not 91
 instance, Android's definition
 of 91
 instrument goal 513
 instrumentation
 explained 457
 when and why to use 457
 InstrumentationTestRunner
 class 451, 455, 457, 459
 Instrumentation class 464
 Intent class 63, 162, 173
 action attribute 68
 Activity Manager 573
 and Cloud to Device
 Messaging 183
 category attribute 68
 data attribute 68
 extras 271
 extras attribute 68
 getXXXExtra methods 187
 type attribute 68
 intent filters 18, 45
 IntentFilter class 63, 278
 intents 44, 63
 explicit 68
 implicit 68
 resolving 68–69
 types of 67–68
 using 64–67
 IntentService class 186
 interface definition
 language 164

interfaces
 HttpContext 304
 MediaPlayerControl 390
 internal storage 225–229
 Interpolator interface 381
 interprocess communication
 76, 160, 272
 inversion of control pattern 476
 <item> element 138
 ItemizedOverlay class 356–357
 mutable 360

J

jarsigner tool 494
 Java 19
 avoiding 585–588
 bytecode 22
 do you need to use? 11
 drawbacks of 585
 included packages and
 libraries 20
 Jython 606
 manifest files 45
 runtime 586
 source code 13
 Timer and TimerTask
 classes 177
 using other languages
 585–588
 Java Database Connectivity, why
 not to use with
 Android 256
 Java runtime 586
 Java runtime environments 19
 Java virtual machine 19
 Dalvik 22–24
 Java-style testing, advantages and
 disadvantages 447
 java.beans package 476
 java.io package 234, 298
 java.net package 21
 java.nio package 21
 java.sql package 21
 java.util package 21
 javac compiler 493
 JavaScript 581–585
 JavaScript Object Notation
 21–326
 data structure 323
 JetPlayer class 388
 JRuby 586
 JSON parser, required
 elements 325
 JSONObject class 325

JUnit 3 testing 453–457
 order of execution 456
 JUnit 4, compared to
 JUnit 3 480
 Jython 606

K

KeyEvent class 606

L

latitude and longitude
 converting to and from street
 addresses 353
 decimal notation 336
 degrees, minutes, and
 seconds 336
 Equator 335
 poles 335
 positive versus negative 337
 potential problems when
 calculating 337
 Prime Meridian 336
 which goes first 337
 Launcher application 95
 layout inflation 104
 layout managers, layout
 parameters 108
 layout method 105
 layout_toRightOf attribute 113
 layout_width attribute 116
 LayoutInflater class 62, 553
 layoutopt tool 34
 layouts 44
 anatomy of 107
 attributes and
 parameters 107–109
 button bar 114
 for different orientations 546
 for splash screens 217
 layout files 107
 layout managers 109–114
 versus layout managers 107
 with IDs 113–114
 LEDs, making them flash 174
 letterbox mode 147
 lexical closure 56
 libraries
 differing versions 522
 included with Android 22
 native 29–31
 runtime libraries for other
 languages 587
 WebKit 581

- library projects, advantages
 - of 544
 - lifecycle phases 79
 - light detection sensors 31
 - LIKE expressions 287
 - LinearGradient class 416
 - LinearLayout class 15–104, 562
 - LinearLayout layout
 - manager 110–111
 - layout parameters 110
 - Linux
 - filesystem 25
 - GNU/Linux 24
 - is Android Linux? 25
 - multitasking 28
 - security model 27
 - user accounts and file
 - permissions 27–28
 - list items 53
 - list selectors, caveats 136
 - ListActivity class 53–122
 - ListFragment class 551
 - onListItemClick method 552
 - ListView class 50, 53, 61, 119,
 - 341, 551
 - caveats 124
 - clickable list items 124
 - color hint 130
 - expanding on 117–125
 - height attribute 124
 - power of 57
 - loadUrl method 584
 - local.properties file 499
 - Locale application 31
 - location
 - bearing 337
 - converting street addresses to
 - and from latitude and longitude 353
 - data type 348
 - determining current
 - location 341
 - elevation 337
 - introduction to 335–337
 - last-known 343
 - latitude and longitude
 - 335–337
 - Location class 343
 - LocationInfo application
 - 337–351
 - LocationListener interface
 - 343–351
 - checking location provider
 - status 344–345
 - determining current location
 - with 345–351
 - LocationManager class
 - 339–341, 345, 348
 - LocationProvider class 341–343
 - choosing the right one 343
 - Log class 576
 - log levels 576
 - logging 575
 - long click 567
 - Looper class 220
 - loose coupling 378
- M**
-
- m2eclipse plugin 518
 - viewing dependencies 520
 - m2eclipse-android-integration
 - plugin 519–520
 - Main class 14
 - main_rules.xml file 501
 - managedCursor class 376
 - manifest 13, 18, 44–46
 - DealDroid application 44
 - manifest file 18, 290, 492
 - adding maps support 352
 - and library projects 544
 - for testing 450
 - permissions for location
 - services 340
 - targeting specific screen
 - sizes 545–547
 - Manifest.permission class 46
 - map-based applications 361
 - converting street addresses to
 - and from latitude and longitude 353–355
 - creating an interactive
 - map 356–358
 - overlying items on a
 - map 358–361
 - MapActivity class 356–358
 - MapController class 356, 358
 - maps 351
 - Maps API key 352
 - MapView class 107–358
 - properties 357
 - margins 108
 - matrix builds 534–538
 - high demand for system
 - resources 537
 - sparse matrixes 538
 - Maven Central, why Google
 - Maps isn't included 521
 - maven-android-plugin 518
 - goals added by 512
 - maven-android-sdk-deployer
 - plugin 523
 - measure method 105
 - MediaController class 390
 - MediaPlayer class 369
 - and audio 384–388
 - playing video 388–391
 - MediaPlayerControl
 - interface 390
 - MediaScanner service 393
 - MediaScannerCollection
 - class 393
 - MediaStore class 374
 - memory 587
 - Menu.add method 58
 - merge directives 114
 - <merge> tag 106, 115–117
 - MessageQueue class 346
 - messages
 - message loops 219
 - message queue 219
 - MIME types 65, 289, 379, 394
 - minSdkVersion attribute 146
 - Mirah 586
 - mkshcard tool 34
 - mock objects
 - and injection 475
 - partial mocking 477
 - Robolectric 477
 - when to use 472
 - Mockito 476
 - MODE_PRIVATE constant 282
 - MODE_WORLD_READABLE
 - constant 229, 282
 - MODE_WORLD_WRITABLE
 - constant 282
 - model objects 243
 - Model-View-Controller design
 - pattern 53, 63
 - Monkey tool
 - p option 484
 - s option 486
 - and exit code 485
 - events log 485
 - supported events 486
 - MonkeyDevice class 603
 - MonkeyImage class 603
 - MonkeyRunner class 603
 - waitForConnection
 - method 605
 - monkeyrunner tool 602–610
 - Jython 606
 - MonkeyDevice class 603
 - MonkeyImage class 603
 - MonkeyRunner class 603

monkeyrunner tool (*continued*)
 plugins 606–610
 Python 604
 scripting 604–606
 mount command 226
 mount points 26
 mounting storage devices 26
 multimedia 367–401
 accessing a user's personal
 media files 371
 and ContentProvider
 374–377
 audio 384
 capturing 391
 images 380–384
 loading 369
 managing 367–380
 music 374
 playing back 380–391
 playing video 388
 recording audio and
 video 395–400
 resources and files 367–374
 selecting 374
 selecting a single file 380
 taking pictures 391–395
 tying playback to Activity
 lifecycle 387
 with Intent and Activity 377
 multitasking, how it works in
 Android 156–157
 mvn archetype, generate
 command 507
 MyMovies application
 header and footer views
 122–125
 introduction 102
 splash screen 217–219

N

native code 585
 Native Development Kit 9, 32
 native libraries, audio and video
 processing 29
 network failure
 high server load 329
 network configuration
 changes 330–332
 network location provider 341
 networking, recovering from
 network failure 326–332
 newInstance method 310
 nine-patch drawables
 creating 142
 padding 142
 .nomedia file 234
 nonconfiguration instance state,
 avoiding memory leaks 94
 normalized data 246
 Notification class 172
 notifications 161
 contentTitle 174
 creating 171–176
 icons 173
 toasts 172
 notifyDataSetChanged
 method 56, 60

O

OASIS XLIFF 48
 Object class 284
 Objective-C 585
 onActivityCreated method 551
 onActivityResult method 393
 onBind method 160
 onCancelled method 209
 onClick attribute 123
 onConfigurationChanged
 method 75
 onCreate method 14, 52, 54, 75,
 80, 84, 91, 123, 160, 162,
 215, 247, 277, 293, 300, 393,
 397, 454, 480, 551
 and unit testing 459
 onCreateOptionsMenu
 method 58, 65
 onCreateView method 553
 onDestroy method 81, 387
 OnDragListener interface 564
 onDraw() method 404
 onDrawFrame() method
 421, 425, 436
 OnItemSelectedListener
 interface 55
 onListItemClick method 57
 onLocationChanged
 method 350
 OnLongClickListener
 interface 565
 onLowMemory method 75
 onMeasure method 105
 onOpen method 247
 onOptionsItemSelected
 method 58, 65, 481
 onPageFinished method 583
 onPause method 52, 58, 80, 387
 onPostExecute method 208
 references to Activity 212
 onPreExecute method 208
 onProviderDisabled
 method 350
 onReceive method 178–179,
 181, 185
 onReceivedError method 583
 onRestart method 80
 onRestoreInstanceState
 method 91
 onResume method 52, 80, 88
 onRetainNonConfiguration-
 Instance method 94, 213
 onSaveInstanceState
 method 81, 91, 393
 overriding 91
 onServiceConnected
 method 168
 onSharedPreferenceChange-
 Listener interface 238
 onStart method 80, 179
 onStartCommand method
 161, 181, 279
 onStatusChanged method 350
 onStop method 81
 onSurfaceChanged()
 method 420, 425
 onSurfaceCreated()
 method 421, 435
 onTabSelected method 559
 onTerminate method 75
 Open Handset Alliance 4
 open source, Android 6
 openConnection method 301
 openFileOutput method 474
 OpenGL ES 416
 applying textures to 3D
 shapes 439
 coordinate system 423
 creating projects 419–421
 drawing triangles 425
 faces 423, 426
 how it works 418–419
 native C API 422
 projection 426
 stride 424
 targeting a specific
 version 417
 terminology 418
 version 1.x 422
 OpenGLDemo project 419
 optimization, ProGuard
 589–601
 options menu, as resource 58
 optString method 326

- orientation
 - and Fragment class 547
 - saving state when orientation changes 92
 - orthOf() method 425
 - out modifier 164
 - OutOfMemoryError 515
 - Overlay class 356, 358
 - OverlayItem class 357–361
- P**
-
- package-debug-sign target 501
 - package-release target 501
 - package-resources target 501
 - PackageManager class 366
 - packages
 - installing or uninstalling with monkeyrunner 602
 - test package 450
 - <padding> element 137
 - Paint class, 2D effects 414
 - Parcel class 165
 - Parcelable interface 66, 91, 166, 173
 - and Scala 588
 - parse method 321
 - parsers
 - Jackson 325
 - JavaScript Object Notation 324
 - KXML2 320
 - pull parsers 322
 - push versus pull 315
 - stream-based 315
 - tree-based 315
 - parsing, response format 316
 - passive location provider 341
 - <path> element 499
 - path separators 25
 - PendingIntent class 178
 - permissions 282, 366
 - phone application 31
 - photos
 - alternative processing methods 393
 - storage locations 393
 - pixels, absolute 152
 - plugins
 - as dependencies 507
 - for monkeyrunner tool 606–610
 - ProGuard 590
 - plurals 48
 - accessing 48
 - pom.xml file 510
 - populate method 360
 - portability
 - density-and-scale-independent pixels 152
 - scaling to different screens 144–149
 - PowerManager API 180
 - pre-build target 500
 - PreferenceActivity class 238–239
 - preferences, maintaining 237
 - <PreferenceScreen> element 239
 - preserving battery life 180, 182
 - processes
 - currently running 76
 - fine-tuning 78
 - how Android chooses which to kill 77
 - private 159
 - visible 168
 - producer-consumer application 220–223
 - producer-consumer scenario 220
 - ProgressDialog class 59
 - ProGuard 589–601
 - enabling 590–593
 - logging 592
 - obfuscation phase 593
 - optimization phase 593
 - plugin 590
 - processing error reports 600–601
 - shrinking phase 593
 - tool 587
 - useful rules and options 597–599
 - writing rules 593–597
 - <project> element 508
 - project property 512
 - projection
 - orthogonal 427
 - perspective 427
 - projects 11
 - structure 13–14
 - properties, in Apache Maven 512
 - <property> element 499, 509
 - Proxy class, PROXY_CHANGE_ACTION 332
 - ps command 76
 - publishProgress method 209
 - pull goal 513
 - push goal 513
 - push parsers, versus pull parsers 315
 - putExtra method 68, 278
 - pyramids, coloring 431–433
 - Python 604
 - Jython 606
- Q**
-
- Quick Response (QR) codes 8, 395
- R**
-
- R class 13, 16, 47
 - accessing resources 48
 - R class missing error in Eclipse 17
 - R.java 492
 - R.raw.constancy parameter 369
 - redeploy goal 513
 - relative semantics 219
 - RelativeLayout class 62, 106
 - RelativeLayout layout manager 112
 - RemoteViews class 175
 - removeOverlay method 360
 - Renderer interface 420
 - rendering views
 - layout pass 105
 - measure pass 105
 - repositories
 - groupId 509
 - installing Google Maps to local repository 522
 - <repository> element 506
 - request-retry handlers 326
 - requestSentRetryEnabled parameter 329
 - /res directory 46
 - res/drawables folder 134
 - /res/raw directory 368
 - reserved IDs 55
 - resource folders, how Android selects 151
 - ResourceCursorAdapter class 377
 - ResourceManager class 371
 - resources 44, 46–49
 - @ prefix 49
 - accessing 48–49
 - alternative resources framework 149

- resources (*continued*)
 - configuration qualifiers 151
 - configuration-independent 149–152
 - IDs 46
 - layouts 49–50
 - location 46
 - non-XML 16, 50
 - referring to 16
 - resource folders 149
 - shared 543
 - sharing privately between applications 285
 - type 46
 - types of 49
 - XML 46
 - Resources class 48
 - resources.arsc file 493
 - ResultSet interface 256
 - retrace tool 601
 - reverse-engineering, preventing
 - with ProGuard 589–601
 - Robolectric
 - advantages and disadvantages 481
 - setting up projects 478
 - RobolectricTestRunner class 478
 - Robotium
 - clickInList method 470
 - future plans for 470
 - goBack method 470
 - relative slowness of 470
 - scrollDown method 470
 - Solo class 468
 - root 25
 - root user 26
 - RotateAnimation class 381
 - rotation 432
 - rotation parameter 428
 - RTC_WAKEUP constant 178
 - Ruboto 587
 - run-tests target 501
 - Runnable interface, Timer class 217
 - runOnUiThread method 466
- S**
-
- save method 254
 - Scala 586–587
 - converting to Parcelable 588
 - ScaleAnimation class 381
 - scaleType attribute 141, 202
 - scheduleAtFixedRate
 - method 219
 - scheduling alarms 180
 - scheme registry 309
 - screen sizes, tablets 545
 - screenshots, with monkeyrunner 602
 - scripting, monkeyrunner tool 604–606
 - SD cards
 - accessing media files on 371
 - devices that don't have one 373
 - /sdcard 27
 - SecurityException 45
 - selector drawables 138–141
 - common states 139
 - order of items 140
 - state_selected state 140
 - <selector> element 138
 - sendBroadcast method 279
 - sendMessage method 196
 - sensors
 - device orientation 31
 - magnetic field detection 31
 - pressure detection 31
 - temperature detection 31
 - server-side programming 244
 - Service class
 - implementing 160
 - lifecycle methods 179
 - testing 453
 - <service> element 159
 - Service process 78
 - ServiceConnection
 - interface 168, 277
 - services 43, 157
 - and Cloud to Device Messaging 183–187
 - background processing 158
 - communicating with 163–169
 - creating 158–161
 - in same process as application 159
 - in separate process 159
 - keeping awake 180–183
 - multitasking with 176
 - prefetching and caching data 163
 - priority 78
 - scheduling 176–187
 - separating tasks from your application with 157
 - sharing objects with BroadcastReceiver 163
 - starting automatically 161–163
 - when to use 157
 - setAdapter method 124
 - setApplication method 461
 - setARGB() method 410
 - setChoiceMode method 122
 - setColor() method 410
 - setContentView method 54
 - setDisplay method 390
 - setItemsCanFocus method 124
 - setLatestEventInfo method 174
 - setprop command 574
 - setRequestProperty method 302
 - setResult method 274
 - setShadowLayer() method 415
 - setTag method 121, 204
 - synchronizing with getTag 205
 - setTextViewText method 176
 - setTheme method 129
 - setTransactionSuccessful method 261
 - setTypeface() method 412
 - setUp method 455, 461, 480
 - SGL 29
 - ShadowActivity class 477
 - shadowOf method 481
 - shape drawables, rectangles 135
 - <shape> element 135, 137
 - shapes, 3D 425
 - shared code, using Ant, Eclipse, or Maven 544
 - SharedPreferences
 - interface 237–241
 - sharing data, using services 274–280
 - showAsAction attribute 558
 - Simple API for XML, disadvantages 319
 - SimpleCursorAdapter class 377
 - sip 153
 - <size> element 137
 - smartphones, detecting capabilities 364–367
 - software development kit, Maven SDK deployer 523
 - <solid> element 137
 - SoundPool class 388
 - Spinner widget 55
 - SQLite 265
 - dynamic data types 250
 - inspecting databases 262
 - SQLiteManager tool 263–265

- SQLite database, caching
 - with 169
 - sqlite3 tool 34, 263
 - SQLiteCursor class 243
 - SQLiteDatabase class 243, 248
 - SQLiteOpenHelper class
 - 243, 245–246
 - SQLiteQueryBuilder class 243
 - SQLiteStatement class 243, 254
 - StackView class 561
 - stale threads 210
 - START_NOT_STICKY flag 179
 - START_STICKY flag 179
 - startActivity method 66, 69, 461
 - startActivityForResult
 - method 379, 393
 - startDocument method 317
 - startDrag method 565
 - startElement method 317
 - startService method 278
 - state
 - controlling 90–95
 - instance state 91–93
 - maintaining in a list 118
 - persistent state 91
 - when configuration changes 89
 - state_checkable state 140
 - state_checked state 140
 - state_enabled state 139
 - state_focused state 139
 - state_pressed state 139
 - state_window_focused state 139
 - StateListDrawable class 140
 - static objects 70
 - StockPortfolio application
 - 157–187
 - storage 29–30
 - cache directories 235
 - internal versus external 225–226
 - read-write 226
 - SD cards 226
 - Streaming API for XML, lack of
 - support in Android 315
 - StrictMode tool 577–578
 - String class, and AsyncTask 207
 - strings.xml 16
 - StringUtils class 503
 - repeat method 498
 - STROKE effect 414
 - <stroke> element 137
 - Structured Query Language 242
 - CREATE command 249
 - Stub class 167
 - stubs 472
 - style attribute 126
 - <style> element 126, 128
 - style items 126
 - styles 131
 - and ListView class 129–130
 - applying and writing 125–127
 - color values 131–132
 - reusing 127
 - separation of concerns 127
 - special values 132–133
 - text appearance 132
 - Subversion 527–533
 - super constructor 121
 - <supports-screens> element 146
 - Surface class 394
 - SurfaceCreated method 398
 - SurfaceHolder interface 397
 - SurfaceView class 51, 390, 395, 403
 - need for separate thread 421
 - sync method 236
 - system partition 8
 - System.getProperty method 574
- T**
-
- tabbed navigation 560
 - TabHost class 560
 - TableLayout class 562
 - TableLayout layout
 - manager 111–112
 - TableRow class 111
 - tables
 - data types for columns 250
 - entity relationship diagrams 246
 - table classes 248–251
 - tablet computers 540
 - fragments 547
 - landscape versus portrait orientation 546
 - tablet-only apps 544
 - TabListener interface 559
 - takePicture method 400
 - <target> element 500
 - <taskdef> element 499
 - tasks 95–97, 501
 - affinity 96
 - definition of 95–96
 - managing with Timer 219
 - tearDown method 466
 - telnet 575
 - test cases
 - ActivityInstrumentationTestCase2 463–467
 - ActivityUnitTestCase 458–462
 - ApplicationTestCase 453–457
 - InstrumentationTestCase 458
 - ProviderTestCase2 453
 - ServiceTestCase 453
 - test-driven development 444
 - TestCase class 451–452
 - testing 443–488
 - application 453
 - black box tests 468
 - creating a test project 450
 - default configuration 534
 - end-to-end 462
 - human-readable tests 468–471
 - instrumentation 457
 - Java-style 452
 - mock objects 471–477
 - Monkey tool 482–488
 - monkeyrunner tool 602–610
 - organizing tests 449–451
 - pseudorandom input 486
 - seeds 486
 - simulating clicks 464, 480
 - speed and stability 482–488
 - test cases 451
 - test fixtures 472
 - unit tests 445–446, 452–462
 - user input 483
 - user stories 462
 - why you should test 444
 - with Robotium 467
 - testTruth method 452
 - text, typefaces 411–412
 - text/plain MIME type 69
 - textAppearance attribute 132
 - TEXTURE_MAG_FILTER
 - constant 436
 - TEXTURE_MIN_FILTER
 - constant 436
 - TextView class 15
 - textViewStyle attribute 132
 - theme engine 125
 - themes, global theme 128
 - Thread class 76, 192
 - sleep method 222
 - thread pools, configuring 202
 - threading, running UI actions
 - on UI thread 466
 - ThreadPoolExecutor class 201

threads
 basic threading 191
 communicating change
 between threads 195
 daemons 219
 how long they live 194
 main application thread 191
 producer threads 220
 race conditions 204
 thread pools 200–205
 updating UI from outside
 main thread 196
 ThreadSafeClientConnManager
 class 307
 Timer class 217
 timers 216
 tools
 command-line 493
 monkeyrunner 602–610
 ProGuard 587, 589–601
 retrace 601
 toString method 60, 312
 custom 281
 TouchUtils class, clickView
 method 465
 traceview tool 34
 transactions 261
 Triangle class 424
 triangles 418
 coplanar 422
 drawing 421
 Typeface class 411

U

u/v coordinates 434
 undeploy goal 513
 <undeployBeforeDeploy>
 element 512
 unit testing
 and mock objects 474
 menu buttons 461
 screen output 461
 with Robolectric 477–482
 unpack goal 513
 UnsupportedOperationException
 Exception 475
 UP action 606
 upper function 257
 URL class 298

URLConnection class 298
 lack of separation of
 concerns 302
 USB debugging 570
 user interfaces
 layout resources 14
 portability 144
 testing 534
 user stories, dividing tests
 into 462
 <uses-feature> element 365
 required attribute 365
 <uses-permission> element 180
 <uses-permissions> element 366
 <uses-sdk> element 146

V

VERSION constant 288
 vertices 418
 VERTEX_SIZE constant 432
 vibrating the device 173
 Video class 377
 VideoView class 390
 View class 15, 107
 view rendering
 best practices 106
 FrameLayout layout
 manager 110
 view trees 103
 ViewBinder interface 377
 ViewGroup class 51
 ViewHolder design pattern 121
 views 14, 44, 51
 cluttering 106
 custom 175
 determining size of 110
 floating 110
 header and footer views 122
 hidden 106
 layouts 106–117
 nesting 106
 parent views versus parent
 class 108
 performance 106
 rendering 105–106
 reusing 62, 106
 setting visibility 106
 view hierarchies 103–104
 visible lifetime phase 79
 Visible process 78
 Void class, and AsyncTask 207

W

waitForConnection method 605
 waitIdleSync method
 465–466
 wake locks 180
 flags 183
 PARTIAL_WAKE_LOCK 180
 static 181
 web development, adapting
 techniques to Android 581
 web services 311
 WebChromeClient class 583
 WebKit library 581
 WebView class 30, 581–585
 WebViewClient class 583
 Wi-Fi, moving out of range 330
 Widget class 51
 Widget.TextView style 126
 windowBackground
 attribute 133
 Wireless Markup Language 295
 wrap_content setting 108
 writeToParcel method 166
 writing tests 451–457

X

xlarge screen size 546
 XML 16
 configuration 308
 parsing with SAX 314–319
 parsing with XmlPull 319
 tree structure 103
 XML elements
 <corners> 135
 <style> 126, 128
 XML pull-parser library 21
 Xml.parse method 318
 xmlns, android namespace 15
 XmlPull, compared to SAX 322
 XmlPullParser interface 321
 XPath 315

Z

zipalign goal 513
 zipalign tool 495, 512
 Zygote 23