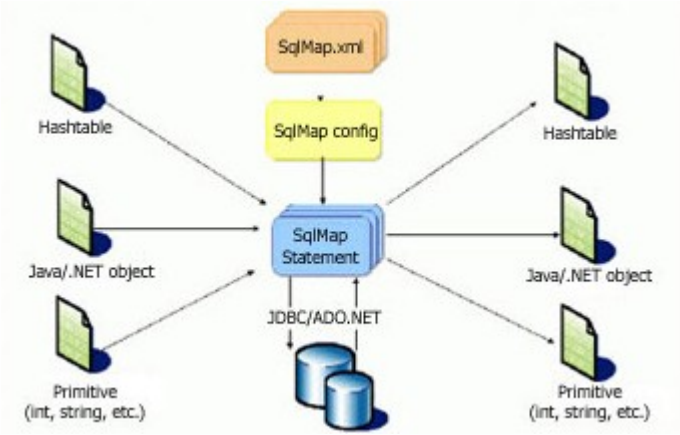
BATIS Data Mapper (a.k.a SQL Maps)

Roman „Dagi“ Pichlík (http://www.sweb.cz/pichlik)



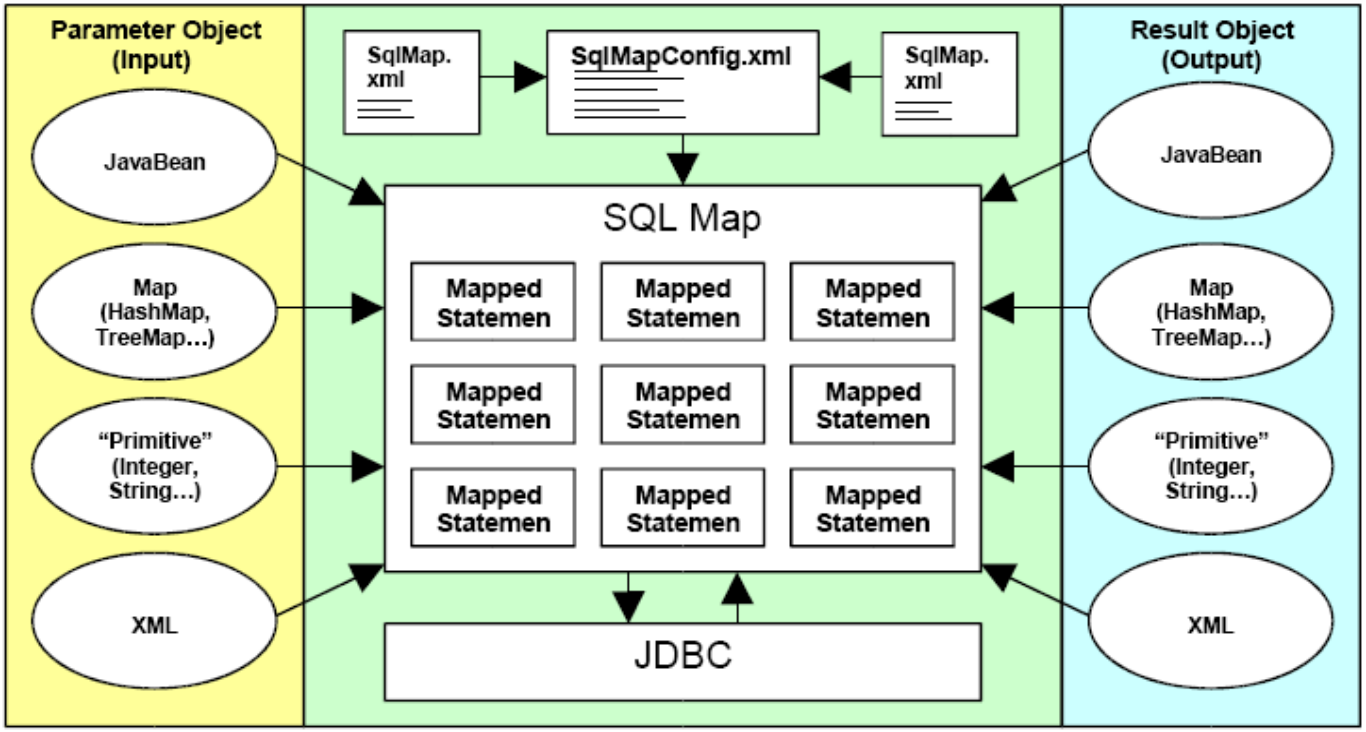
iBATIS targets

- provide a simple framework to provide 80% of JDBC functionality using only 20% of the code
- helps reduce the amount of Java/JDBC code that is needed to access relational database
- simply maps JavaBeans to SQL statements using a very simple XML descriptor
- easily maps JavaBeans objects to PreparedStatement parameters and ResultSets
- is not intended to replace Object-Relational Mapping (ORM) tools such as Hibernate, JDO

iBATIS features

- connection and transaction management
- converting SQL ResultSets into Java objects
- setting Java objects as query parameters
- configurable and flexible result caching
- result paging and lazy loading
- complex objects graph mapping (1:1, 1:N, M:N)
- lazy loading and N+1 problem solution
- dynamically construed SQL and SQL reuse

iBATIS concept overview

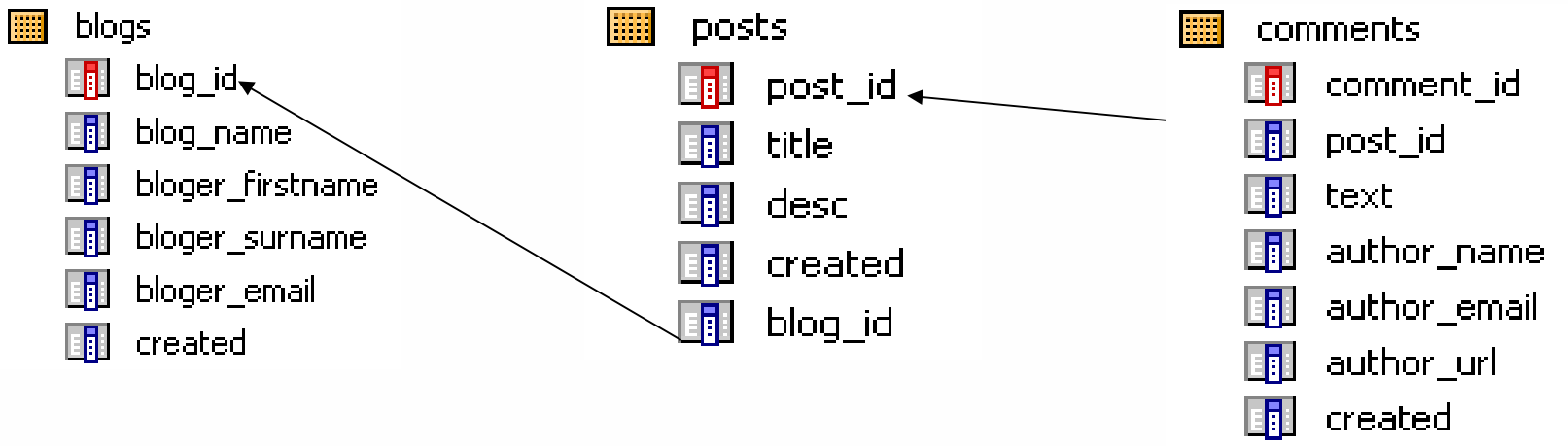


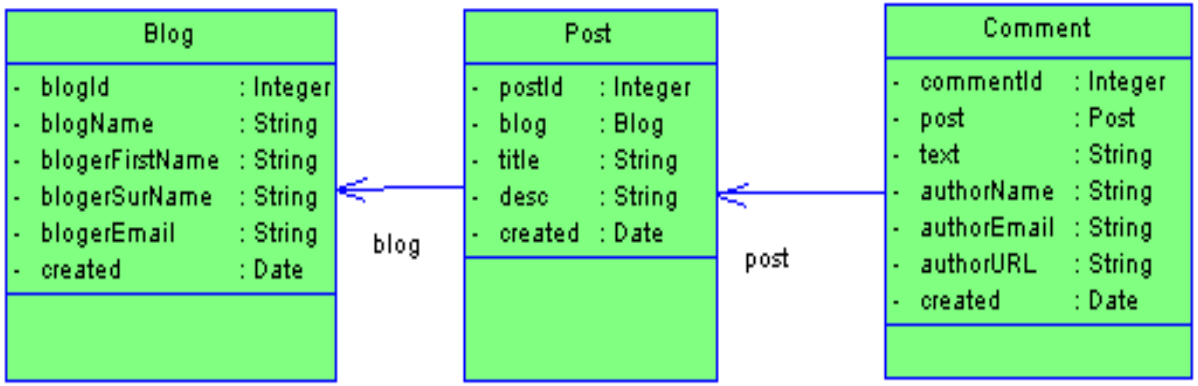
1.provide an object as a parameter

2.execute the mapped statement

3.single object, collection of objects or rows effected is returned.

Sample Weblog Application





SQL Maps config

```
<sqlMapConfig>

  <settings cacheModelsEnabled="true" enhancementEnabled="true" lazyLoadingEnabled="true" errorTracingEnabled="false"
maxRequests="32"   maxSessions="10"    maxTransactions="5"    useStatementNamespaces="true" />
        <transactionManager type="JDBC">
           <dataSource type="SIMPLE" >
                 <property name="JDBC.Driver" value="com.mysql.jdbc.Driver"/>
                 <property name="JDBC.ConnectionURL"
value="jdbc:mysql://dagi/dev?useUnicode=true&characterEncoding=UTF-8"/>
                 <property name="JDBC.Username" value="bloger"/>
                 <property name="JDBC.Password" value="changeit"/>
                 <property name="Pool.MaximumActiveConnections" value="10"/>
                 <property name="Pool.MaximumIdleConnections" value="5"/>
                 <property name="Pool.MaximumCheckoutTime" value="120000"/>
                 <property name="Pool.TimeToWait" value="500"/>
                 <property name="Pool.PingQuery" value="select now()"/>
                 <property name="Pool.PingEnabled" value="false"/>
                 <property name="Pool.PingConnectionsOlderThan" value="1"/>
                 <property name="Pool.PingConnectionsNotUsedFor" value="1"/>
                  <property name="Pool.QuietMode" value="false"/>
           </dataSource>
        </transactionManager>
  <sqlMap resource="cz/sweb/pichlik/ibatis/samples/Blog.xml"/>
  <sqlMap resource="cz/sweb/pichlik/ibatis/samples/Post.xml"/>
  <sqlMap resource="cz/sweb/pichlik/ibatis/samples/Comment.xml"/>

</sqlMapConfig>
```

Statements resources

Select statement definition and use

Statement definition

```
<sqlMap namespace="Blog">
  <typeAlias alias="blog" type="cz.sweb.pichlik.ibatis.samples.domain.Blog"/>
  <!-- Selects all blogs-->
  <select id="getAll" resultClass="blog">
    select
          blog_id as blogId,
          blog_name as blogName,
          bloger_firstname as blogerFirstName,
          bloger_surname as blogerSurName,
          bloger_email as blogerEmail,
          created
    from
         blogs
  </select>
 </sqlMap>
```

Statement use

```
Reader configReader = new InputStreamReader(this.class.getResourceAsStream("SqlMapConfig.xml"));

//SqlMapClientBuilder is used to read configuration settings
SqlMapClient sqlMapClient = SqlMapClientBuilder.buildSqlMapClient(configReader);

//SqlMapClient is thread safe client used for interacting with SQLMaps, it is also possible to use SqlMapSession per single thread
List<Blog> blogs = sqlMapClient.queryForList("Blog.getAll" , null);
```

Insert statement definition and use

```
<insert id="save" parameterClass="blog">
    insert into blogs
        (blog_id, blog_name, bloger_firstname, bloger_surname, bloger_email)
    values
        (#blogId#, #blogName#, #blogerFirstName#, #blogerSurName#, #blogerEmail#)
</insert>
```

```
public void addBlog(final Blog blog) throws SQLException {
    SqlMapSession session = null;
    try {
        session = sqlMapClient.openSession();
        //Demarcates the beginning of a transaction scope. Transactions must be properly committed
        //or rolled back to be effective.
        session.startTransaction();

        //Executes a mapped SQL INSERT statement.
        session.insert("Blog.save", blog);

        //Commits the currently started transaction.
        session.commitTransaction();
    } finally {
        //Ends a transaction and rolls back if necessary.  If the transaction has been started, but not committed, it will be
        // rolled back upon calling endTransaction().
        if(session != null){
            try{
                session.endTransaction();
            } finally {
                session.close();
            }
        }
    }
}
```

Note: Execution of update and delete statement is same, but session.update and session.delete are used instead of session.insert. It is also possible to call stored procedures.

Select statement result mapping

Directly mapped result approach

```
<select id="getAll" resultClass="blog">
    select
        blog_id as blogId,
        blog_name as blogName,
        bloger_firstname as blogerFirstName,
        bloger_surname as blogerSurName,
        bloger_email as blogerEmail,
        created ....
```

- **no way to specify the types of the output columns**
- **no way to automatically load related data (complex properties)**
- **slight performance consequence**

Select statement result mapping

ResultMap approach

```
<resultMap id="resultMapName" class="some.domain.Class" [extends="parent-resultMap"]>
      <result property="propertyName" column="COLUMN_NAME"
         [columnIndex="1"] [javaType="int"] [jdbcType="NUMERIC"]
         [nullValue="-999999"] [select="someOtherStatement"]
      />
       <result ……/>
       <result ……/>
       <result ……/>
</resultMap>
```

- **complex property mapping (1:1, 1: M, N:M)**
- **column and java type definition**
- **null value replacement**
- **resultMap reuse (extend)**

Select statement result mapping

- **result map for mapping returned columns to java bean properties**
- **result map can be used for any select statement**

```
<resultMap id="blog-result-mapping" class="blog">
            <result column="blog_id" property="blogId"/>
            <result column="blog_name" property="blogName"/>
            <result column="bloger_firstname" property="blogerFirstName"/>
            <result column="bloger_surname" property="blogerSurName"/>
            <result column="bloger_email" property="blogerEmail"/>
      <result column="created" property="created"/>
</resultMap>

<select id="findById" resultMap="blog-result-mapping">
   select  * from blogs where blog_id=#blogId#
</select>

<select id="findByName" resultMap="blog-result-mapping">
   select  * from blogs where blog_name=#blogName#
</select>
```

1:1 mapping (nested property)

```
<typeAlias alias="comment" type="cz.sweb.pichlik.ibatis.samples.domain.Comment"/>
<resultMap id="comment-result-mapping" class="comment">
        <result column="c.comment_id" property="commentId"/>
        <result column="c.text" property="text"/>
        <result column="c.author_name" property="authorName"/>
        <result column="c.author_email" property="authorEmail"/>
        <result column="c.author_url" property="authorURL"/>
        <result column="c.created" property="created"/>
        <result column="p.post_id" property="post.postId"/>
        <result column="p.title" property="post.title"/>
        <result column="p.desc" property="post.desc"/>
        <result column="p.created" property="post.created"/>
 </resultMap>

 <select id="getAllByPostId"  resultMap="comment-result-mapping">
   select
      c.*,
      p.*
   from
      posts p, comments c
   where
      p.post_id = #postId#    and c.post_id = p.post_id
 </select>
```

1:1 mapping (separate select)

```
<typeAlias alias="comment" type="cz.sweb.pichlik.ibatis.samples.domain.Comment"/>

<resultMap id="comment-result-mapping" class="comment">
        <result column="c.comment_id" property="commentId"/>
        <result column="c.text" property="text"/>
        <result column="c.author_name" property="authorName"/>
        <result column="c.author_email" property="authorEmail"/>
        <result column="c.author_url" property="authorURL"/>
        <result column="c.created" property="created"/>
        <result column="{postId=post_id}" property="post" select="Post.findByIdII"/>
</resultMap>


<select id="findByIdII" resultMap="generic-post-result-mapping">
    select
        p.*
    from
        blogs b,
        posts p
    where
        p.post_id=#postId#   and p.blog_id = b.blog_id
  </select>
```

1:M mapping

```
<sqlMap namespace="Post">
 <typeAlias alias="post" type="cz.sweb.pichlik.ibatis.samples.domain.Post"/>
 <resultMap id="post-result-mapping" class="post">
     <result column="p.post_id" pr`operty="postId"/>
     <result column="p.title" property="title"/>
     <result column="p.desc" property="desc"/>
     <result column="p.created" property="created"/>
     <result column="b.blog_id" property="blog.blogId"/>
      <result column="b.blog_name" property="blog.blogName"/>
      <result column="b.bloger_firstname" property="blog.blogerFirstName"/>
      <result column="b.bloger_surname" property="blog.blogerSurName"/>
      <result column="b.bloger_email" property="blog.blogerEmail"/>
     <result column="b.blog_created" property="blog.created"/>
     <result column="{postId=post_id}" property="comments" select="Comment.getAllByPostId" />
</resultMap>

<select id="getAllByBlogId" resultMap="post-result-bmapping">
    select …
</sqlMap>
<sqlMap namespace="Comment">
 <typeAlias alias="comment" type="cz.sweb.pichlik.ibatis.samples.domain.Comment"/>
 <select id="getAllByPostId"  resultMap="comment-result-mapping">
  select ...
```

```
public class Post implements Seria
    private Integer postId;
    private Blog blog;
    private String title;
    private String desc;
    private Date created;
    private List<Comment> comments
```

Result caching

- simply by specifying the cacheModel parameter
- Read only and Read/Write cache supported
- various type of cache implementation (LRU, Memory, FIFO, OSCache)
- parametrized flush behaviour (time, statement execution)

```
<cacheModel id="blog-cache" type ="LRU">
  ....
</cacheModel>

<select id="getAll" resultClass="blog" cacheModel="blog-cache">
 ....
</select>
```

Read Only Cache

- **returns identic instances of cached object**
- **shared per session (???)**
- **objects read from a read-only cache should not be modified**

```
<cacheModel id="blog-cache" type ="LRU" readOnly="true" serialize="false">
  <flushInterval hours="24"/>
  <flushOnExecute statement="Blog.save"/>
  <flushOnExecute statement="Blog.update"/>
  <flushOnExecute statement="Blog.delete"/>
  <property name="cache-size" value="1000" />
</cacheModel>

<!-- Selects all blogs-->
<select id="getAll" resultClass="blog" cacheModel="blog-cache">
      ...
```

Read/Write cache

- different instances (copies) of the cached object to each session
- every cached object must be serializable
- each session can safely modify returned instance

```
<cacheModel id="blog-cache-rw" type ="LRU" readOnly="false" serialize="true">
   <flushInterval hours="24"/>
   <flushOnExecute statement="Blog.save"/>
   <flushOnExecute statement="Blog.update"/>
   <flushOnExecute statement="Blog.delete"/>
   <property name="cache-size" value="1000" />
 </cacheModel>

 <!-- Selects all blogs-->
 <select id="getAll" resultClass="blog" cacheModel="blog-cache-rw">
       ...
```

Inline Parameter Maps

- **places the JavaBeans property names inline with the Mapped Statement**
- **any Mapped Statement that has no explicit parameterMap specified will be parsed for inline parameters**

```
<insert id="save" parameterClass="cz.sweb.pichlik.ibatis.samples.domain.Comment">
    insert into comments
        (comment_id, post_id, text, author_name, author_url, created)
    values
        (#commentId#, #post.postId#, #text#, #authorName#, #authorURL#, #created#)
 </insert>
```

Parameter Maps

- **mapping JavaBeans properties to the parameters of a statement**

```
<parameterMap id="parameterMapName" [class="com.domain.Product"]>
        <parameter property ="propertyName" [jdbcType="VARCHAR"] [javaType="string"]
                [nullValue="NUMERIC"] [null="-9999999"]/>
        <parameter …… />
        <parameter …… />
</parameterMap>


<parameterMap id="insert-product-param" class="com.domain.Product">
        <parameter property="description" />
        <parameter property="id"/>
</parameterMap>

<statement id="insertProduct" parameterMap="insert-product-param">
        insert into PRODUCT (PRD_DESCRIPTION, PRD_ID) values (?,?);
</statement>
```

Dynamic mapped statement and SQL fragment includes

```
<sql id="posts_sorting_fragment">
  <isPropertyAvailable prepend="order by" property="SORT">
                                        p.created DESC
  </isPropertyAvailable>
</sql>

<select id="onlyPosts" resultClass="java.util.HashMap">
   select
      p.*
   from
      posts p
   where
      p.blog_id = #blogId#
      <include refid="posts_sorting_fragment"/>
 </select>
```

SqlMapClient and SqlMapSession API

EXECUTE

delete(String id, Object parameterObject)
insert(String id, Object parameterObject)
update(String id, Object parameterObject)

SELECT

queryForList(String id, Object parameterObject)
queryForList(String id, Object parameterObject, int skip, int max)
queryForMap(String id, Object parameterObject, String keyProp)
queryForMap(String id, Object parameterObject, String keyProp, String valueProp)
queryForPaginatedList(String id, Object parameterObject, int pageSize)
queryWithRowHandler(String id, Object parameterObject, RowHandler rowHandler)
queryForObject(String id, Object parameterObject)
queryForObject(String id, Object parameterObject, Object resultObject

BATCH

startBatch ()
executeBatch()

Resources

- http://www.sweb.cz/pichlik/ibatis/bloger.zip - example application
- http://www.sweb.cz/pichlik/ibatis/presentation.pdf - this presentation
- http://ibatis.apache.org/ IBATIS homepage