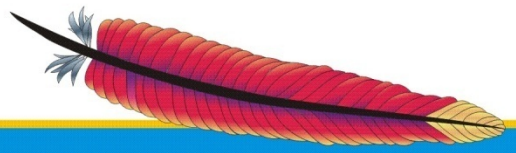
ApacheCon



Leading the Wave of Open Source

iBATIS

Apache iBatis

Getting Up to Speed

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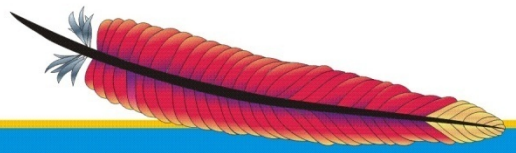
Day
Day Software

About Carsten Ziegeler

- Apache Software Foundation Member
  - Cocoon, Excalibur, Pluto, Felix, Incubator, Sling, Sanselan
  - PMC: Cocoon, Incubator, Portals, Felix, Excalibur (Chair)
- Senior Developer at Day Software
- Article/Book Author, Technical Reviewer
- JSR 286 spec group (Portlet API 2.0)

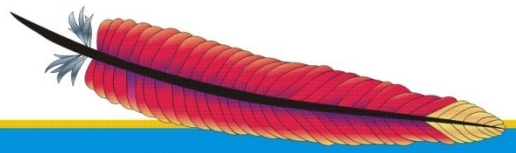
Apache iBatis

- **Quick Intro**
- Quick Start Guide
- The Data Mapping
- The Database Configuration
- Summary



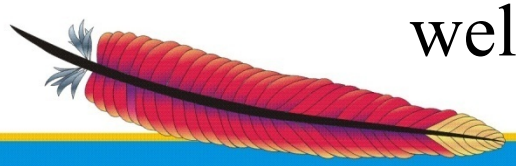
A Common Problem

- Reading from / writing to a database in Java
- Mapping of result sets to objects
- Mapping of objects to tables/columns
- Object Relational Mapping (ORM)



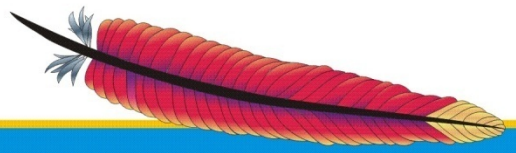
Why do I need iBatis?

- Several ORM solutions out there
  - Hibernate, Apache OpenJPA, Apache OJB
  - Very sophisticated, but "heavy" solutions
  - Usable for literally everything
  - Setting up, configuring, using takes time
- What about javax.sql/JDBC?
  - ….if you think that SQL and Java code mixes well



Why do I need iBatis?

- Apache iBatis fits in-between
  - Small library
  - Simple setup
  - Easy to use
  - Uses data maps



Use the Right Tool!

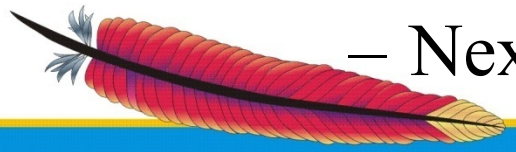
- Not every tool is suited for every use case!
  - Analyze requirements
  - Decide for the tool
  - Constantly check decision
- Apache iBatis is not suited for all ORM problems

Some Typical Scenarios for iBatis

- Reading dictionaries (like i18n translations)
- Performing complex and nested queries
  - Full SQL support
- Reading configuration
- Writing log statements
- Displaying query results

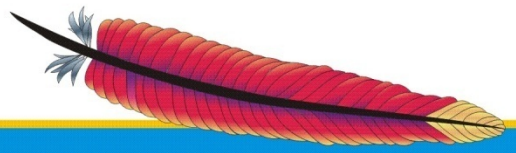
The Project

- Popular tool
  - Abstracting JDBC
  - Working at the SQL level
- Started by Clinton Begin
  - Part of Apache since 2005
  - Top level project
- Current version 2.x (> 3 years old)
  - Next major version in design discussions



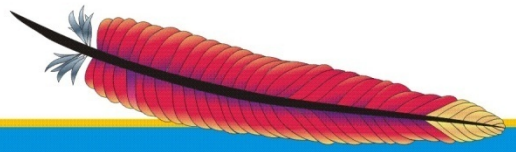
The Project

- Two frameworks
  - iBatis Data Mapper
  - iBatis Data Access Objects
- Implementations for different languages
  - Java, .Net, Ruby/Rails
- Focus on the Java Data Mapper



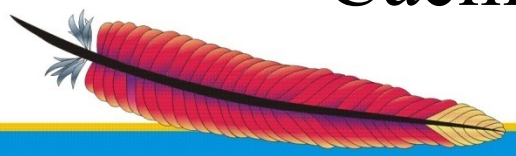
How Does it Work?

- SQL statements are defined in XML
- Statements can contain placeholders
- Placeholders are replaced on execution
- SQL query result is mapped to objects



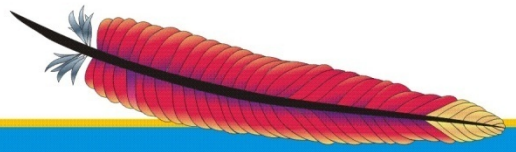
Some Advantages

- Retain the full power of SQL
  - Functions like avg, sum, count etc.
  - Mapping across tables
- Single point of configuration
- Short integration time
- Very good documentation
- Caching of query results



Caveats

- No transparent persistence
- No change detection
- Explicit mapping required
- No implicit operations (like cascaded updates, deletes etc.)

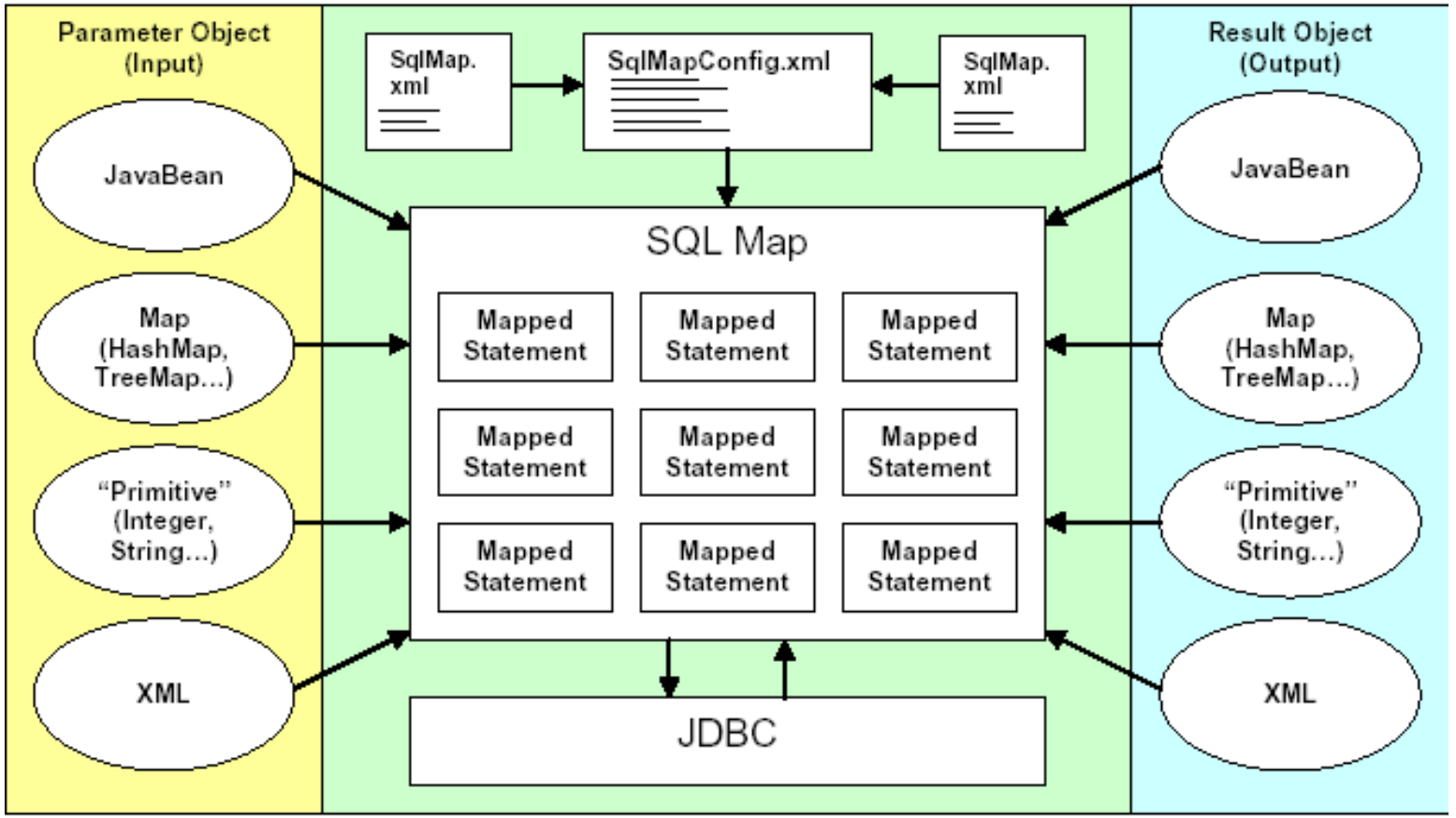


Installation

- Download and add to classpath
- Optional 3rd party jars for additional stuff
  - Refer to the documentation

File Name	*Description*	*Required*
ibatis-common.jar	iBATIS Common Utilities	YES
ibatis-sqlmap.jar	iBATIS Data Mapper Framework	YES
ibatis-dao.jar	iBATIS Data Access Framework	NO

Data Mapper Concept



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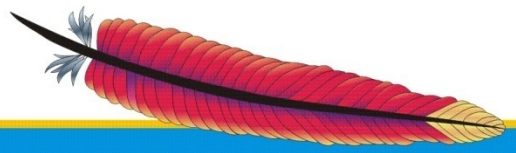
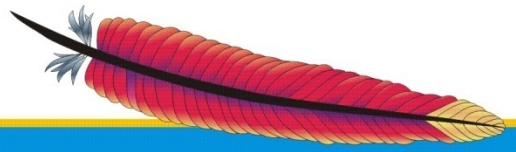


Four Basic Steps

1. Write Java beans (optional)
2. Create mapping configuration
3. Specify the SQL configuration
4. Write the app code executing the statements



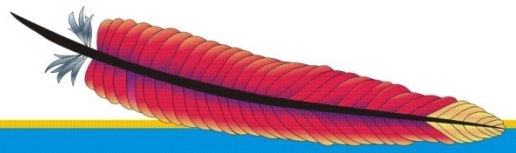
1. Write Java Beans (optional)

- Use primitive types for properties
- Alternative: maps

Person.java

```
public class Person {
   private long personId;
   private String name;
   private java.util.Date dateOfBirth;

   // getters and setters:
   ...
```

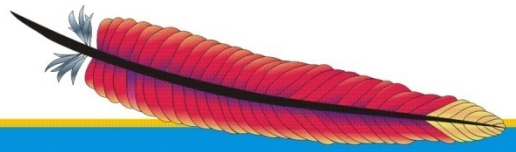


2. Create Mapping Configuration

Person.xml

```
<sqlMap namespace="Person">

  <select id="getPerson" resultClass="samples.Person"
          parameterClass="long">
     SELECT id                  as personId
     ,      p_name              as name
     ,      date_of_birth       as dateOfBirth
     FROM person_t pers
     WHERE pers.id = #value#
  </select>
</sqlMap>
```



3. Specify the SQL Configuration

sql-map-config.xml

```
<sqlMapConfig>

  <transactionManager type="JDBC">
    <dataSource type="SIMPLE">
      <property ...
      ...
    </dataSource>
  </transactionManager>

  <sqlMap resource="samples/maps/Person.xml"/>

</sqlMapConfig>
```

4. Write the App Code

DAO.java

```
public Person getPerson(long id) {
    Person p = null;
    try {
        // Configure iBatis
        Reader reader = Resources.getResourceAsReader
                    ("samples/sql-map-config.xml");
        SqlMapClient sqlMap =
                SqlMapClientBuilder.buildSqlMapClient(reader);

        // execute
        p = (Person)sqlMap.queryForObject("getPerson", id);
    } catch (Exception e) {
        // do something useful here
    }
    return p;
}
```

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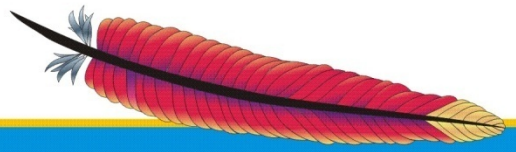
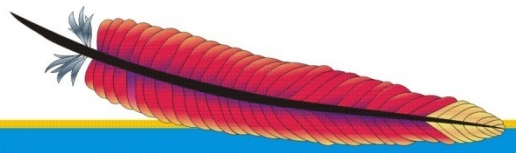


The Data Mapping

- Define mapping between Java objects and SQL
- XML configuration file(s)
- iBatis offers many possibilities/features
  - The following is just an overview
  - Check out the docs
  - (Often maps are sufficient)



Mapping Elements

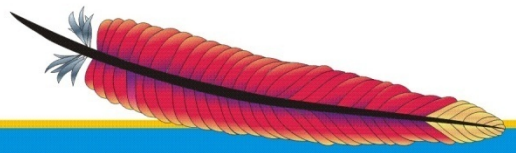
- Mapping Java beans to SQL statements
- More than one config file possible

```
<sqlMap>

  <typeAlias/> *
  <parameterMap/> *

  <resultMap/> *

  <statement/> *
  <select | insert | update | delete | procedure/> *
</sqlMap>
```

Data Mapper Concept

- Mapped statements
  - SQL
  - Parameter maps (input)
  - Result maps (output)

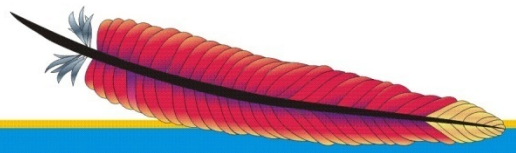
```
<select id="getAllUsers" resultMap="User">
    SELECT id, username, password, active
    FROM user_t
</select>
```



Querying the Database

- Unique identifier
- Result and parameter class
- SQL statements (it's XML!)

```
<select id="getOlderThan" resultClass="Person" parameterClass="date">
  <![CDATA[
    SELECT id as personID
           ,  ...
    FROM person_t pers
    WHERE date_of_birth > #value#
  ]]>
</select>
```



Parameters: Primitive Types

- Primitive types can directly be used for input
  - e.g. String, Integer, Date, etc.
  - #value# references the actual value

```
<statement id="getPerson" parameterClass="java.lang.Integer">
          SELECT * FROM product_t
  WHERE product_id = #value#
</statement>
```

```
sqlMapClient.queryForObject("getPerson", new Integer(1));
```

Parameters: Beans

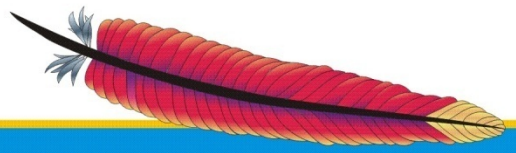
- Mapping description: bean -> input
  - Properties
  - Optional type definition: Java and JDBC
  - Optional null values
  - Optional type handler for conversion

```
<parameterMap id="parameterMapName" [class="someDomainClass"]>
   <parameter property="propertyName" [jdbcType="VARCHAR"]
       [javaType="string"] [nullValue="-1"]
       [typeHandler="someHandler"]/>
   <parameter .../>
</parameterMap>
```

Parameters: Beans

- Properties are applied in order of definition

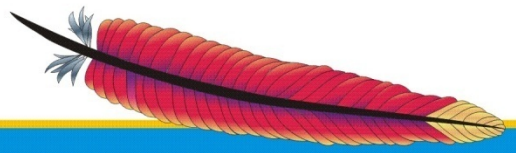
```
<parameterMap id="personMap"
              class="samples.Person">
   <parameter property="name"/>
   <parameter property="dateOfBirth"/>
   <parameter property="address"/>
</parameterMap>

<insert id="insertPerson" parameterMap="personMap">
   INSERT INTO person_t
   (name, date_of_birth, address)
   VALUES (?, ?, ?)
</insert>
```



Parameters: Inline Beans

- Less verbose form of parameter maps
  - Inline property names

```
<insert id="insertPerson" parameterMap="samples.Person">
   INSERT INTO person_t
   (name, date_of_birth, address)
   VALUES (#name#, #dateOfBirth#, #address#)
</insert>
```



Parameters: Inline Beans

- Support for types and null values

```
<insert id="insertPerson" parameterMap="samples.Person">
   INSERT INTO person_t
   (name, date_of_birth, address)
   VALUES (#name#, #dateOfBirth#, #address:VARCHAR:NO_ADDR#)
</insert>
```

Parameters: Maps

- Alternative to custom beans: maps
  - java.util.HashMap etc.
  - #key# references the value stored for *key*

```
<statement id="getAddresses" parameterClass="java.util.Map">
          SELECT * FROM addresses_t
          WHERE person_id = #personID#
          AND category_information = #category#
</statement>
```

```
params.put("personID", new Integer(1));
params.put("category", "Business");
sqlMapClient.queryForList("getAddresses", params);
```

Result Maps

- Mapping result sets to beans
  - Properties/columns
  - Optional type definition: Java and JDBC
  - Optional null values
  - Optional type handler for conversion

```
<resultMap id="resultMapName" class="someDomainClass"
           [extends="parent-resultMap"]>
  <result property="propertyName" column="COLUMN_NAME"
            [javaType="int"] [jdbcType="NUMERIC"]
            [nullVlaue="-1"]
[typeHandler="someHandler"]/>
  <result .../>
</resultMap>
```

Result Maps: Inline

- Direct mapping

```
<select id="getPerson" parameterClass="long"
                       resultClass="samples.Person">
  SELECT id AS personID
  , first_name AS firstName
  , email
  , ...
  FROM person_t pers
  WHERE pers.id = #value#
</select>
```

```
public class Person {
  private long personID;
  private String firstName;
  private String email;
  ...
```

Primitive Results

- Primitive types can directly be used
  - e.g. String, Integer, Date, etc.
  - Result map or inline

```
<resultMap id="get-result" resultClass="java.lang.Integer">
   <result property="value" column="NUMBER_OF_CUSTOMERS"/>
</resultMap>
```

```
<statement id="getPersonCount" resultClass="int"
   SELECT count(*) AS value
   FROM person_t
</statement>
```

Map Results

- Alternative to custom beans: maps
  - java.util.HashMap etc.

```
<resultMap id="result-map" resultClass="java.util.HashMap">
   <result property="id" column="ID"/>
   <result property="title" column="TITLE"/>
   <result property="speaker" column="SPEAKER_NAME"/>
</resultMap>

<select id="getAllSessions" resultMap="result-map">
 SELECT id, title, speaker_name
 FROM sessions_t
</select>
```

```
sqlmap.queryForList("getAllSessions")

{id=1, title=iBatis, speaker=Ziegeler}
{id=2, title=JCR, speaker=Ziegeler}
{id=3, title=Portals, speaker=Ziegeler}
```

Map Results Inline

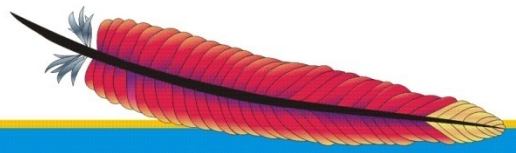
- Inline definition

```
<select id="getAllSessions" resultClass="java.util.HashMap">
 SELECT id, title, speaker_name   speaker
 FROM sessions_t
</select>
```

```
sqlmap.queryForList("getAllSessions")

{id=1, title=iBatis, speaker=Ziegeler}
{id=2, title=JCR, speaker=Ziegeler}
{id=3, title=Portals, speaker=Ziegeler}
```

Parameters and Results

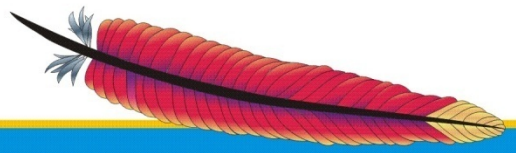
- Primitive types
- Maps
- Beans
- Inline or extra definition
- Quick Start: Maps + primitive types inline



Using the Data Mapper

- Lightweight API
  - Configuration
  - Executing Queries
  - Updating (inserts and deletes)

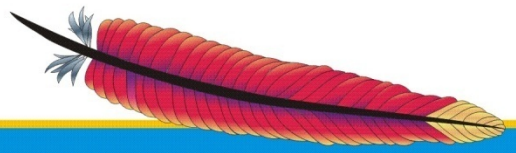
```
Reader reader = Resources.getResourceAsReader
                ("samples/sql-map-config.xml");

SqlMapClient sqlMap =
             SqlMapClientBuilder.buildSqlMapClient(reader);
```



Queries

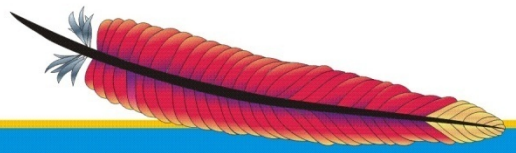
- Single objects: sqlMap.queryForObject()
- Lists: sqlMap.queryForList()
- Maps: sqlMap.queryForMap()
  - Key can be any mapped property
- Each query is run with:
  - Configured map identifier
  - Parameters (optional)

```
sqlmap.queryForList("getAllSessions")

{id=1, title=iBatis, speaker=Ziegeler}
{id=2, title=JCR, speaker=Ziegeler}
{id=3, title=Portals, speaker=Ziegeler}
```



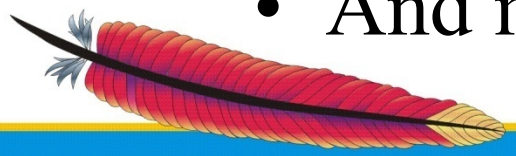
Updates, Inserts and Deletes

- sqlMap.update("updatePerson", person);
- sqlMap.insert("insertPerson", person);
- sqlMap.delete("deletePerson", 5);



Additional Features

- Mapping relationships
- Joins
- Lazy loading
- Transactions, Batches
- Stored Procedures
- Caching
- And more…



Fragments

- Define fragments for reuse
  - Avoid duplicate definitions

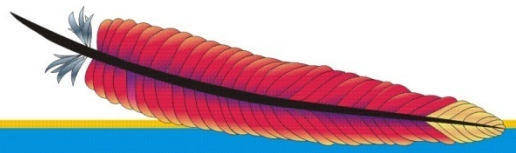
```
<sql id="base-select">
    SELECT id as personID
    ,      ...
    FROM person_t pers
</sql>

<select id="getPerson" resultClass="person" parameterClass="long">
  <include refid="base-select"/>
  WHERE pers.id = #value#
</select>
<select id="getPersons" resultClass="person">
  <include refid="base-select"/>
  ORDER BY date_of_birth   ASC
</select>
```

Dynamic SQL Statements

- Dynamic statements (if …)
- Using parameters:

```
<select id="findPersons" resultMap="person"
        parameterClass="java.util.Map">
  SELECT id, first_name, last_name FROM person_t pers
  WHERE category = #category#
  $whereclause$
  ORDER BY $orderlist$
</select>
```

```
Map paramMap = new HashMap();
paramMap.put("category", "Business"));
paramMap.put("whereclause", "and id > 10");
paramMap.put("orderlist", "date_of_birtsh DESC");

sqlmap.queryForList("findPersons", paramMap);
```



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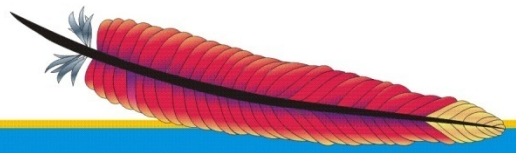


Data Base Configuration

- Central XML configuration
  - Properties
  - Data source

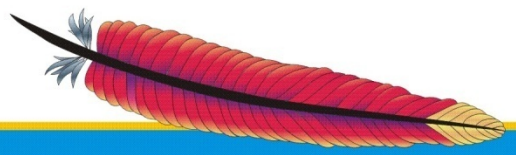
```
<sqlMapConfig>
  <properties/>
  <settings/>
  <typeAlias/> *

  <transactionManager>
     <dataSource/>
  </transactionManager>

  <sqlMap/> *
</sqlMapConfig>
```

Configuration Properties

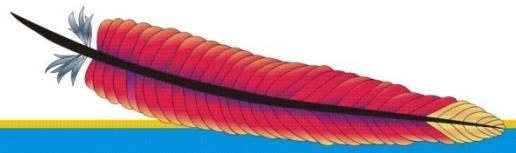
- Properties can be loaded from
  - The classpath: <properties resource=""/>
  - URL: <properties url=""/>
- Values can be referenced with Ant style syntax: ${key}



Transaction Manager

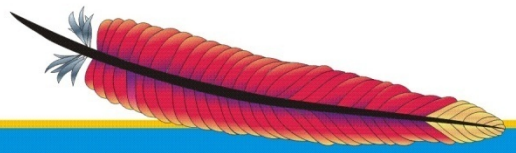
- Transaction manager
  - JDBC
  - JTA
  - EXTERNAL

```
<transactionManager type="JDBC">
     <dataSource …
```



Data Source

- Data source factory and properties
  - SIMPLE – based on iBATIS connection pooling implementation
  - DBCP – uses Jakarta DBCP
  - JNDI – retrieves data source from a JNDI context
  - Own factories possible



Data Source Sample

- Data source factory and properties

```
<dataSource type="SIMPLE">
  <property value="${driver}" name="JDBC.Driver" />
  <property value="${url}" name="JDBC.ConnectionURL" />
  <property value="${username}" name="JDBC.Username" />
  <property value="${password}" name="JDBC.Password" />
</dataSource>
```

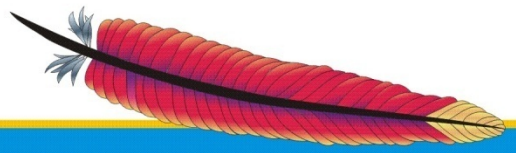
SQL Maps Configuration

- All SQL Map files must be referenced
  - Classpath
  - URL

```
<sqlMap resource="samples/Person.xml" />
<sqlMap url="file:///d:/ibatis/Person.xml" />
```

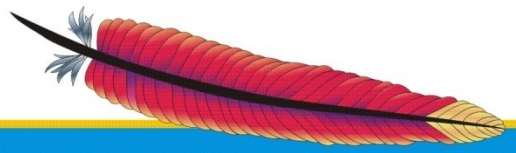
Apache iBatis

- Quick Intro
- Quick Start Guide
- The Data Mapping
- The Database Configuration
- **Summary**



Apache iBatis

- Easy and quick start
- Mapping Java beans to SQL at the SQL level
- XML configuration files for mapping and db config
- Very good documentation!
- Check it out!



ApacheCon

Thanks
Q&A

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