Hibernate in Action

CHRISTIAN BAUER
GAVIN KING

MANNING
Greenwich
(74° w. long.)
foreword xi
preface xiii
acknowledgments xv
about this book xvi
about Hibernate3 and EJB 3 xx
author online xxi
about the title and cover xxii

Understanding object/relational persistence 1

1.1 What is persistence? 3
   Relational databases 3 • Understanding SQL 4 • Using SQL
   in java 5 • Persistence in object-oriented applications 5
1.2 The paradigm mismatch 7
   The problem of granularity 9 • The problem of subtypes 10
   The problem of identity 11 • Problems relating to associations 13
   The problem of object graph navigation 14 • The cost of the
   mismatch 15
1.3 Persistence layers and alternatives 16
   Layered architecture 17 • Hand-coding a persistence layer with
   SQL/JDBC 18 • Using serialization 19 • Considering EJB
   entity beans 20 • Object-oriented database systems 21
   Other options 22
1.4 Object/relational mapping 22
   What is ORM? 23 • Generic ORM problems 25
   Why ORM? 26
1.5 Summary 29
CONTENTS

2 Introducing and integrating Hibernate   30
   2.1 “Hello World” with Hibernate   31
   2.2 Understanding the architecture   36
      The core interfaces   38 • Callback interfaces  40
      Types   40 • Extension interfaces  41
   2.3 Basic configuration   41
      Creating a SessionFactory   42 • Configuration in
      non-managed environments   45 • Configuration in
      managed environments   48
   2.4 Advanced configuration settings   51
      Using XML-based configuration   51 • JNDI-bound
      SessionFactory   53 • Logging   54 • Java Management
      Extensions (JMX)   55
   2.5 Summary   58

3 Mapping persistent classes   59
   3.1 The CaveatEmptor application   60
      Analyzing the business domain   61
      The CaveatEmptor domain model   61
   3.2 Implementing the domain model   64
      Addressing leakage of concerns   64 • Transparent and
      automated persistence   65 • Writing POJOs   67
      Implementing POJO associations   69 • Adding logic to
      accessor methods   73
   3.3 Defining the mapping metadata   75
      Metadata in XML   75 • Basic property and class
      mappings   78 • Attribute-oriented programming   84
      Manipulating metadata at runtime   86
   3.4 Understanding object identity   87
      Identity versus equality   87 • Database identity with
      Hibernate   88 • Choosing primary keys   90
   3.5 Fine-grained object models   92
      Entity and value types   93 • Using components   93
   3.6 Mapping class inheritance   97
      Table per concrete class   97 • Table per class hierarchy   99
      Table per subclass   101 • Choosing a strategy   104
3.7 Introducing associations 105

Managed associations? 106 • Multiplicity 106
The simplest possible association 107 • Making the association bidirectional 108 • A parent/child relationship 111

3.8 Summary 112

4 Working with persistent objects 114

4.1 The persistence lifecycle 115

Transient objects 116 • Persistent objects 117 • Detached objects 118 • The scope of object identity 119 • Outside the identity scope 121 • Implementing equals() and hashCode() 122

4.2 The persistence manager 126

Making an object persistent 126 • Updating the persistent state of a detached instance 127 • Retrieving a persistent object 129
Updating a persistent object 129 • Making a persistent object transient 129 • Making a detached object transient 130

4.3 Using transitive persistence in Hibernate 131

Persistence by reachability 131 • Cascading persistence with Hibernate 133 • Managing auction categories 134
Distinguishing between transient and detached instances 138

4.4 Retrieving objects 139

Retrieving objects by identifier 140 • Introducing HQL 141
Query by criteria 142 • Query by example 143 • Fetching strategies 143 • Selecting a fetching strategy in mappings 146
Tuning object retrieval 151

4.5 Summary 152

5 Transactions, concurrency, and caching 154

5.1 Transactions, concurrency, and caching 154

5.2 Understanding database transactions 156

JDBC and JTA transactions 157 • The Hibernate Transaction API 158 • Flushing the Session 160 • Understanding isolation levels 161 • Choosing an isolation level 163 • Setting an isolation level 165 • Using pessimistic locking 165

5.3 Working with application transactions 168

Using managed versioning 169 • Granularity of a Session 172 • Other ways to implement optimistic locking 174
5.4 Caching theory and practice 175
  Caching strategies and scopes 176 • The Hibernate cache architecture 179 • Caching in practice 185
5.5 Summary 194

6 Advanced mapping concepts 195
  6.1 Understanding the Hibernate type system 196
    Built-in mapping types 198 • Using mapping types 200
  6.2 Mapping collections of value types 211
    Sets, bags, lists, and maps 211
  6.3 Mapping entity associations 220
    One-to-one associations 220 • Many-to-many associations 225
  6.4 Mapping polymorphic associations 234
    Polymorphic many-to-one associations 234 • Polymorphic collections 236 • Polymorphic associations and table-per-concrete-class 237
  6.5 Summary 239

7 Retrieving objects efficiently 241
  7.1 Executing queries 243
    The query interfaces 243 • Binding parameters 245
    Using named queries 249
  7.2 Basic queries for objects 250
    The simplest query 250 • Using aliases 251 • Polymorphic queries 251 • Restriction 252 • Comparison operators 253
    String matching 255 • Logical operators 256 • Ordering query results 257
  7.3 Joining associations 258
    Hibernate join options 259 • Fetching associations 260
    Using aliases with joins 262 • Using implicit joins 265
    Theta-style joins 267 • Comparing identifiers 268
  7.4 Writing report queries 269
    Projection 270 • Using aggregation 272 • Grouping 273
    Restricting groups with having 274 • Improving performance with report queries 275
CONTENTS

7.5 Advanced query techniques 276
   Dynamic queries 276 • Collection filters 279
   Subqueries 281 • Native SQL queries 283

7.6 Optimizing object retrieval 286
   Solving the n+1 selects problem 286 • Using iterate()
   queries 289 • Caching queries 290

7.7 Summary 292

8 Writing Hibernate applications 294

8.1 Designing layered applications 295
   Using Hibernate in a servlet engine 296
   Using Hibernate in an EJB container 311

8.2 Implementing application transactions 320
   Approving a new auction 321 • Doing it the hard way 322
   Using detached persistent objects 324 • Using a long session 325
   Choosing an approach to application transactions 329

8.3 Handling special kinds of data 330
   Legacy schemas and composite keys 330 • Audit logging 340

8.4 Summary 347

9 Using the toolset 348

9.1 Development processes 349
   Top down 350 • Bottom up 350 • Middle out (metadata oriented) 350 • Meet in the middle 350
   Roundtripping 351

9.2 Automatic schema generation 351
   Preparing the mapping metadata 352 • Creating the schema 355 • Updating the schema 357

9.3 Generating POJO code 358
   Adding meta-attributes 358 • Generating finders 360
   Configuring hbm2java 362 • Running hbm2java 363

9.4 Existing schemas and Middlegen 364
   Starting Middlegen 364 • Restricting tables and relationships 366 • Customizing the metadata generation 368
   Generating hbm2java and XDoclet metadata 370
9.5 XDoclet 372
   Setting value type attributes 372 • Mapping entity associations 374 • Running XDoclet 375

9.6 Summary 376

appendix A: SQL fundamentals 378

appendix B: ORM implementation strategies 382
   B.1 Properties or fields? 383
   B.2 Dirty-checking strategies 384

appendix C: Back in the real world 388
   C.1 The strange copy 389
   C.2 The more the better 390
   C.3 We don’t need primary keys 390
   C.4 Time isn’t linear 391
   C.5 Dynamically unsafe 391
   C.6 To synchronize or not? 392
   C.7 Really fat client 393
   C.8 Resuming Hibernate 394

references 395
index 397