Symbols

! operator 142
!= operator 142, 146
& operator 142, 145
&& operator 143, 146
* operator 142
*= operator 143
+ operator 142
++ operator 142, 143
, operator 147
/ operator 142
/= operator 143
<%= tag> 712
<% tag> 712
<> operator 601
< operator> 601
= operator 143, 146, 601
== operator 142
=> operator 142
> operator 601
>= operator 601
>> operator 144
>>> operator 142
? operator 143, 146
^ operator 142, 145
| operator 143
|| operator 143, 146
~ operator 142

Numerics

1.5, see JDK 1.5
16-bit
ASCII, String, and binary 400
character output 403
streams, why not use 406
UCS transformation format 456
Writer class 398, 399
4-layer TCP/IP model 645
5K contest 756
64-bit compatible 45
7-layer ISO model 644
8-bit
ASCII, String, and binary 400
outputstream classes and methods 399
outputstreams 398

A

abstract 177
interface methods 230
overriding, forcing on 177
abstract classes 234
Abstract Factory pattern 312
accept method 666
access modifiers

interfaces 230
overview 103
syntax 104
accuracy 149, 150
Acord 732
action listeners
callback interfaces 240
see also listeners
activation record 208
adapter classes
class names 510
event handling 508
example 510
listener adapter class 509
major pitfall 511
Adapter pattern 312
addAll method 345
addresses
comparing String addresses 63
finding IP for machine name 673
INetAddress 674
IP address, determining 642
loopback address 664
pointers, references 28
algorithms
garbage collection 206
scheduling, POSIX 275
threads 269
Turing machine 336
alternating and pattern matching 479
Amazon
web services and REST 774
web services beta kit contents 772
web services overview 759
web services, running 773
web services, using 771
anchors in pattern matching 477, 478
angle brackets
generics and 317
syntax 136
anonymous classes 93
event handling 508
instance initializers 93
ANSI
codesets appendix 787
SQL and 595
Ant 689
Apache
configuration 703
defined 689
deployment 706
servlet reference implementation 688
API
interfaces 230
networking 648
Object class 57
overview of POSIX threads standard 267
reading Java API 79
ServerSocket 666
String class 58, 60
Apple’s Zen Garden 132
Applet 559
applets
astronomy applet 575
containers 559
life cycle 526
Light Relief 199
limitations 435
methods 560
Powers of 10 tutorial 200
application layer 645
application libraries, see libraries
application programmer interface, see API
Application Service Provision 687
applications in jar files 102
ArgumentIndex 396
arguments
generic type parameters 325
parameters versus 95, 318
var-args 97
variable arity 98
arithmetic shift operator 144
ArrayList class 349, 352
arrays
ArrayList class 349, 352
arrays of arrays, instantiating in steps 193
arrays of, declaring 191
arrays of, description 190
brackets 194
bulk transfer from buffer to 448
cloning 236
compatibility 188
creating 187
description 185
duplicating 189
I/O output destination 399
indexes, when checked 186
indexing and 64-bit Java 195
initializing 189
iterating over 192
length of array 187
multi-dimensional 190
object type 185
output 400
size 187
terminology in other languages 191
values method and enumeration 123
ASCII
ASCII, String, and binary 400
character sets 454
codesets appendix 787
input 414
MIME 702
printable output 402
required encodings 456
XML and 731
ASP overview 685
assert
caveat 223
complete example 222
overview 221
two key steps 221
assignment
operator precedence 143
operators 153
associativity 148
astronomy applet 575
attributes
databases, defined 583
defined 591
XML 726, 734
autoboxing
overview 55
performance 56
primitives and variable arity 98
AVG function 602
AWT
Canvas component 534
Container class 553
description 500
inheritance example 162
native library behavior 520
Axis 763

B
back references and pattern matching 476
beans
example in JSP 715
Java beans and JSP 712, 715
bible code 546
BigDecimal class 155, 392, 490
big-endian storage 454
BigInteger class 155, 392, 490
binary
ASCII, String, and binary 400
byte-swapping binary data 459
input 414
output to 401
bind method 666
binding, late 174
bitwise shift 142
blackout and race conditions 290
blank final variable 118
blocked server I/O 443
blocking I/O workaround 443
blocks
  statements, blocks of 69
  synchronized 292
BNF and generics 323
book website 14
boolean
  defined 41
  description 43
BorderLayout 564
Bosiak, Jon 731
bounds
  generic bounds that men-
  tion generic type 331
  generic parameter bounds
  type parameters 330
  wildcards 364
  wildcards, lower bounds
  on 365
BoxLayout 565
braces 136
brackets 194
branches
  break, omitting at end 72
default branch 72
break
  continue 76
  enumeration 124
  omitting at end of branch 72
  statement syntax 76
browsers
  defined 684
  HTTP, retrieving pages 671
  protocols 693
BufferedInputStream class 420
BufferedOutputStream class 408
BufferedReader class 414
BufferedWriter class 408
buffers
  bulk transfer from 448
  creating 445
  current position 444
  memory 441
  memory mapping 451
  methods 446
  overview 441
  reading a file 446
  view buffers 447
business-to-business XML processes 732
buttons
  JButton 531
  JButonGroup 535
  JRadioButton 535
  radio buttons 535
byte
  defined 41
  description 48
  byte array input source 415
byte-swapping binary data 459
C
  C++ 173
  CAFEBABE 420
  calculations
    operator descriptions 143
    precision 149
  Calendar class 484, 485
    numbers for months 486
    utilities 483
  call chain 211
  callbacks
    callback routine 501
    interface callbacks 239
  Canvas
    corresponding Swing com-
    ponent 534
    functionality 534
  cardinality 583, 591
  Carnivore FBI program 667
  case 72
  casting
    Class class 180
    classes, rules 170
    generics 320
    note on 47
    operator 153
    operator precedence 142
    overflow 154
    subclasses and superclasses
      169
    widening and narrowing
      152
    see also conversion
  Catalina 689
  catching
    catch clause 211
    defined 211
    exceptions 214
    exceptions within throwing
    method 214
  categories
    event handling 507
    lightweight controls 523
  certification exam
    Java exams 313
    superclass/subclass com-
    patibility 171
  CGI
    client/server and 687
    defined 684, 689
    servlets versus 687
  channels
    close-on-interrupt 443
    file channel 444
    overview 441
    reading a file 446
    transfer data methods 444
    when to use 441
  char
    defined 41
    description 43
    Filter to replace 407
    Unicode 45
  character escape sequences 45
  character sets 454
    encoders and decoders 440
    encodings 459
    results 458
    summary 460
    using specific 457
  checkboxes 533
  CipherOutputStream 408
  Class class 179, 322
  class data sharing 19
  classes
    access modifiers 103, 104
accessing member from within versus without 31
casting rules 170
Class class 179
Collection 320
constant-specific class bodies 130
declaring with generic type parameters 322
deﬁned 20, 160
Double 241
eXception hierarchy 213
File class 387
forward referencing 138
grouping in packages 23
HashSet 353
jar ﬁles, putting in 101
Math class 195
methods, syntax 95
Object 57
objects and 26
packaging 99
qualifying names 137
static 113
String 60
TreeSet 356
wrapping output classes 406
classpath
jar ﬁles 102
Java installation 782
client/server
client sockets 655
Java Studio Creator 610
Mckoi JDBC driver mode 613
server sockets 666
TCP/IP model 650
web programming 687
clock program
compiling and running 20
main code for 32
Cloneable interface 235
cloning
arrays 236
Cloneable interface 235
common pitfall 237
deﬁned 235
protected and 237
shallow versus deep 236
close method 405
code
commenting out 78
timing 493
codesets appendix 787
COFFEEPOT property 148
colliding data ﬁeld names 167
columns, deﬁned 583
csv operator 147
command line input 390, 391
command line output 393
Command pattern 312
comments
commenting out code 78
conventions 78
javadoc 78
javadoc tool overview 80
XML 726
commercial databases 611
Comparable interface 232, 359
changes in JDK 1.5 233
complete example 232
generic parameters 233
type argument 233
with generics 327
without generics 327
Comparator interface 359
compare method 361
compareTo method 232, 233, 361
comparing
incorrect optimization 360
intern method 63
objects 59
SQL comparison operators 601
Strings 63
compatibility
arrays 188
Tomcat and servlet/JSP 689
web services 761, 762
XML 731
compile time
generics error reporting 321
literals 42
compiling
clock program example 20
Java 18, 781
servlets 700
Component class 554
components
debugging 561
debugging lightweight 545
defined 521, 552
displaying 526
heavyweight and lightweight 522
Swing component descriptions 529
Swing list 543
toolkit 571
see also GUI
composite types
deﬁned 22
primitive types versus 22
concatenation 61
conditional operator precedence 143
conditional statements 69
configuration
Tomcat 703
Tomcat paths 705
Index

connecting  
connection methods 619 
Connection object and transactions 625 
database connection 617 
databases 615 
networking connection classes 649 
URLConnection 673 
console input 390, 391 
constants 
constant-specific class bodies 130 
enumeration constants 121 
fine keyword 117 
connectors  
collection constructors 346 
constructor calling another 91 
default no-arg 90 
enumeration 128 
enheritance 92 
enheritance and 174 
no-arg, when not to use 90 
overview 89 
syntax 90 
container classes, see collections  
containers  
AWT containers 553 
class hierarchy 553, 555, 556 
layout 561 
overview 552 
servlet, defined 684 
Swing containers 554 
Tomcat 689 
content length, tracking in servlets 703 
context-sensitive parsing 122 
continue  
brake statement 76 
dowhile statement 75 
controls 
defined 521, 552 
see also GUI 
conversion  
casting 47 
conversion specifiers 395 
overflow 154 
widening and narrowing 152 

see also casting 
cookies 
defined 690 
description 710 
copying  
arrays 189 
cloning 235 
COUNT function 602 
covariant return types 238, 325 
CREATE  
defined 596 
example 597 
curly braces 136 
cursors  
appearance 572 
icons 572 
result sets 604 
D  
data  
instance data versus static data 114 
moving between threads 305 
static 114 
validation, DTD 726 
data race conditions 291 
data types  
benefits 21 
primitives versus 22 
procedural language data types 21 
SQL 598 
see also attributes, variables 
databases  
commercial 611 
connecting to 615 
connection 617 
connection methods 619 
defined 582 
design 584 
drivers  
defined 615 
loading 616 
entity integrity 587 
foreign keys 586 
Java bean in JSP, example 715 

Java Studio Creator 610 
JDBC  
complete example 627 
overview 610 
mathematical concepts 584 
Mckoi  
downloading and installing 592 
jar files, setting up 593 
query tool 594 
running 613 
running sample code 613 
noncommercial 612 
normal forms 590 
ODBC 615 
primary keys 586 
reducing duplicated data 585 
referential integrity 586 
relational overview 582 
terminology 591 
relationships  
many-to-many 588 
one-to-many 587 
one-to-one 587 
result set metadata 630 
SQL  
data types 598 
executing commands on databases 619 
execution methods 620 
functions 602 
overview 595 
statement categories 596 
tables  
adding 590 
defined 583 
terminology 583 
transaction integrity 587 
transactions 625 
datagrams 640 
datagram sockets 645 
diagram 641 
datalink layer 645 
DataOutputStream class 401 
DateFormat class 484 
dates  
Date class 483 
month numbers 486 
see also Calendar
deadlock 304
debugging
GUI 561
lightweight components 545
servlets 707
sockets 666
telnet 667
threads bug 303
decoders, character set 440
decrement operator 142, 143
deep clone 236
default no-arg constructor 90
degrees 196, 583
delayed binding 174
delegation-based model 501
DELETE
defined 596
example 605
demons
sendmail 657
threads 280
deploying servlets 706
deprecated
interfaces 485
thread methods 283
description 159
descriptors
defined 390
standard in, out, err 391
design patterns
1.1 event handling 513
Factory 738, 749
Factory summary 753
overview 311, 312
designing databases 584
destructor 95
Digital Signature Algorithm interfaces 490
dippy birds 286
directories for Java classpath 102
disk
freeing disk space 14
objects, writing to 436
dispose method 207
DNS servers 648
Document Type Definition, see DTD
documentation 608
doGet 697
DOM
defined 733
example 737
nodes 741
SAX versus 745
using 736
domains 583
doPost 697
double
defined 41
largest double precision number 51
overflow 154
range of values 50
strictfp 198
Double class 241
double-byte characters 411
double-clickable jar files 102
dowhile 75
downloading
Amazon web services beta kit 771
Google web services beta kit 764
Java 781
Mckoi database 592
Tomcat 691
DriverManager 617
drivers
defined 615
FragmentManager 617
loading 616
DROP
defined 596
example 606
DTD
business-to-business processes 732
defined 727, 734
Shakespeare’s plays 729
syntax 727
dump program 419, 432
dumping a file to hexadecimal 418
duplicating
arrays 189
see also cloning, copying
DVDs
illegal prime number 424
illegal tshirt 463
dynamic content 684, 687
E
EBCDIC 454, 731, 787
EDSAC 335
eggs, standard size and enumeration 128
elements, XML 725
email 657, 659, 667
debugging 667
embedded mode 613
empty bodies and listener adapter classes 509
encoders, character set 440
encoding, HTTP 696
encodings
character sets 459
required 456
endian, big and little 454
end-of-line characters 386
Englebart, Doug 516
ENIAC 334
Enterprise Edition
J2EE features 339
overview 14
entities 734
entity integrity 587
Entscheidungsproblem 334
enumeration
1.5, how done before 112
break statements 124
complicated types 127
constants 121
constant-specific class bodies 130
constructors 128
egg example 128
enumerated type benefits 119
final ints, drawbacks 119
import static 126
predefined members 129
qualified name 125
servlets 699
statement updates for 121
Index

static and final 112
switch statement 124
type name, importing 125
values method and 123
why enumerate types 119
enumerations 111
environment variables and properties 493
EOFException 418
equality
comparing objects 59
see also comparing
equals method 59, 63
errors
assertion error 222
detecting early, generics 320
generics 326
window, JOptionPane 537
escape characters and pattern matching 474
escape sequences 45
evaluating
arrays 141
expressions 139
operands 141
evaluation and conversions 152
event dispatcher 502, 527
event handlers
anonymous classes 508
interface callbacks 239
event handling
1.1 design pattern 513
1.1 event object hierarchy 504
1.1 event passing 503
actions 500
categories 507
events 507
events, defined 501
framework for all 507
interface for each Swing component 543
interfaces 507
Java event model 501
listener adapter class 509
overview 501
registering several listeners 513
slimmer code 508
summary 512
threads 502
event-driven programming 501
events
1.1, event object hierarchy 504
1.1, how passed in 503
defined 501
Swing events list 543
exceptions
catching within throwing method 214
causing 212
class hierarchy 213
defined 211
fancy stuff 219
how methods declare 218
how propagates if not caught in throwing method 217
I/O 417
iterating through collections 349
method that threw 220
overview 210
related 216
servlets 703
summary 221
terminology 211
thrown, what happens 211
user-defined 213
executable application in a jar file 102
exercises
advanced I/O 460
advanced threads 312
classes and objects 38
collections 377
constructors and visibility 107
containers and layout 574
event handling 515
I/O 423
interfaces 242
JDBC 631
networking 679
polymorphism and inheritance 183
regular expressions 496
servlets and JSP 717
SQL 607
statements 83
Swing 546
XML 755
expression statements 70
expressions
conversions 152
evaluating 139
precision 149
regular expressions 470
syntax 139
extend, defined 160

F
factoring out, defined 585
Factory design pattern 738, 749, 753
fall-through 72
FBI Carnivore program 667
fields
access modifiers 104
forward referencing 138
file channels 444
File class 387, 388
file descriptors
defined 390
standard in, out, err 391
file locking 452, 454
files
example of output to 401
I/O output destination 399
input source 415
random access file 430
FilterInputStream class 421
FilterOutputStream class 408
FilterReader class 414
filters 407
FilterWriter class 406
final 176
blank final variable 118
description 117
interface data fields 230
ints, using to enumerate 119
overriding, forcing off 175
finalizers
description 205
JLS citation 207
finally
catching exceptions 214
cleaning up with, note 216

firewalls 648, 652

Flags 396

float

defined 41

overflow 154

range of values 52

floating-point

division operator 143

double 50

extension 151

float 52

inaccuracy issues 150

overflow 154

significant figures 149

types overview 49

flow of control

assert statement 78

dowhile statement 75

exceptions 211

throw statement 78

transfer of control statements 77

FlowLayout 562

flush after use 405

footprint reduction 19

for

arrays, iterating over 192

enumeration and 121

statement syntax 73

foreach

collections, iterating through 347

enumeration 122

foreign keys 586

Formatter class 394

formatting

format specifiers 396

string output 436

forms

doGet and doPost 697

example 704

headers 696

normal form 590

POST and GET 695

servlets and 694

forward referencing names 138

fragmentation 204

frames 561

frameworks

event handling framework 507

Java Collection Framework 341

logging 384

thread pools 310

FTP 640

functions, SQL 602

Furby 156

garbage collection

algorithms 206

costs and benefits 205

description 202, 204

finalizers 205

fragmentation 204

weak references 207

generic methods 366, 367

generic parameters 362

generics

arguments for generic type parameters 325

arguments versus parameters 318

bounds 330

cloning method and 325

Comparable interface with 327

Comparable interface without 327

declaring class with generic type parameters 322

defined 317, 319

generic class example 334

generic interface example 334

generic interfaces 326

generic method example 334

generic methods 362

generic type parameters 322

generic type restrictions 328

instantiating object 325

invoking methods on objects 326

methods, invoking on objects 326

parameter bounds 333

parameter bounds that mention generic type 331

problem solved by 319

purpose 321

table example 324

terminology 334

three parts 322

using outside Collection classes 322

GET

defined 690

HTTP GET command 669

POST and 695

GIF

image I/O 384

importing images into program 558

JFrame 557

Google

googlewhacking 778

web services beta kit contents 764

web services overview 759

web services, running 768

web services, using 764

WSDL file 766

goto 68

grahmar, defined 8

greater than operator, precedence 142

GregorianCalendar class 484, 485, 486

grep program for pattern matching 482

GridLayout 564

groups and pattern matching 476

GUI

cursor icons 572

event handling actions 500

event handling overview 501

functionality, four basic areas 499

heavyweight and lightweight components 522

JFC overview 520

JFC terminology 521
Index

JFrame, displaying components 526
layout managers 562
pluggable look and feel 549
printing screen 571
Swing component descriptions 529
see also AWT, Swing, event handling
GUI event handlers 239
gzip 409, 421
GZIPInputStream class 421
gzipOutputStream class 408
H
handlers 211
event handlers and interface callbacks 239
see also event handlers
Hank the Angry, Drunken Dwarf 717
Hard Luck Hard Disk 83
hardware for networking 646
has a 166
hash tables
defined 371
hashcodes 59
HashMap class 369, 372
HashSet class 346
collections and lists 351
using 353
Hatless Atlas song 65
header files
use in other languages 23
headers
HTTP 696
servlet request methods 699
heap
default size 202
description 202
garbage collection 202
storage lifetime 203
heavyweight 522
Hello World 783
hexadecimal 418
Hindi output 401
HotSpot 19
HTML
5K contest 756
overview 723, 724
POST and GET 669
servlets, invoking with 694
XML versus 722
XML’s advantages over 722, 724
HTTP
1.1 enhancements 702
browsing 671
defined 690
GET command 669
headers 696
mapped I/O HTTP server 677
multithreaded HTTP server 675
POST and GET 695
requests and responses 695
response syntax 696
servlet requests 698
servlets and 693
version comparison 702
hubs 647
I/O
16-bit character output 403
ASCII printable output 402
binary reader methods 411
blockedReader 443
buffers 441
channels 441
design philosophy 385
exceptions 417
File class 387
file locking 452
formatted string output 436
input 410
input methods 415
input sources 411, 415
inputstream wrappers 420
interrupting 283
java.io package 382
key File class members 388
keyboard 390, 391
memory-mapped 449
Multics 450
multiplied non-blocking 441
non-blocking 440
number of classes 382
output 397
output destinations 399
packages 384
piped I/O for threads 305
platform differences 386
practical output examples 400
printstreams 391
problems 382
processes, limitations on running 435
program output, reading 432
random access file 430
reader wrappers 413
reading file and dumping to hexadecimal 418
threads, stopping 283
wrappers 383
wrapping additional output classes 406
writer wrappers 406
XML support class 439
zip files, outputting 409
see also input, output
IBM Linux watch 108
icons for cursors 572
identifiers
defined 137
legal Java identifiers 138
names versus identifiers 137
overview 137
identity conversions 152
IDEs 18
if statement syntax 71
illegal

prime number 424

tshirts 461
images, importing into program 558
IMAP 640
immutability and final keyword 117
immutability of Strings 61, 63, 64
implicit fall-through 72
importing
    import static syntax 126
type name, enumeration 125
IN operator 601
indexes
    array indexes, when checked 186
arrays 195
INetAddress 674
inheritance
    benefits of 165
    casting 169
    casting rules 170
    constructors 92
    constructors and 174
data field name collision 167
description 159
    example of real-world 160
    interfaces 228, 230
Java example 162
    multiple inheritance 167
Object and polymorphism 174
summary 167
    superclass object acting as subclass 169
toString method 175
initializing arrays 189
inner classes and event handlers 508
input
    basic methods 415
description 410
double-byte characters 411
InputStream wrappers 420
problem 412
reader methods, basic 411
reader wrappers 413
sources 411, 415
    see also I/O
InputStream class 415
InputStreamReader class 421
inputstreams
    piped I/O 305
    TCP/IP diagram 650
    wrappers 420
INSERT

defined 596
defined 596
example 598
insolvent pachyderms 778
installing
    Mckoi database 592
    Tomcat 691
instance initializers 93
instance methods and enumeration variables 129
instanceof 145
    instead of switch 743
    operator 145
instantiating
    arrays 187
    constructors 89
    objects, constructors 89
int
    defined 41
description 46
integrity
    defined 591
    entity 587
    referential 586
    transaction 587
interface, see GUI
interfaces
    abstract classes versus 234
    callbacks 239
    Comparable 232
defined 230, 234
deprecated 485
event handling 507
generic interfaces 326
generic parameter bounds 333
Java Native Interface 495
JDBC, interfaces versus classes 618
locks and memory mapping 440
member behavior 230
overview 227
problem solved by 228
summary 231
Swing event handler interfaces 543
intern method 63
Internet Protocol, see IP interpreter
performance boosts 19
program for Java 18
interrupting
    I/O 283
    interrupt method 304
    threads 303
introspection 180
ints
    enumeration and final int drawbacks 119
    overflow 154
IP 640
    address, determining 642
    current connections, showing 668
defined 650
    finding address for machine name 673
    INetAddress 674
    loopback address 664
    ports and 652
    protocols built on 645
    version 4 versus version 6 646
ipconfig 642
is a 166
ISO
codesets appendix 787
ISO-8859-1 456
seven-layer model 644
ISPs, blocking 633
iterating
collections 347
collections, exceptions 349
    Iterator interface 347

J

J2EE
    features 339
    overview 14
J2ME overview 12
J2SE overview 13
Jakarta 690
JApplet
element 526
    subclass of Panel 559
jar files
    applications, storing in 102
classpath 102
creating 101
double-clickable 102
executable application in 102
Google web services 765
location JDK looks for 102
Mckoi 629
Mckoi, setting up 593
servlet deployment 706
Jasper 690
Java
classpath, installation 782
clock program, main code for 32
compiling 18, 781
downloading 781
early names for 378
event model 501
J2EE overview 14
J2ME overview 12
J2SE overview 13
JRE overview 18
JVM overview 18
language overview 8
Microsoft and 7
objects, introduction to 17
operator descriptions 143
operator precedence 142
overview 3
package list 11
portability benefits 4
portability, importance 5
running program 18
strongly typed, defined 42
see also JDK.
Java Foundation Classes, see JFC
Java Native Interface 495
Java Studio Creator 610
javac 18
javadoc 78
comments 78
tool, overview 80
using 82
JAXB 733
JAXM 733
JAXP 733, 735
JButton
description 530
example 527
internationalization 531
JButtonGroup 535
JCheckBox 533
JComponent
actions 524
component descriptions 529
controls 525
debugging components 545
description 524
features provided 522
Frame, arranging 527
overview 522
JContentPane 556
JDBC
additional information 631
complete example 627
drivers, loading 616
interfaces versus classes 618
overview 582, 610
prepared statements 626
SQL connection methods 619
SQL execution methods 620
stored procedures 627
transactions 625
transactions, batching 624
versions 614
JDiskReport 14
JDK
classes, finding 101
features in each release xix
see also Java
JDK 1.1
event handling pattern 513
event object hierarchy 504
event passing 503
JDK 1.5
arrays, iterating over 192
autoboxing and unboxing 55
class data sharing 19
concurrent package 310
deprecated thread methods 283
ellipsis token 136
enum keyword 136
enumerations 111
footprint reduction 19
generics 181, 317
JAXB
new features summary 440
StringBuilder 64
variable arity 97
JEditorPane
description 541
JTabbedPane and 539
JFC
advantages 521
overview 520
terminology 521
JFrame
containers 557
displaying components 526
example 504, 527, 557
JGlassPane 556
JLabel 529
JLayeredPane 556
JMenuBar 556
JOptionPane 537
JPanel 556
alternative using JLabel 534
description 534
JTabbedPane and 539
KeyListener 535
using 558
JPG 558
JRadioButton 535, 550
JRE overview 18
JRootPane 556
JScrollPane 538
JServ 690
JSP
container, Tomcat 689
description 514
executing 713
Java beans 712, 715
Java beans example 715
overview 683, 685, 710
servlets versus 710
Struts 714
syntax 711
tag libraries 716
tags 712
terminology 689
JTabbedPane 539
JTextField 532
JToolTip 531
Just in Time compiling 19
Just Java website 14
JVM overview 18
JWindow 560
Kenobi, Obi-Wan 545
KeyAdapter 511
keyboard I/O 390, 391
keyboard output 393
KeyListener 535
keys 586
keywords 136
defined 522
LIKE operator 601
Limewire 38
LineNumberInputStream class 421
LineNumberReader class 414
link layer 645
Linnaean taxonomy 160
Linux
portability of Java 4
watch 108
listeners
adapter class pitfall 511
callback interfaces 240
element 509
listener adapter class 509
pluggable look and feel 551
registering several for same
event 513
top-level class, making into
508
lists
ArrayList class 349, 352
collections 342
LinkedList class 349
List class 349
maps and 342
sorting for collections 359
literals
boolean literals 43yte literals (none) 48
char literals 44
defined 42
int literals 46
long literals 47
short literals (none) 49
String literals 60
Strings, immutable 61
little-endian storage 455
local thread storage 308
locks
deadlock 304
file locking 452
read/write 291
logging servlets 703
long
defined 41
description 46
loopback address 664
loops
  break statement 76
  continue statements 75
dowhile statement 75
  for loop and enumeration 123
  for statement 74
looping statement syntax 73
mutually exclusive threads 298
variable, declaring 74

M
Macintosh
  portability of Java 4
mail
  500 mile limit 680
  MIME 702
  sending 657
main method
  example 32
  static 116
many-to-many relationships 588
Map interface
  HashMap 372
  TreeMap 375
mapped I/O HTTP server 677
maps
  collections 342
  defined 343
Maps interface 369
mark and sweep 206
Matcher class 469
Math class 195, 318, 392
math package 196, 490
MAX function 602
Mckoi
  class path 629
  downloading and installing 592
  jar files 629
  jar files, setting up 593
  query tool 594
running 613
running sample code 613
memory management 202
finalizers 205
garbage collection 202, 204
heap 202
leaks 203
memory no longer in use, indicating 204
reclaiming objects 94
reference types and 28
stack 208
weak references 207
memory mapping interface 440
memory-mapped I/O 449, 450
metacharacters and pattern matching 474
metadata
  File class 387
  File class members 388
  result sets 630
metawords in pattern matching 480
methods
  access modifiers 104
  activation record 208
  catching exception within throwing method 214
  exceptions, declaring 218
  File class 388
  finding method that threw exception 220
  forward referencing 138
  generic methods 362
  generic, example 334
  grouping in packages 23
  I/O metadata 388
  instance methods and enumeration variables 129
  interfaces 230
  invoking static method through instance variable 116
  overloading 96, 171
  overriding 172
  overview 95
  parameterizing 366
  reference variables, passing parameters to methods 96
  servlet request methods 699
  servlet response methods 700
  stack 208
  static methods 116
  static, common pitfall 117
  Swing interface methods 543
  variable-arity 97
  see also generic methods
MFC memory leaks 203
Micro Edition overview 12
MicroQuill 203
Microsoft
  Java and 7
  memory leaks 203
  OpenOffice.org office suite competitor 6
MIME 702
MIN function 602
MiniScribe 83
modal Window 560
monitors and threads 291
months
  numbers for 486
  see also Calendar
motion sensors 285
mouse inventor 515
Multics 450
Multics and wait/notify 297
multi-dimensional arrays 190
multidimensional arrays 190
multiple inheritance 167
  interfaces 229
  multiplexed non-blocking server I/O 441
multithreading, see threads
mutually exclusive threads 287
  communicating 295
  example 288
  over a method 294
  over block of statements 293
  over entire class 292
MVC
  overview 552
  Struts 715
naming

data field collision 167
early names for Java 378
forward referencing 138
names versus identifiers 137
package names and namespaces 100
package names, unique 100
package naming rules 99
qualifying subclasses and data field names 167
XML namespaces 729

Napster 38
narrowing conversion 152
NASA Spirit Rover 224
Native Interface 495
native library behavior in AWT 520
negation and pattern matching 479
nerd detection system 184
nested classes 104
nesting 166
netstat 668
network layer 645

networking
    additional information 679
    hardware 646
    IP and UDP diagram 641
    ISO seven-layer model 644
    library 648
    overview 639
    TCP/IP four-layer model 645
    Windows 657
    see also sockets, packets, protocols
new features in 1.5, see JDK 1.5
new keyword 90
no-arg constructor 90
nodes and DOM 741
non-blocking I/O 440, 442
noncommercial databases 612
non-polling I/O 442
normal form 590

notify method 297, 303
NTP 655, 656
null
databases 587
null reference 27
null bodies and listener adapter class 509
numbers
    random 492
    see also Math class

Object class
    equals method 59
    inheriting from 174
    overview 57
object orientation
    classes, defined 20
    inheritance 159
    inheritance and constructors 92
    inheritance example 162
    polymorphism 159
    terminology 160
object references 96
ObjectOutputStream class 408
objects
    arrays, similarities 186
    arrays, similarities and differences 186
    autoboxing 55
    code example, simple 30
    collection objects, declaring 345
    comparing value 59
    defined 26
    heap 202
    instantiating
        constructors 89
        steps that occur 93
    instantiating for generics 325
    introduction to 17
    memory management 94
    no longer in use, indicating 204
    object wrapper classes for primitive types 54
    pass by value versus pass

by reference 96
primitives versus 27
reference to an object versus 29
static 113
storage lifetime 203
wrappers for primitives 53
writing objects to sockets 437
writing to disk 436
Observer pattern 312
octal escape sequences 45
ODBC 615
one-to-many relationships 587
one-to-one relationships 587
OOP, see object orientation
OpenOffice.org office suite 6
operand evaluation 141
operating cycle of servlets 708
operating systems
    I/O differences among 386
    portability, benefits 4
    portability, importance 5
operators
    cast and assignment 153
    description 140
    Java operator descriptions 143
    precedence 142
    SQL comparison 601
optimization
    incorrect 360
    servlets 709
order of evaluation
    operands 140
    see also evaluating
output
    arrays 400
    destination options 399
    practical examples 400
    readers versus output-streams 397
    reading program output 432
    Width 396
    wrapping additional output classes 406
    zip files 409
    see also I/O
OutputStream class 408
outputstreams 16-bit characters 398
binary output 401
element 400
piped I/O 305
readers versus 397
servlets 703
TCP/IP diagram 650
wrappers 408
OutputStreamWriter class 408
overflow
BigInteger 155
casting 154
overloading 171
description 171
methods, syntax 96
overriding versus 174
overriding
covariant return types 238
forcing off with final 175
forcing on with abstract 177
methods 172
overloading versus 174

P
packages
classpath 102
defined 99
finding classes 101
grouping classes in 23
I/O packages 384
Java package list 11
naming rules 99
packaging classes 99
unique names 100
visibility 98
packets
diagram 641, 643
routers and 647
UDP 649
watching 667
p-and-v semaphores 291
parallel processing 269, 281
parameterized type 334
parameters
arguments versus 95, 318
generic methods 366
generic parameter bounds 333
generic type 322
pass by value versus pass by reference 96
passed by reference 96
passed by value 96
primitives and parameter-passing 96
reference variables, passing parameters to methods 96
wildcard parameters 362
parentheses 136
parsers
DOM 736
SAX 744
SAX versus DOM 745
pass by reference 96
pass by value 96
Pattern class 469
pattern matching
alternating 479
anchors 477
anything but feature 473
anything except this word feature 479
capturing groups 476
cautions 469
classes 469
escape characters 474
grep program 482
metawords 480
methods 470
patterns, forming 470
quantifiers 475
ranges 473
sample program 472
single-character metacharacters 474
three main steps 468
using 469
when used 468
word negation 479
patterns
design pattern summary 753
design patterns overview 312
Factory design pattern 749
pattern matching and I/O
440
PatternSyntaxException 469
performance
autoboxing 56
batching SQL statements and transactions 624
interpreter performance
boosts 19
servlets 709
strictfp 198
StringBuilder 64
petservlet
petform.html 704
results 705
pi 195, 318, 394
ping programs 653, 654
pipes
example of output to 401
I/O output destination 399
input source 415
piped I/O for threads 305
pitfall 305
pluggable look and feel
illustration 551
overview 549
pointers 28
polls, rigging results 717
polymorphism 159, 171
description 171
late binding 174
Object, inheriting from 174
overloading 171
overloading versus overriding 174
overriding 172
parametric 319
populating tables with INSERT 599
portability
benefits 4
I/O 386
I/O design philosophy 385
importance 5
jobs, effect on 6
OpenOffice.org 6
pluggable look and feel 549
web based software 686
XML 731
ports
defined 652
firewalls and 652
predefined 652
POSIX
scheduling algorithm 275
thread standard 267
POST
defined 690
GET and 695
post-increment operator 142, 143
Powers of 10 tutorial 200
powers of two table 785
precedence 142
associativity versus 148
operator precedence 142
operators 142
precision
calculation accuracy 149
calculations 149
floating-point 149, 151
floating-point arguments 396
pre-increment operator 142, 143
prepared statements
description 606
using 626
primary key 586
prime numbers
table 875
example program finding 281
illegal 424
primitives
autoboxing 55
boolean, description 43
byte, description 48
casting 47, 153
char, description 43
composite types versus 22
data types versus 22
defined 21
descriptions 41
int, description 46
long, description 46
object wrapper classes for
primitive types 54
object wrappers 53
objects versus 27
short, description 49
printf
method 394
variable-arity of methods 97
printing screen 571
println 670
PrintStream class 402
printstreams 391
PrintWriter class 403
priority 275
private
access modifiers 103, 105
protected versus 106
procedural language data types 21
programming language, see languages
properties
environment variables equivalent 493
predefined 494
processing 494
protected
access modifier rationale 106
access modifiers 105
cloning and 237
defined 237
JLS citation 239
private versus 106
servlet request and response 698
protocols
HTTP and web components 693
IP; built on 645
remote and println 670
socket 663
SPAM, reducing 636
Trusted Internet Protocol 636
provisioning 687
proxy servers 648
public
access modifiers 103, 105
interface methods and fields 230
punctuation
defined 136
operators 140
PushbackInputStream class 421
PushBackReader class 414
Q
quantifiers and pattern matching 475
queries
Mckoi query tool 594
SELECT example 599
SELECT result sets 603
SELECT statement 596
speeding up 624
SQL executeQuery method 620
SQL subqueries 602
queues
collections 342
R
race conditions
avoiding 291
blackout 290
defined 289
radians, converting to degrees 196
radio buttons 535, 566
raising 211
Random Access File class 430
Random class 492
ranges and pattern matching 473
read/write locks 291
readers
basic methods 411
outputstreams versus 397
reader classes 397
reader classes for input 411
reader wrappers 413
reading from System.in 391
records
DELETE and DROP 596
deleting 605
DROP 596
UPDATE statement 596
updating 605
reference counting 206
reference implementation, servlet 688
reference types
  arrays 185
  defined 27
  key points 22
  string comparison 63
  why used 28
reference variables
  passing parameters to methods 96
  tree data structures 29
  why used 28
references
  back references and pattern matching 476
  forward-referencing names 138
  objects versus reference to an object 29
  pass by value versus pass by reference 96
  pointers, addresses 28
references types
  memory management and 28
  referential integrity 586
regular expressions
  pattern matching 470
  properties 493
related threads 280
relational databases 581
  defined 582
  many-to-many relationships 588
  mathematical concepts 584
  see databases, relational tables 582
relations 583
relationships 587
reliability and enumeration constants 121
removeAll method 345
repetition and pattern matching quantifiers 475
requests
  HTTP 695
  servlet 698
  servlet requests, key methods 699
servlets 697
reserved words 136
responses
  HTTP 695, 696
  servlet responses, key methods 700
  servlets 697, 699
  syntax 696
REST
  Amazon web services 774
  overview 775
result sets
  contents 603
  metadata 630
  SELECT example 601
  sorted 604
  retain method 345
  return statement syntax 77
  right bitwise shift 142
Robocode software 110
RosettaNet 732
routers
  defined 646
  packets and 647
rows 583
rules
  generic type parameter bounds 330
  googlewhack 779
  XML 725
run method 271, 274, 282
Runnable interface
  creating new thread 270
  object, turning into thread 272
  Swing threads 528
  Thread class 284
  using 272
run-time amnesia 328
run-time internals 202, 208
run-time library
  overview 10
  source code 62
SAX
  defined 733
DOM versus 745
example 746
using 744
Scanner class 391
SCJP 313
screen, printing 571
scrolling 538
searching and web services 770
Searching class 325
second normal form 590
sections of XML documents 728
security
  firewalls 648
  serializing and 438
  web services 772
SELECT
  defined 596
  example 599
  pitfalls 604
  result sets 603
selection statements 71
selector-based multiplexing 442
semaphores, p-and-v 291
SequenceInputStream class 421
serializing
  objects, making serializable 437
  security and 438
  writing objects to disk 436
servlet containers
  defined 684
  Tomcat 689
servlets
  CGI versus 687
  compiling 700
  container, defined 684
  debugging 707
  deployment 706
  development tips 707
  dynamic content 684
  example 701
  example, running 692
  exceptions 703
  forms and 694
  HTML to invoke 694
  logging 703
  operating cycle 708
  output streams 703
  overview 683
pathnames for executing 705
pet servlet results 705
products replaced by 687
reference implementation 688
requests 698
requests and responses 697
requests, key methods 699
responses 698
responses, key methods 699
set specification location 710
terminology 689
threads 709
tips 703
Tomcat configuration 703
tracking content length 703
web services and why use 687
writing sessions 710
sets 342
HashSet class 353
maps and Set interface, defined 355
see also result sets
shadowing field names 167
Shakespeare DTD 729
shallow clone 236
shift, bitwise 142
short defined 41
description 49
signed shift operator 144
significant figures
double, largest possible 51
floating-point 49
SimpleDateFormat class 484, 488
SimpleTimeZone class 484
single-character metacharacters 474
Singleton pattern 312
Sky View cafe 575
SmartHeap 203
SMTP 657, 658
SNMP 640
SOAP 763
sockets background 642
blocking I/O 443
C/C++ 653
client socket 655
client versus server 645
connections 645
datagram 645
datagram diagram 641
debugging 666
defined 652
diagram 643
I/O output destination 399
input source 415
Java 653
networking classes 648
println and 670
protocols 663
server socket 660
server sockets 666
ServerSocket 666
stock finder 672
stream sockets 645
TCP/IP diagram 650
URLconnection 673
writing objects to 437
sorting interfaces for collections 359
result sets 604
Sorting class 325
source code of Java run-time library 62
spam lovely 632
pattern matching 468
preventing 634
Spirit Rover 224
SQL comparison operators 601
cursor 604
data types 598
executing statements 619
execution methods 620
functions 602
overview 595
prepared statements 606
result sets 603
statement categories 596
statements, batching 624
stored procedures 606
support for SQL types 490
square brackets for SQL types 490
SSEC 335
stack description 208
diagram 209
servlet stack trace 707
Stack class 489
stack cracking 208
stack frame 208
stack trace, defined 211
threads and 210
Standard Edition overview 13
standard in, out, err 391
start method 271
statements assert 221
branches 72
break statements 76
common Java statements 67
dowhile statement 75
dowhile statements 75
empty statement ( 69
enumeration, updates for 121
expression statements 70
for statements 73
if statements 71
looping statements 73
organizing 69
overview 68
return statements 77
selection statements 71
SQL statement categories 596
SQL statements, batching 624
switch statements 71
switch’s design flaws 73
transfer of control 77
static data 114
defined 112, 113
description 113
import static syntax 126
main method 113, 116
methods 116
methods, common pitfall 117
mutual exclusion over class
static methods 293
treads 293
what you can make static 114
stderr 391
stdin 391
stdout 391
stop and copy 206
storage
big-endian 454
little-endian 455
thread local storage 308
storage lifetime 203
stored procedures
defined 592
description 606
using 627
stream sockets 643, 645
streams
closing after use 405
input and output streams 397
memory-mapped I/O 449
selecting class for 398
strictfp 151, 198
String class
concatenation 61
creating new 61
methods, important 64
overview 58, 60
toString method 58
StringBuffer 415
Strings
ASCII, String, and binary 400
comparing 63
formatted output 436
I/O output destination 399
intern method 63
StringBuffer 63
StringBuilder 64
strongly typed 42
Struts
finding more information 715
overview 714
subclasses
casting 169
data field names 167
defined 160
inheritance example 163
interfaces 228
overriding 172
superclass acting as subclass 169
subqueries
eamples 603
SQL 602
subtypes
defined 160
see also subclasses
SUM function 602
super
keyword 164
using 166
superclasses
casting 169
defined 160
superclass acting as subclass 169
supertypes
defined 160
see also superclasses
swapping bytes 459
Swing
component descriptions 529
containers 554
debugging lightweight components 545
error message windows 537
event-dispatching thread requirement 528
events list 543
JComponent, description 524
lightweight controls 523
most useful component 538
threads warning 527
threads, Runnable interface 528
switch
break statement 76
design flaws 73
enumeration and 124
instanceof instead of 743
statement syntax 71
switches
defined 646
hubs versus 647
layer 3 646
synchronization
blocks 292
defined 277
events and threads 502
Multics 297
mutual exclusion over block of statements 293
mutual exclusion over method 294
servlets 709
solutions 291
wait/notify 295
syntactic sugar 122, 332
syntax
angle brackets 317
arguments versus parameters 95
arrays 185, 187
arrays and brackets 194
arrays of arrays 191
comments 78
constructors 90
CREATE 597
DELETE 605
doGet and doPost 698
DROP 606
DT 727
exceptions, catching 214
epressions 139
generic methods 366
generics 334
HTTP 696
identifier rules 137
INSERT 598
JSP 711
methods 95
operators 140
overloading methods 96
punctuation 136
SELECT 599
SELECT pitfalls 604
SQL operators 601
statements 69
UPDATE 605
XML 725
XML comments 726
System.in 391
System.out.println 393
tables
CREATE statement 596
creating 597
database, adding to 590
defined 583
DELETE and DROP 596
deleting 605
inserting records 598
tabs
adding tab and component 541
escape sequences 44
JTabbedPane 539
tags
attributes 726
DTD 727
element tags 725
HTML tags 723
JSP 712
JSP tag libraries 716
XML 734
XML tags 724
TCP/IP 640
client/server model 650
diagram 643
four-layer 645
overview 640
Windows 657
Telnet 640
telnet 667
templates, see generics
test-and-set instructions 291
text editors and pattern matching 468
text fields 532
TFTP 640
third normal form 590
Thread class
diagram 271
example 284
non-private members 284
threads 271
advanced topics 287, 295
API 267
bug 303
categories of thread programming 277
concurrent package 310
creating 270
defined 267
demon 280
deprecated methods 283
diagram 278
event handling and 502
interrupting 303
local storage 308
moving data between 305
Multics 297
mutually exclusive 277, 287
mutually exclusive, communicating 295
mutually exclusive, example 288
pipe pitfall 305
piped I/O 305
prime number program 281
race conditions 289
read/write locks 291
reasons to use 269
related 280
Runnable interface 272
Runnable interface and Swing threads 528
running 271
servlets 709
stack allocated for 210
stopping 283
Swing threads warning 527
synchronization 277, 709
synchronization solutions 291
synchronized blocks 292
unrelated 278, 280
unsynchronized 280
volatile 304
wait/notify 295
XML 753
three-dimensional arrays 190
throwing exceptions 211
time
global timeservers 656
NETP 655
time-sharing 268
time-slicing 275
see also Calendar
TimeZone class 484
timing your code 493
toaster, Java-powered 242
Tomcat
configuration 703
defined 690
deployment 706
downloading 691
installing 691
overview 689
running JSP 713
servlet debugging tips 707
starting and stopping 692
versions 689
tooltips 531
toString method 58, 175
traceroute 647
transactions
batching 624
Connection object 625
transaction integrity 587
transfer of control statements 77
Transmission Control Protocol, see TCP
transport layer 645
TreeMap class 369, 375
trees
DOM parser, example 740
DOM XML parser 737
reference variables 29
reference variables and 29
XML document structure 727
TreeSet class 356
triggers 592
tru/false, boolean 43
Trusted Internet Protocol 636
try
after completed 216
exceptions 214
overhead 218
statement example 215
tuple, defined 583, 592
Turing, Alan 335
two, powers of, table 785
two-dimensional arrays 190
type arguments 334
type erasure 328
type name 125
type parameters 334
types
array compatibility 188
composite types 22
conversion 47
covariant return types 238
enumerated type benefits 119
enumerating, why 119
floating-point 49
generic type restrictions 328
generics 320
grouping in packages 23
reference types 27
reference, why used 28
type parameter and bounds 330
see also data types

U
UDDI
    defined 763
    overview 775
UDP 640, 641
unboxing, see autoboxing
Unicode
    char and 45
    operating systems and 45
    unrelated threads 278, 279, 280
    unsynchronized threads 279, 280
UPDATE
    defined 596
    example 605
URLs
    I/O output destination 399
    URLConnection 673
    user datagrams 640
    user interface, see GUI
UTF 456
utilities
    BitSet class 489
    calendar and time 483
    Properties class 494
    Random class 492
    Stack class 489

V
validation, DTD 726
values method
    enumeration and 123
    predefined members 129
    var-args 97
    variable-arity 97
variables
    casting note 47
    data types versus primitives 22
    enumeration variables and instance methods 129
    pass by value versus pass by reference 96
    reference variables, passing parameters to methods 96
    see also attributes, data types
Vector class thread bug 303
versions
    IP 646
    JDBC 614
    JDK xix
    servlet reference implementation 688
    XML 733
view buffers 447
virtual 173
visibility 98
    access modifiers 104
    keywords 98
    protected 237
    see also access modifiers
volatile 304
votebot 718

W
wait method 297
wait/notify 295, 297
war files 706
warnings and JOptionPane 537
weak references 207
web browsers
    defined 684
    protocols 693
web components
    JSP overview 711
    portability 686
    servlet and JSP overview 683
terminology 689
web searches 468
web servers 661
    defined 684
    multithreaded HTTP server 675
    protocols 693
web services
    Amazon beta kit, downloading 771
coding your own 770
    conclusions 777
    defined 761
    four components 762
    Google beta kit, downloading 764
    overview 759
    problem they solve 761
    REST 774
    running Amazon web services 773
    running Google web services 768
    security 772
    servlets and 687
terminology 763
writing, steps 763
website for book website 14
well formed XML documents 726
widening and narrowing conversions 152
widening conversion 47, 152
widgets 521
wildcards
    defined 334
    generic methods, combining with 367
    lower bounds on 365
    wildcarding generic parameters 362
Window
    containers 560
    JComponent overview 522
    JFrame example 504
    window listener 509
window listeners
    example 509
    see also listeners
Windows
portability of Java 4
TCP/IP 657
windows
error message, JOptionPane 537
JTabbedPane 539
see also GUI
winipconfig 642
wireless devices 12
word negation in pattern matching 479
wrappers
autoboxing 55
defined 383
InputStream wrappers 420
object wrapper classes for
primitive types 54
object wrappers for primitives 53
output classes 406
primitives, why wrap in objects 53
reader wrappers 413
writer wrappers 406
writers
16-bit characters 398
writer classes 397
WSDL
defined 763
Google WSDL 766
overview 775
X
XML 735
attributes 726
business-to-business processes 732
comments 726
document tree structure 727
DOM, using 736
DTD 726
elements 725
Factory design pattern 749
HTML versus 722
HTML, advantages over 722, 724
information resources 755
Java XML notes 753
JAXP library 735
namespaces 729
origin 731
problem it solves 731
rules 725
SAX versus DOM 745
SAX, using 744
sections 728
Shakespeare DTD 729
support class, I/O 439
tags 734
terminology 733
threads 753
validation 726
well formed documents 726
XSLT 733, 763
Z
Zen Garden 132
Zermelo-Frankel set theory 122
zip files 409
ZipOutputStream class 408