Hibernate in 60 Minutes

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My JDBC Experience

- Frustration drove me to investigate Hibernate
- Custom JDBC frameworks and idioms
  - Usually a class called JdbcUtil with static methods
- Custom code generators
  - Database metadata is too cool to resist
- Custom strategy for optimistic locking
- Database-specific ID generation

Typical JDBC Problems

- Massive duplication
- Tied to specific database
- Error-prone try/catch/finally
- Relationships are really hard
  - N+1 selects problem
  - parent/child updates
    - delete all then add
- Screen-specific DAOs for optimization

Hibernate Questions

- How hard is it to learn and use?
- How invasive is it to my code?
- What are the configuration headaches?
  - Yet another framework with XML files, JAR files, additional build complexity?
- Does it simplify my life?

What is Hibernate?

- Java Object/Relational Mapping
  - Open source – LGPL
  - http://www.hibernate.org/ (JBoss Group)
- Lets you avoid SQL
- Works with (almost) all relational DBs
  - DB2, FrontBase, HSQLDB, Informix, Ingres, Interbase, Mckoi, MySQL, Oracle, Pointbase, PostgreSQL, Progress, SAP DB, SQL Server, Sybase, etc...
  - Or you can extend one of the `Dialect` classes

What is Hibernate? (Cont'd)

- Has a huge feature list
  - Go to their web site – we don't have time
- Maps JavaBeans (POJOs) to tables
  - XML defines the mappings
  - Very few bean requirements
- SQL is generated at app startup time
  - As opposed to bytecode manipulation
  - New database? No problem! Change a few props

Avoiding SQL

- Hibernate Query Language approach

```
public User getByScreenName(String screenName) {
  try {
    return (User) getSession().createQuery(
        "from User u where u.screenName=:screenName")
            .setString("screenName", screenName)
            .uniqueResult();
  } catch (HibernateException e) {
    throw new DaoException(e);
  }
}
```

JavaBeans Property Name

- Code-based query API

```
public User getByScreenName(String screenName) {
  return getUnique(Expression.eq("screenName", screenName));
}
```

Sample Application Code

```
Session session = getSessionFactory().openSession();

// assume we know the root category id is 1
Category rootCategory = (Category) session.load(
        Category.class, new Long(1));

// we can immediately traverse the collection of messages
// without any additional Hibernate code
for (Object msgObj : rootCategory.getMessages()) {
    Message msg = (Message) msgObj; // generics+XDoclet==bad
    System.out.println("Subject: " + msg.getSubject());
    System.out.println("Body: " + msg.getBody());
    System.out.println();
}

session.close();
```

Sample Code with Transaction

```
Session sess = ...
Transaction tx = sess.beginTransaction();

// find the root category using Criteria
Criteria criteria = sess.createCriteria(Category.class);
criteria.add(Expression.isNull("parentCategory"));
Category rootCategory = (Category) criteria.uniqueResult();

// change something
rootCategory.setDescription("The Root Category");

tx.commit();
sess.close();
```

Development Options

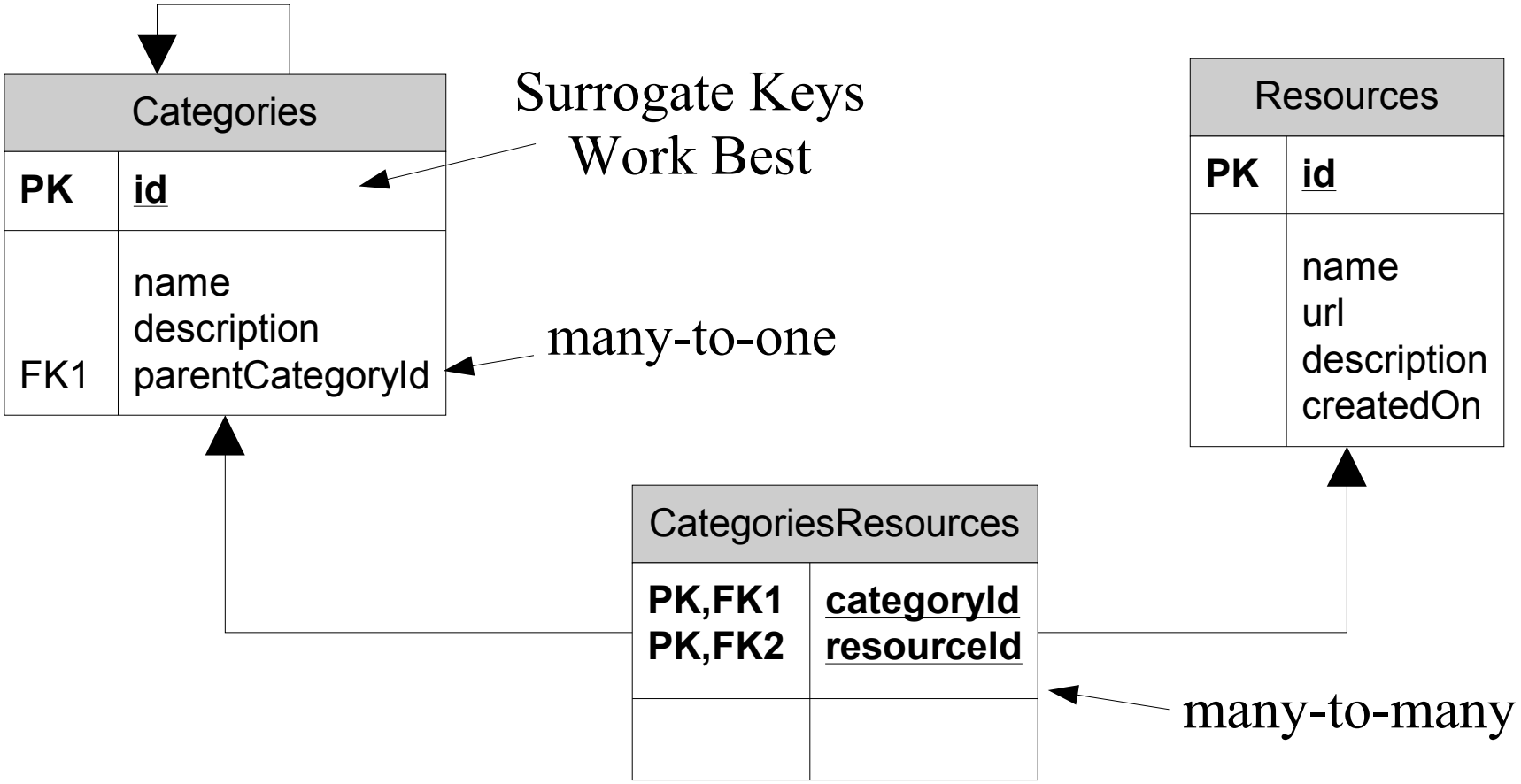
- Start with the database
  - Use middlegen to generate mapping files
  - Use hbm2java to generate JavaBeans
- Start with JavaBeans 👍
  - Use XDoclet to generate mapping files
  - Use hbm2ddl to generate the database
- Start with the XML mapping files
  - Hand-code the mapping files
  - Use both hbm2java and hbm2ddl

Hibernate Tutorial

- Design the database
- Code some persistent classes
- Write an Ant buildfile
  - Generate the mapping files and hibernate.cfg.xml
- Choose a strategy for sessions and transactions (Spring framework)
- Write and test the DAOs
- Add business logic and helper methods

Database Design

- Design your database first



Persistent Objects

- POJOs - Plain Old Java Objects
  - No base class or interface requirement
- Must have public no-arg constructor
- Should have getter/setters
  - Or Hibernate can access fields directly
  - Hibernate uses JavaBeans property names
    - For mappings as well as in queries
- Serializable is recommended
- XDoclet tags are useful but not required

My Base Class

```
public class PersistentClass implements Serializable {
    private static final long serialVersionUID = 1;
    private Long id;

    /**
     * @hibernate.id
     *      column="id"
     *      unsaved-value="null"
     *      generator-class="native"
     *      access="field"
     */
    public Long getId() {
        return id;
    }

    private void setId(Long id) {
        this.id = id;
    }
}
```

Hibernate assigns the id

Category Class

```
public class Category extends NameDescription {
    private static final long serialVersionUID = 1;

    private Set childCategories = new HashSet();
    private Set resources = new HashSet();
    private Category parentCategory;

    public Category() {
    }

    public Category(String name, String description) {
        super(name, description);
    }

    public Set getChildCategories() {
        return childCategories;
    }

    public void setChildCategories(Set childCategories) {
        this.childCategories = childCategories;
    }
```

My base class, not Hibernate's

Category (Cont'd)

```
    public Category getParentCategory() {
        return parentCategory;
    }

    public void setParentCategory(Category parentCategory) {
        this.parentCategory = parentCategory;
    }

    public Set getResources() {
        return resources;
    }

    public void setResources(Set resources) {
        this.resources = resources;
    }
}
```

Mapping Files

Or Java 5 Annotations

- Generated by XDoclet, 1 per persistent bean

```
<hibernate-mapping>
  <class name="com.ericburke.linkblog.model.Category"
      table="Categories">
    <id name="id" column="id" type="java.lang.Long"
        unsaved-value="null">
      <generator class="native"/>
    </id>

    <set name="childCategories" lazy="true"
         inverse="true" cascade="save-update">
      <key column="parentCategoryId"/>
      <one-to-many class="com.ericburke.linkblog.model.Category"/>
    </set>

    <many-to-one name="parentCategory"
        class="com.ericburke.linkblog.model.Category"
        cascade="none" column="parentCategoryId" not-null="false"/>
```

Mapping Files (Cont'd)

```
    <set name="resources" table="CategoriesResources"
         lazy="true" cascade="save-update">
      <key column="categoryId"/>
      <many-to-many column=”resourceId”
          class="com.ericburke.linkblog.model.Resource"/>
    </set>

    <property name="name" type="java.lang.String"
              column="name" length="255"/>

    <property name="description" type="java.lang.String"
              column="description" length="2000"/>
  </class>
</hibernate-mapping>
```

Xdoclet Tag Example

```
/**
 * @hibernate.class table="Categories"
 */
public class Category extends NameDescription {

    /**
     * @hibernate.set cascade="save-update" inverse="true"
     *     lazy="true"
     * @hibernate.collection-key column="parentCategoryId"
     * @hibernate.collection-one-to-many
     *     class="com.ericburke.linkblog.model.Category"
     */
    public Set getChildCategories() {
        return childCategories;
    }

    // no tags on the setters
    public void setChildCategories(Set childCategories) { }
```

hibernate.cfg.xml

Generated by XDoclet, or use Spring's XML file

```
<hibernate-configuration>
  <session-factory>
    <property name="dialect">
       net.sf.hibernate.dialect.HSQLDialect</property>
    <property name="show_sql">true</property>
    <property name="use_outer_join">false</property>
    <property name="connection.username">sa</property>
    <property name="connection.driver_class">
       org.hsqldb.jdbcDriver</property>
    <property name="connection.url">
       jdbc:hsqldb:hsql://localhost/linkblog</property>
    <property name="connection.pool_size">5</property>

    <mapping
        resource="com/ericburke/linkblog/model/Category.hbm.xml"/>
    <mapping
        resource="com/ericburke/linkblog/model/Resource.hbm.xml"/>
  </session-factory>
</hibernate-configuration>
```

Ant Buildfile

- Invokes XDoclet
  - XDoclet ships with the Hibernate tasks
  - Generates mapping files and hibernate.cfg.xml
- Hibernate includes tasks for
  - hbm2java – generates the persistent classes
  - hbm2ddl – generates the database

Requires the persistent .class files in the taskdef's classpath

- Classpath needs
  - Hibernate Jars, Hibernate extensions, XDoclet, JDBC driver JAR file

HibernateUtil

- Trivial examples show this class
  - Creates a SessionFactory in the static initializer

```
Configuration cfg = new Configuration();
SessionFactory sessionFactory =
    cfg.configure("/hibernate.cfg.xml")
        .buildSessionFactory();
```

- Provides access to a Session ThreadLocal

```
public static Session getSession() {
    Session s = (Session) threadSession.get();
    if (s == null) {
        s = sessionFactory.openSession();
        threadSession.set(s);
    }
    return s;
```

- APIs to begin/commit/rollback transactions

DAOs

- Insulate your code from Hibernate specifics
- CRUD operations
  - I use Java 5 generics heavily
  - You can also use Spring for DAO support
- Locating persistent objects
  - Use Hibernate queries for efficiency
  - From there, walk the graph using normal Java collections semantics
    - Detached objects can be challenging

Servlet Filter

```
public class HibernateFilter implements Filter {
    public void init(FilterConfig fc) throws ServletException {
    }

    public void destroy() {
    }

    public void doFilter(ServletRequest req, ServletResponse res,
                         FilterChain filterChain)
            throws IOException, ServletException {
        try {
            filterChain.doFilter(req, res);
            HibernateUtil.commitTransaction();
        } finally {
            HibernateUtil.closeSession();
        }
    }
}
```

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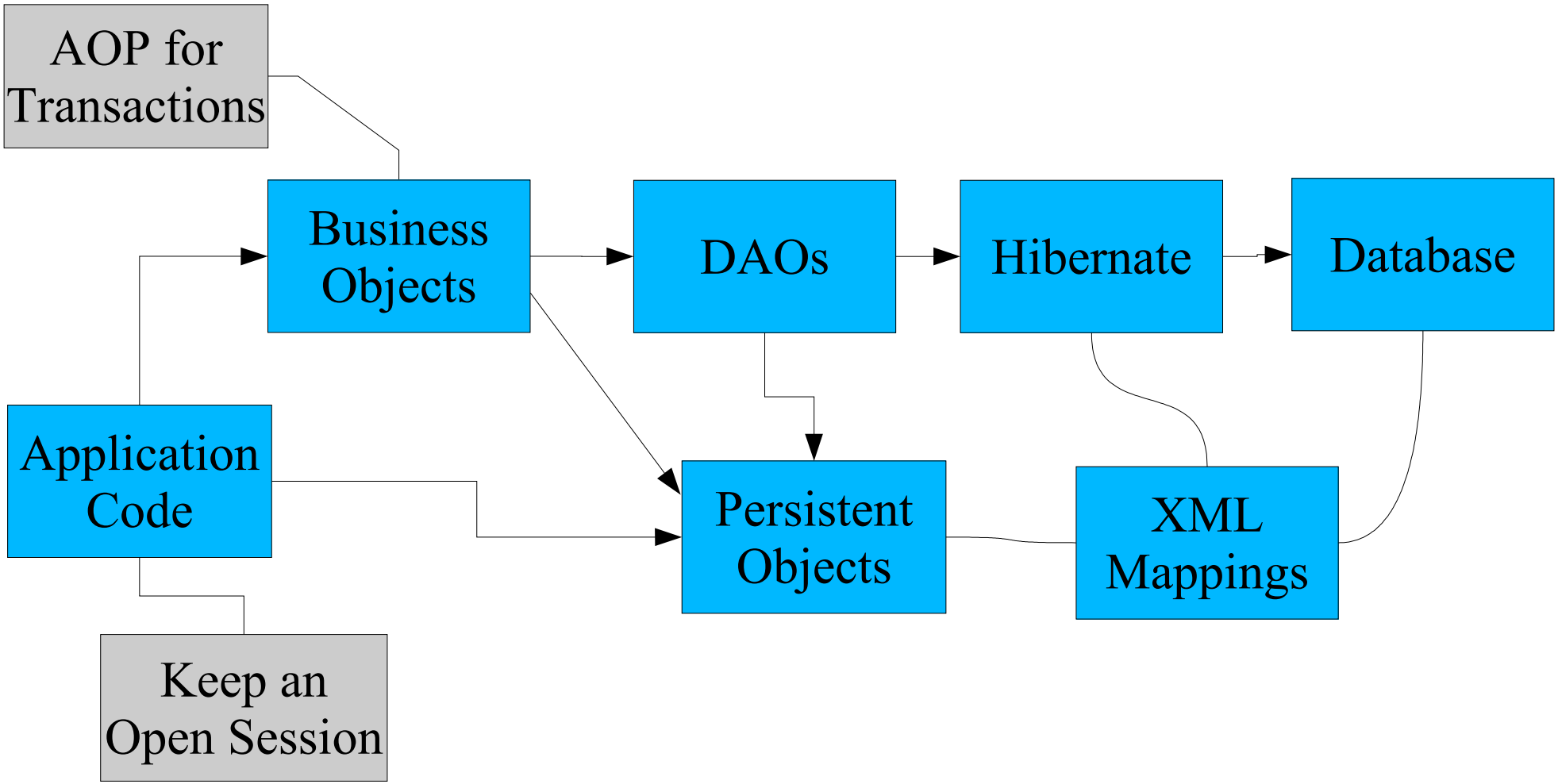
Business Objects

- A layer between your application code and the DAOs
  - Only allow business objects to hit the DAOs
  - Business objects and app code use persistent objects
- Provide a consistent place to use AOP
  - try/catch/finally for transactions
- Risk duplicating DAO code
  - Sometimes business object methods just delegate

Architecture Summary



Gotchas

- Must always have an open session
  - Seemingly innocent code like fetching a lazy collection bombs
  - Swing – open a session on event thread
  - Servlets – use a filter or Spring
- Hibernate tasks do not abort Ant
  - No failonerror attribute
  - Watch the build output carefully
- Test associations and collections heavily

When Not to Use Hibernate

- A horrible database design is forced on you
  - Many composite keys
- If your application is mostly mass operations
  - See pg. 181 “Hibernate in Action”
  - You might exhaust available heap space
- ??

10 Reasons to Love Hibernate

1. Dynamic UPDATE generation – figure out which columns changed
2. Trying new databases
3. Traversing associations
4. Optimistic Locking
5. ID generation
6. No more DTOs
7. Query result paging
8. Automatic dirty checking
9. Good price
10. Good documentation