

iBatis for Chado

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ibatis and Abator

- **iBatis**

- **Light-weight framework**
- **Still based on SQL but eliminates the repetitive drudgery of JDBC**
- **Shallow learning curve**

- **Abator**

- **Generates ibatis CRUD objects by introspecting database tables**

Abator

```
<abatorConfiguration>
  <abatorContext>  <!-- TODO: Add Database Connection Information -->
    <jdbcConnection driverClass="COM.ibm.db2.jdbc.app.DB2Driver"
      connectionURL="jdbc:db2:XBDV05"
      userId="db2inst1"
      password="*****">
      <classpathEntry location="/Program Files/IBM/SQLLIB/java/db2java.zip" />
    </jdbcConnection>
```

```
  <javaModelGenerator
    targetPackage="org.gmod.architecture.framework.bakeoff.abator.model"
    targetProject="gene" />
  <sqlMapGenerator
    targetPackage="org.gmod.architecture.framework.bakeoff.abator.sql"
    targetProject="gene" />
  <daoGenerator type="IBATIS"
    targetPackage="org.gmod.architecture.framework.bakeoff.abator.dao"
    targetProject="gene" />
</abatorConfiguration>
```

Abator

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      targetPackage="org.gmod.architecture.framework.bakeoff.abator.dao"  
      targetProject="gene" />  
</abatorConfiguration>
```

Abator

```
<table schema="db2inst1" tableName="synonym">
```

```
<generatedKey column="synonym_id" sqlStatement="VALUES PREVVAL FOR  
synonym_seq" identity="true" />
```

```
<columnOverride column="CREATED_BY" jdbcType="INTEGER" />
```

```
<columnOverride column="MODIFIED_BY" jdbcType="INTEGER" />
```

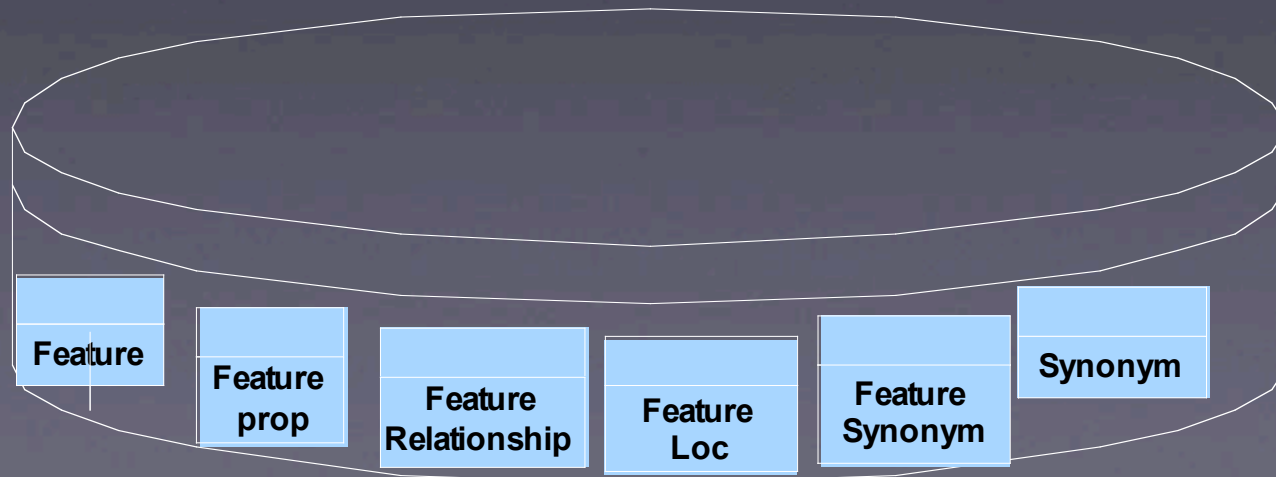
```
</table>
```

Abator

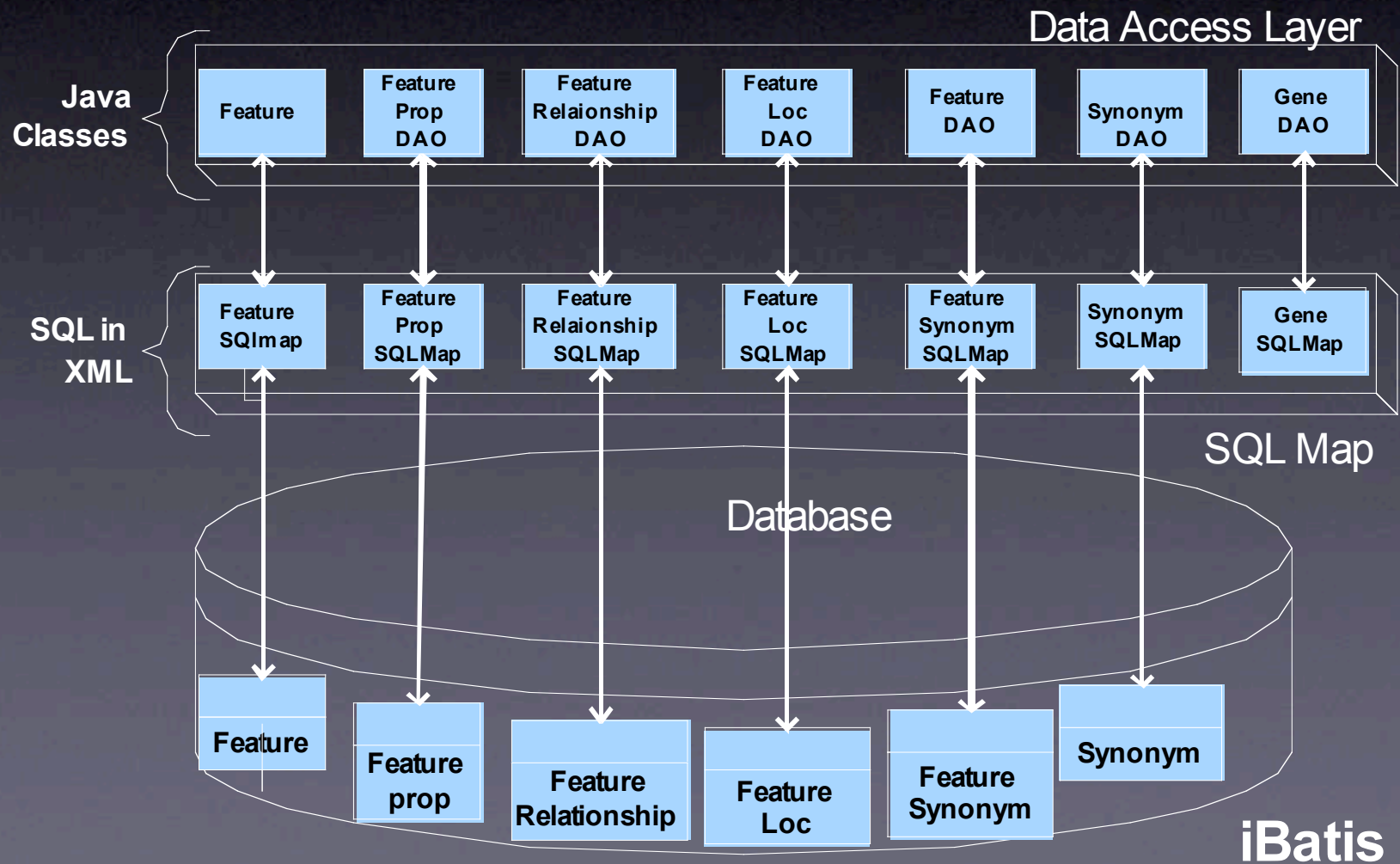
Works as

- Eclipse plug-in
- ANT
- Standalone

Architecture



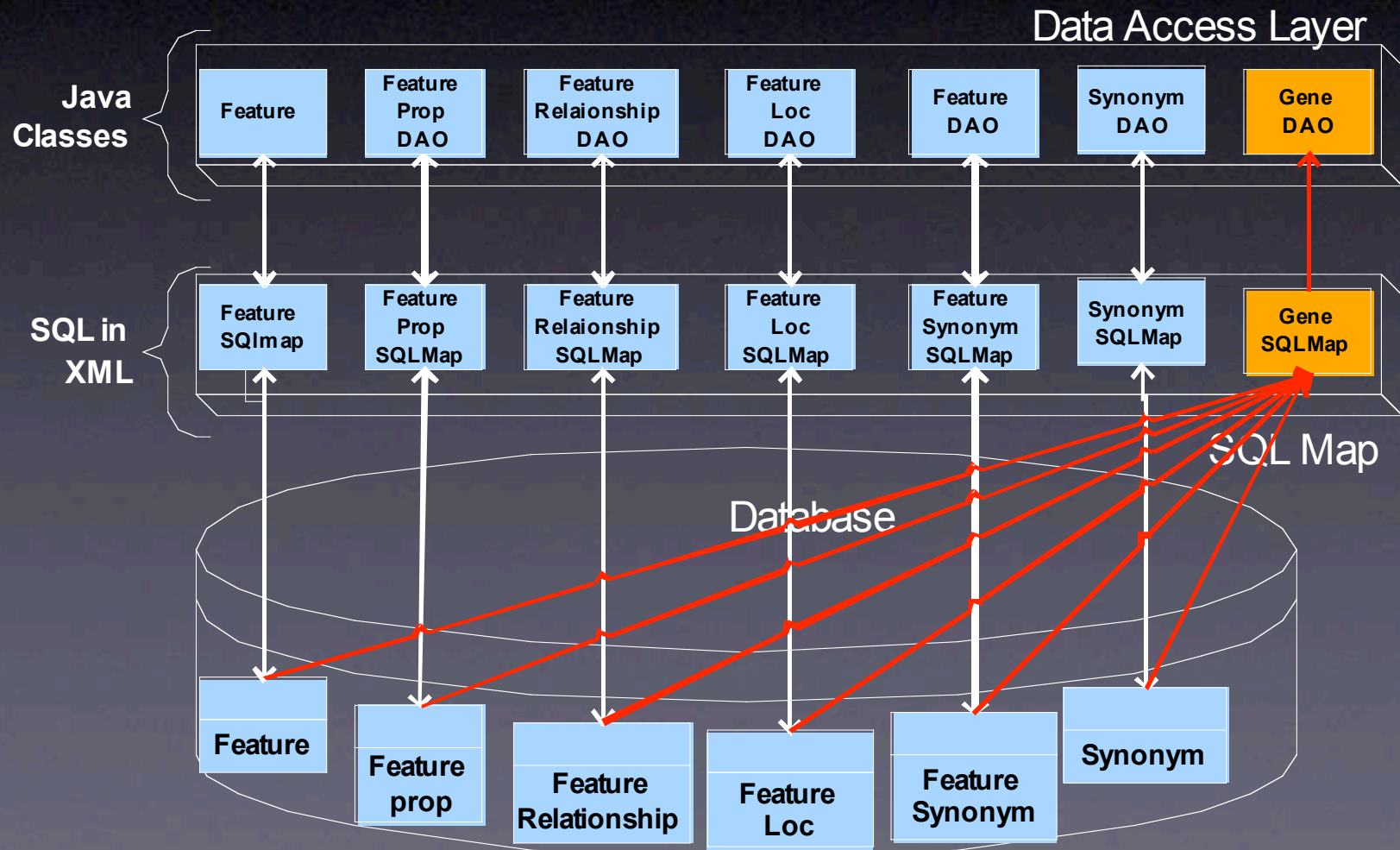
Architecture



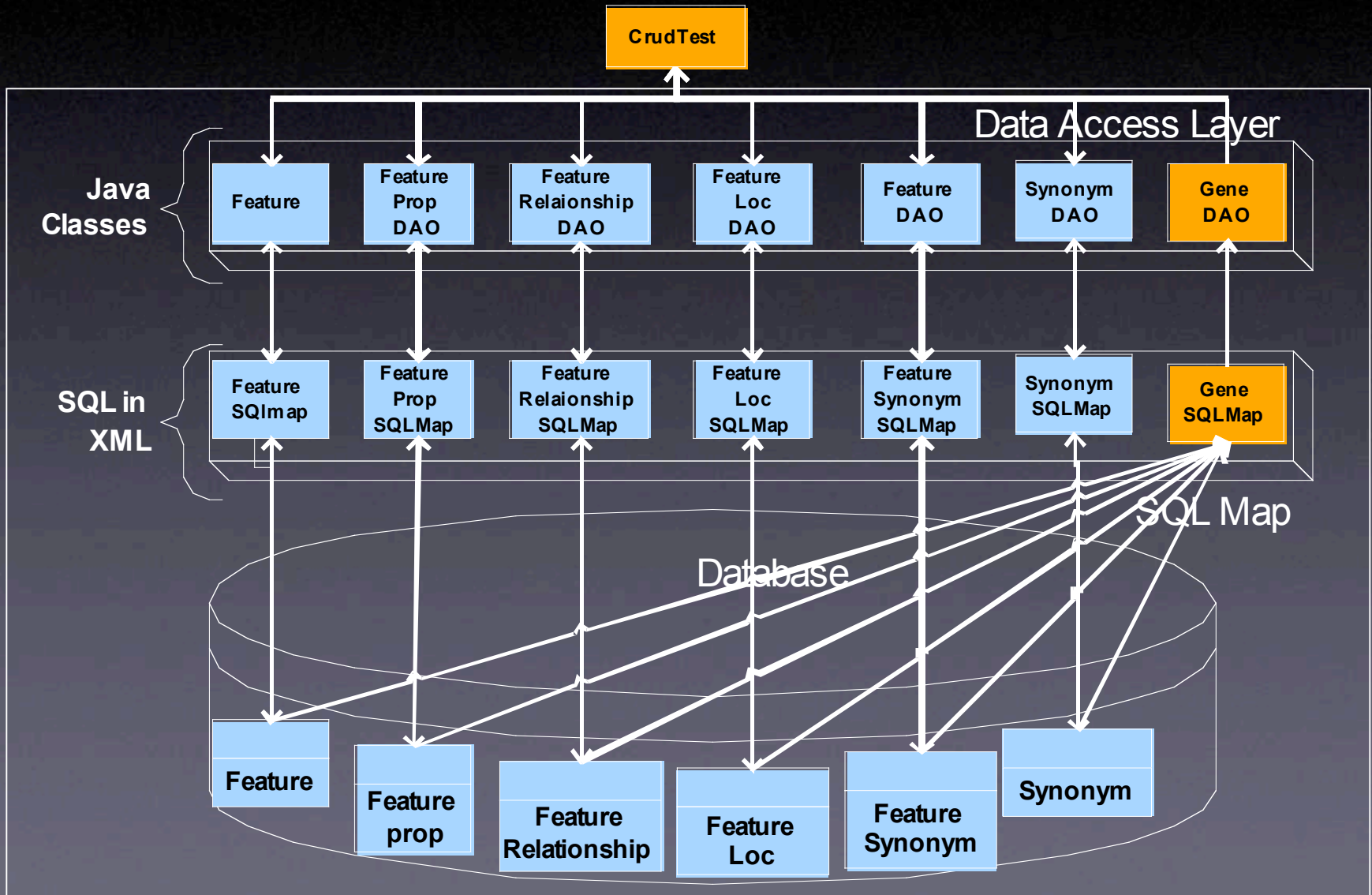
DAO Methods

- **Insert (Feature)**
- **Update (Feature)**
- **DeletebyKey (FeatureKey)**
- **SelectbyKey (FeatureKey)**
- **SelectbyExample (FeatureExample)**
- **DeletebyExample (FeatureExample)**

Architecture



Architecture



Insert

```
<insert id="abatorgenerated insert" parameterClass=
"org.gmod.architecture.framework.bakeoff.abator.model.FeatureWithBLOBs">
  insert into db2inst1.feature
    (DBXREF_ID, ORGANISM_ID, NAME, UNIQUENAME,
     RESIDUES, SEQLEN, MD5CHECKSUM, TYPE_ID, IS_ANALYSIS,
     IS_OBSOLETE, CREATED_BY)
  values (#dbxrefId:INTEGER#, #organismId:INTEGER#, #name:VARCHAR#,
         #uniquename:VARCHAR#, #residues:CLOB#, #seqlen:INTEGER#,
         #md5checksum:CHAR#, #typeId:INTEGER#,
         #isAnalysis:SMALLINT#, #isObsolete:SMALLINT#,
         #createdBy:INTEGER#)

  <selectKey resultClass="java.lang.Integer" keyProperty="featureId">
    VALUES PREVVAL FOR feature_seq
  </selectKey>
</insert>
```

Insert

```
<insert id="abatorgenerated_insert" parameterClass=
  "org.gmod.architecture.framework.bakeoff.abator.model.FeatureWithBLOBs">
  insert into db2inst1.feature
    (DBXREF_ID, ORGANISM_ID, NAME, UNIQUENAME,
     RESIDUES, SEQLEN, MD5CHECKSUM, TYPE_ID, IS_ANALYSIS,
     IS_OBSOLETE, CREATED_BY)
  values (#dbxrefId:INTEGER#, #organismId:INTEGER#, #name:VARCHAR#,
         #uniquename:VARCHAR#, #residues:CLOB#, #seqlen:INTEGER#,
         #md5checksum:CHAR#, #typeId:INTEGER#,
         #isAnalysis:SMALLINT#, #isObsolete:SMALLINT#,
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         #isAnalysis:SMALLINT#, #isObsolete:SMALLINT#,
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    VALUES PREVVAL FOR feature_seq
  </selectKey>
</insert>
```

Insert

```
<selectKey resultClass="java.lang.Integer"  
           keyProperty="featureId">  
    VALUES PREVVAL FOR feature_seq  
</selectKey>
```

Insert

```
<selectKey resultClass="java.lang.Integer"  
           keyProperty="featureId">  
    VALUES PREVVAL FOR feature_seq  
</selectKey>
```


Insert

```
try {
    sqlMap.startTransaction();
    pGene.id = featureDAO.insert(pGene.getFeatureWithBLOBs());
    featurepropDAO.insert(pGene.getPropertyDescription());
    pGene.featurelocId = featurelocDAO.insert(pGene
                                              .getFeaturelocWithBLOBs());
    pGene = insertExons(pGene);
    insertSynonyms(pGene);
    sqlMap.commitTransaction();
} catch (Exception e) {
    System.out.println(e);
    throw (e);
} finally {
    sqlMap.endTransaction();
}
```

Insert

```
try {  
    sqlMap.startTransaction();  
    pGene.id = featureDAO.insert(pGene.getFeatureWithBLOBs());  
    featurepropDAO.insert(pGene.getPropertyDescription());  
    pGene.featurelocId = featurelocDAO.insert(pGene  
                                                .getFeaturelocWithBLOBs());  
    pGene = insertExons(pGene);  
    insertSynonyms(pGene);  
    sqlMap.commitTransaction();  
} catch (Exception e) {  
    System.out.println(e);  
    throw (e);  
} finally {  
    sqlMap.endTransaction();  
}
```


Transactions

- **SQLMap**
- **JDBC**
- **JTA - Java Transaction API**
 - **2-Phase commit**
- **Hibernate**
- **External (Customized)**

Retrieval

symbol: xfile

**description: A test gene for GMOD meeting
mRNA Feature**



exon_1: start: 13691 end: 13767
strand: 1
srcFeature_id: Id of genomic sample

exon_2: start: 14687 end: 14720
strand: 1
srcFeature_id: Id of genomic sample

•Master Detail Report


Master Detail Reports

```
<resultMap id="SelectGeneResults"
  class="org.gmod.architecture.framework.bakeoff.Gene" groupBy="id">
  <result column="FEATURE_ID" property="id" jdbcType="INTEGER"/>
  <result column="GENE_NAME" property="name" jdbcType="VARCHAR" />
  <result column="DESCRIPTION" property="description"
  jdbcType="VARCHAR" />
  <result column="TYPE_ID" property="typeId" jdbcType="INTEGER" />
  <result property="exons" resultMap = "gene.SelectExonResults"/>
</resultMap>
```

```
<resultMap id="SelectExonResults"
  class="org.gmod.architecture.framework.bakeoff.Exon">
  <result column="EXON_ID" property="id" jdbcType="INTEGER"/>
  <result column="EXON_NAME" property="name" jdbcType="VARCHAR" />
  <result column="EXON_RESIDUES" property="residues" jdbcType="CLOB" />
  <result column="STRAND" property="strand" jdbcType="INTEGER" />
  <result column="FMIN" property="fmin" jdbcType="INTEGER" />
  <result column="FMAX" property="fmax" jdbcType="INTEGER" />
  <result column="SRCFEATURE_ID" property="sourceFeatureId"
  jdbcType="INTEGER" />
</resultMap>
```

Master Detail Report

```
<resultMap id="SelectGeneResults"
  class="org.gmod.architecture.framework.bakeoff.Gene" groupBy="id">
  <result column="FEATURE_ID" property="id" jdbcType="INTEGER"/>
  <result column="GENE_NAME" property="name" jdbcType="VARCHAR" />
  <result column="DESCRIPTION" property="description"
  jdbcType="VARCHAR" />
  <result column="TYPE_ID" property="typeId" jdbcType="INTEGER" />
  <result property="exons" resultMap = "gene.SelectExonResults"/>
</resultMap>
```



```
<resultMap id="SelectExonResults"
  class="org.gmod.architecture.framework.bakeoff.Exon">
  <result column="EXON_ID" property="id" jdbcType="INTEGER"/>
  <result column="EXON_NAME" property="name" jdbcType="VARCHAR" />
  <result column="EXON_RESIDUES" property="residues" jdbcType="CLOB" />
  <result column="STRAND" property="strand" jdbcType="INTEGER" />
  <result column="FMIN" property="fmin" jdbcType="INTEGER" />
  <result column="FMAX" property="fmax" jdbcType="INTEGER" />
  <result column="SRCFEATURE_ID" property="sourceFeatureId"
  jdbcType="INTEGER" />
</resultMap>
```

Master Detail Report

| <u>gene_id</u> | <u>Symbol</u> | <u>Type</u> | <u>Fmin</u> | <u>Fmax</u> |
|----------------|---------------|-------------|-------------|-------------|
| 6129482 | x-files | gene | 13691 | 13767 |
| 6129482 | x-files | gene | 14687 | 14720 |



| <u>gene_id</u> | <u>Symbol</u> | <u>Type</u> | <u>Fmin</u> | <u>Fmax</u> |
|----------------|---------------|-------------|-------------|-------------|
| 6129482 | x-files | gene | 13691 | 13767 |
| | | | 14687 | 14720 |

Dynamic Queries

The screenshot shows a Mozilla Firefox browser window titled "Search Gene - Mozilla Firefox". The address bar contains the URL "http://xlaevis.cpsc.ucalgary.ca/gene/gene.do". The browser's menu bar includes "File", "Edit", "View", "Go", "Bookmarks", "Tools", and "Help". The address bar also shows navigation icons and a "Go" button. Below the address bar, there are several bookmarks: "Xenbase", "Wiki", "NCBI", "XDB3", "DB2 Universal Database", "Bugzilla Main Page", "GP Mockup", and "Iamgold strikes US\$3 ...".

The main content area features the "Xenbase [Beta]" logo on the left and a "My Xenbase" box with "[Login]" and "[Register]" links on the right. A navigation menu below the logo includes "Blast Frogs", "Genes", "Genomics", "Anatomy & Development", "Literature", "Community", and "Education & Research".

The search interface is prominently displayed. It has a "Search" label, a dropdown menu set to "Genes", and a "For" dropdown menu. A search input field is present, followed by a "Search" button. To the right of the search bar is a "Report Bug:" link with a gear icon.

Below the search bar, the "Search Genes" section is visible. It includes a "Search for:" label, a dropdown menu currently showing "Search All", and a search input field with a "Search" button. A "Suggest:" button is located to the left of the dropdown menu. The dropdown menu is open, showing the following options: "Search All", "Gene Symbol including synonyms and orthologs", "Gene Symbol including synonyms", "Gene Symbol", and "Gene Name".

At the bottom of the page, there are links for "Contact Us", "Need Help?", and "About Xenbase". The copyright notice "©Xenbase 2005-2006" is centered at the bottom. The browser's status bar at the very bottom shows "Done".

Dynamic Queries

- **Gene Name (Description)**
 - Feature, Featureprop
- **Symbol**
 - Feature
- **Feature Synonyms**
 - Feature, Feature_Synonym, Synonym
- **Ortholog Synonyms**
 - Feature, Feature_relationship, Feature, Feature Synonyms

Dynamic Queries

FROM

CAT_X_GENE_V gc

<isEqual

prepend=" ,property="searchSymbol"
compareValue="true">

GENE_SYMBOLS s

</isEqual>

<isEqual prepend=" ,"
property="searchNcbi"
compareValue="true">

NCBI_GI n

</isEqual>

Dynamic Queries

```
<dynamic prepend="WHERE">  
<isEqual prepend="AND" property="searchNameOnly"  
    compareValue="true">  
    <iterate property="searchTokens" conjunction="AND"  
        open=" (" close=") ">  
        LOWER (VARCHAR (gc.longname) ) LIKE  
        LOWER (CAST (#searchTokens [] :VARCHAR# AS VARCHAR (512) ) )  
    </iterate>  
</isEqual>
```

Iterate very useful for multiple search terms

Miscellaneous Features

- **Supports various data sources**
 - Simple JDBC
 - DBCP – Apache Connection Pooling
 - JNDI – Java Naming Directory Interface
- **Very flexible**
- **Local caching of results**
 - Lazy loading

Support

- **In GMOD used by**
 - Xenbase, Artemis at Sanger
- **Many other users:**
 - e.g. MySpace.com
- **Top level Apache Project**
 - www.ibatis.apache.org
- **Active community**

iBatis Cons

- **Does not hide SQL**
- **Does not create a whole object model of the db in memory**
- **Not as widely used as Hibernate**
- **No Perl version**

iBatis Pros

- **Does not hide SQL**
 - No new query language to learn
- **Separates and groups SQL**
- **Simple !!**
 - Light wrapper - No real tweaks
- **Does the job well**
- **Excellent support for Master Detail and Dynamic queries.**

Thanks

- **GMOD**
 - Eric Just
 - Everyone else
- **Ibatis**
- **Developers**
 - Kevin Snyder,
 - Chris Jarabek,
 - Ross Gibb
- **PI**
 - Peter Vize
- **Financial Support**
 - Alberta Heritage Foundation for Medical Research
 - Alberta Network for Proteomics Innovation
 - University of Calgary, Faculty of Science
 - University of Calgary Dept. of Computer Science
 - NICHD