SQLTags Framework

JSP Development
using the SQLTags Framework
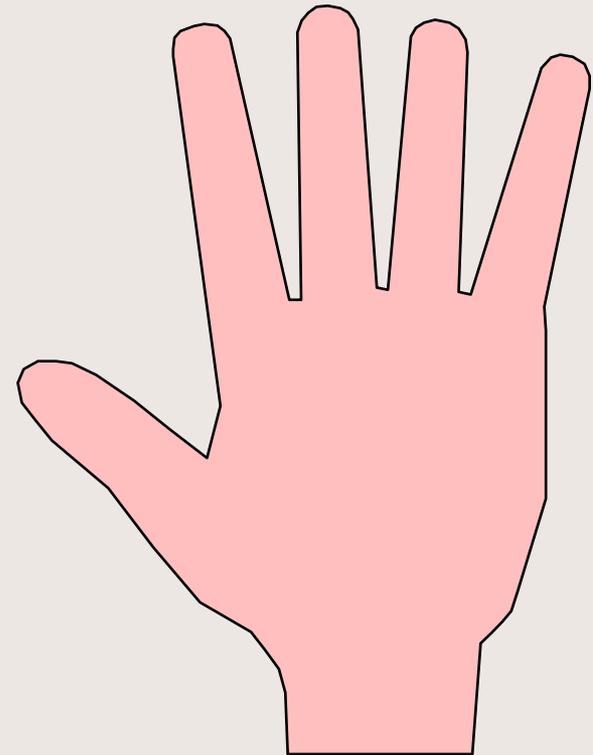
Introduction- AIT

- Applied Information Technologies, Inc.

  Oracle on the Web since 1995

- Web/Database Integration

  – Presented SQLweb at 1995 MAOP Meeting

- Focused on Java and JSP Development and Oracle DBA Services

AIT APPLIED INFORMATION TECHNOLOGIES, INC

SQLTags Framework

Introduction- Audience

- Who are You?

- Experience Level?
  - Oracle/JDBC (DBA)
  - Java/JSP (Developers)
  - HTML/Graphics? (UI)

SQLTags Framework

Introduction- Presenter

- Why are we here?

- Presentation Goals To Share:
  - Experience,
  - Insights, and
  - Practices

- Get Feedback from Peers

SQLTags Framework

Introduction- Skill Sets

- Web/Database Integration Requires the Following Skill Sets:
  - HTML/Graphic Designers/User Interface
  - Database Administrators/Database Designers
  - Developers/Programmers
- Each "Skill Set" Requires Dedication; thus
- Each "Skill Set" Requires Different People

SQLTags Framework

Introduction- Skill Sets
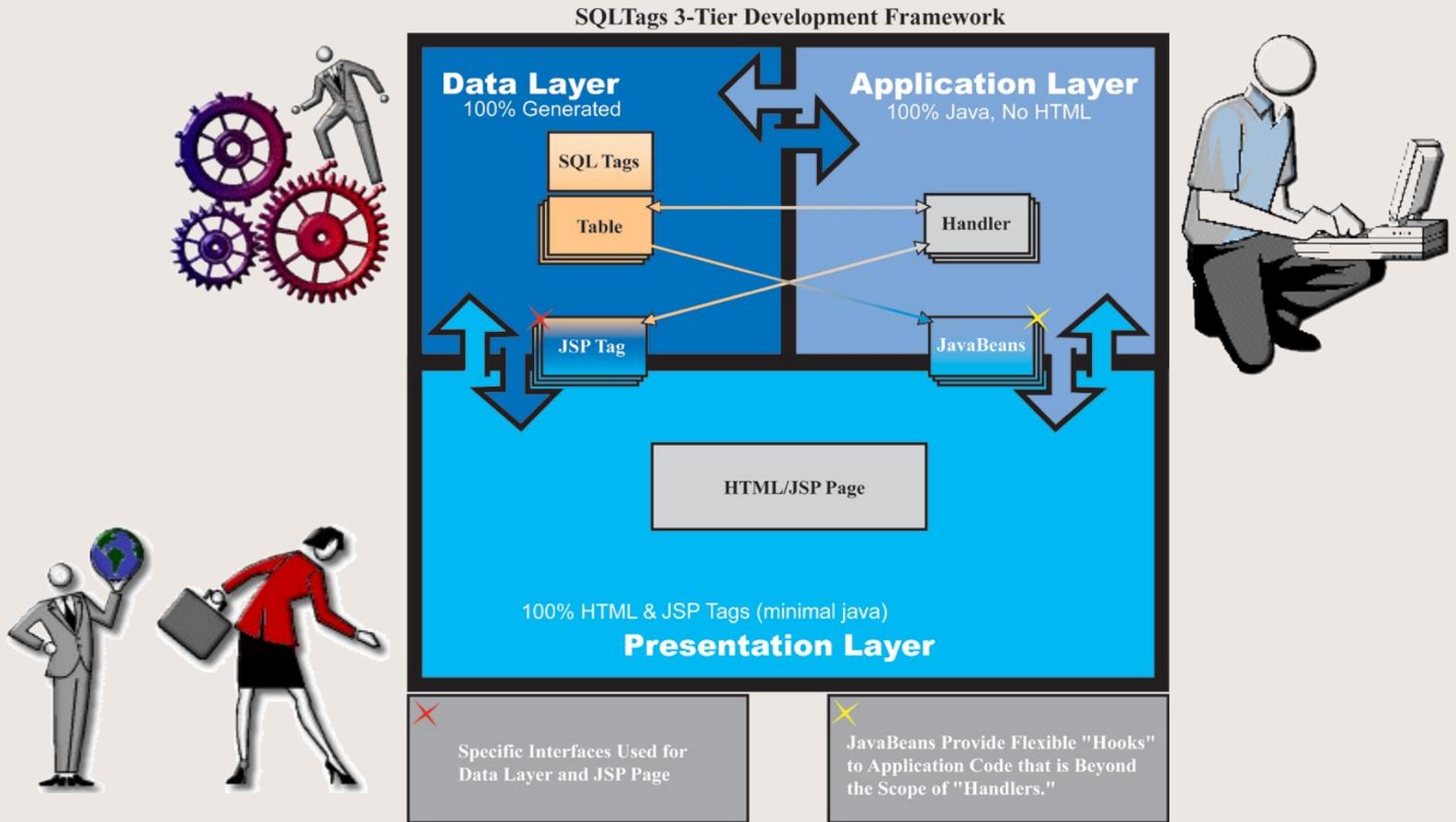
- HTML/Graphic Designers

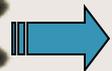- Database Administrators/ Database Designers

- Programmers
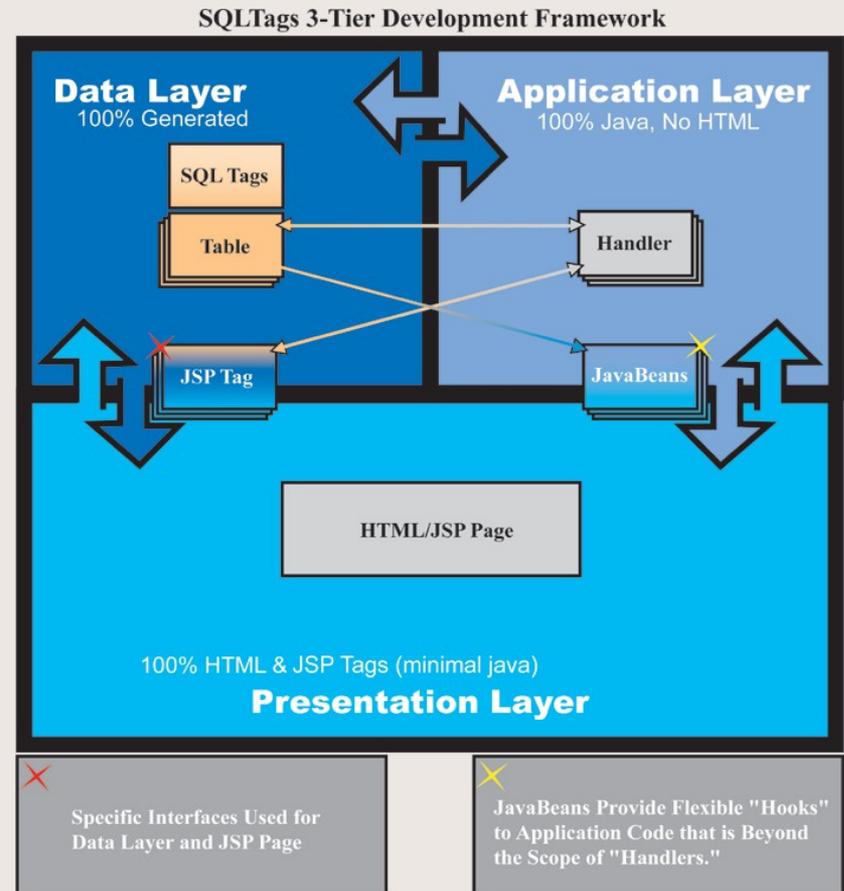
SQLTags Framework

Introduction- Teamwork

SQLTags Framework
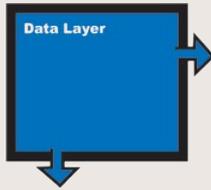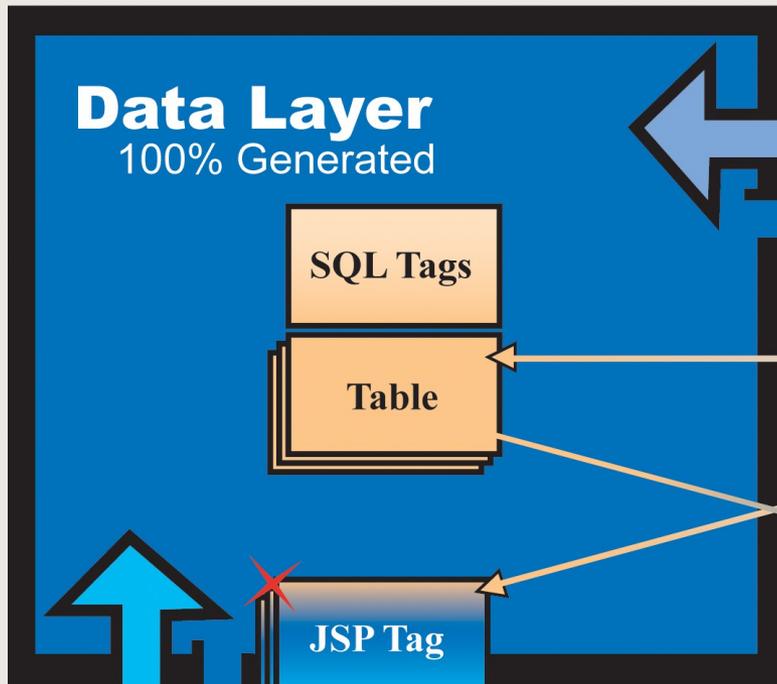
SQLTags Framework

- Data Layer
  - SQLTags Classes
  - 100% Generated
- Application Layer
  - SQLTagsHandler
  - JavaBeans
- Presentation Layer
  - HTML
  - SQLTags JSP TAGS

SQLTags 3-Tier Development Framework

Data Layer
100% Generated

Application Layer
100% Java, No HTML

SQL Tags

Table

Handler

JSP Tag

JavaBeans

HTML/JSP Page

100% HTML & JSP Tags (minimal java)
Presentation Layer

✕ Specific Interfaces Used for Data Layer and JSP Page

✕ JavaBeans Provide Flexible "Hooks" to Application Code that is Beyond the Scope of "Handlers."
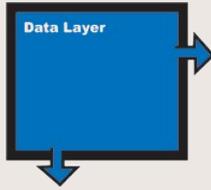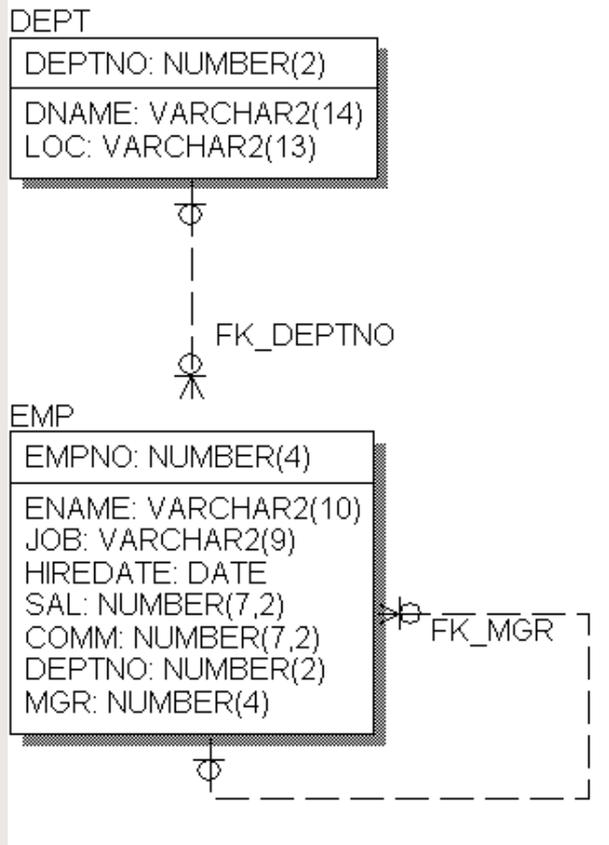
SQLTags Framework

Data Layer

- DBAs maintain Database Schema and Generated Classes

- Based on Entity-Relationship Diagram ("ERD")

- Database Tables, Indexes, and Other Objects
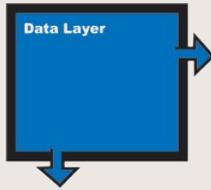
- Generated Java Classes

SQLTags Framework

Data Layer

DEPT
- DEPTNO: NUMBER(2)
- DNAME: VARCHAR2(14)
- LOC: VARCHAR2(13)

FK_DEPTNO

EMP
- EMPNO: NUMBER(4)
- ENAME: VARCHAR2(10)
- JOB: VARCHAR2(9)
- HIREDATE: DATE
- SAL: NUMBER(7,2)
- COMM: NUMBER(7,2)
- DEPTNO: NUMBER(2)
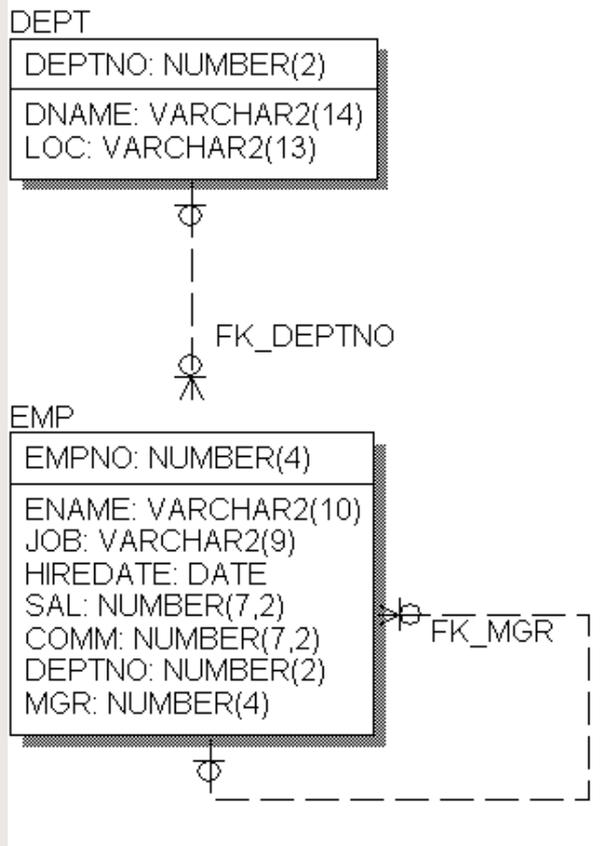- MGR: NUMBER(4)
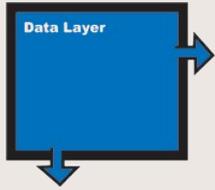
FK_MGR

- **ERD Describes**
  1. Database
     - Tables
       - DEPT, EMP
     - Foreign Keys
       - FK_DEPTNO
       - FK_MGR
     - Indexes and Other …
  2. Java Classes
     - DEPT.class, DEPT_TAG.class
     - EMP.class, EMP_TAG.class

SQLTags Framework

Data Layer


```
DEPT
DEPTNO: NUMBER(2)
DNAME: VARCHAR2(14)
LOC: VARCHAR2(13)
```

FK_DEPTNO

```
EMP
EMPNO: NUMBER(4)
ENAME: VARCHAR2(10)
JOB: VARCHAR2(9)
HIREDATE: DATE
SAL: NUMBER(7,2)
COMM: NUMBER(7,2)
DEPTNO: NUMBER(2)
MGR: NUMBER(4)
```

FK_MGR

- Java Classes
  - Follows "JavaBean" conventions
  - Available to JSP Page
    - as JavaBeans
    - and as TAGS
  - Provides Accessors and Mutators for:
    - Columns
    - Foreign Keys

SQLTags Framework

Data Layer

DEPT.java

```
// Accessors
String getDEPTNO()
String getDNAME()
String getLOC()

// Mutators
void setDEPTNO(String s)
void setDNAME(String s)
void setLOC(String s)

// FK PARENT Accessors
// FK CHILDREN Accessors
EMP getFK_DEPTNO_CHILDREN()
…
boolean insert()
boolean update()
boolean delete()
boolean select()
boolean fetch()
```
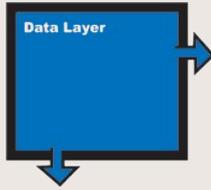
- DEPT Class Example
  - Accessors & Mutators
    - Columns
    - Foreign Keys, too!
  - DML Operations
    - Insert
    - Update
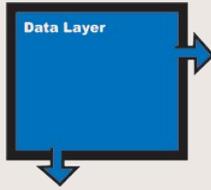   - Delete
  - More …

SQLTags Framework

Data Layer

EMP.java

```
// Accessors
String getEMPNO()
String getENAME()
String getJOB()
String getHIREDATE()
…
// Mutators
void setEMPNO(String s)
void setENAME(String s)
void setJOB(String s)
Void setHIREDATE(String s)
…
// FK PARENT Accessors
DEPT getFK_DEPTNO_PARENT()
EMP  getFK_MGR_PARENT()
// FK CHILDREN Accessors
EMP  getFK_MGR_CHILDREN()
…
```

- EMP Class Example
  - Accessors & Mutators
    - Columns
    - Foreign Keys, too!
  - DML Operations
    - Insert
    - Update
    - Delete
  - More …

SQLTags Framework

Data Layer

```
Example.jsp

<html>
…
<sqltags:dept
    id="d"
    operation="Insert"
    DEPTNO="10"
    DNAME="ACCOUNTING"
    LOC="NEW YORK"
    />
…
</html>
```

```
Example2.jsp

<html>
…
<sqltags:dept
    id="d2"
    properties="true"
    operation="Insert"
    />
…
</html>
```
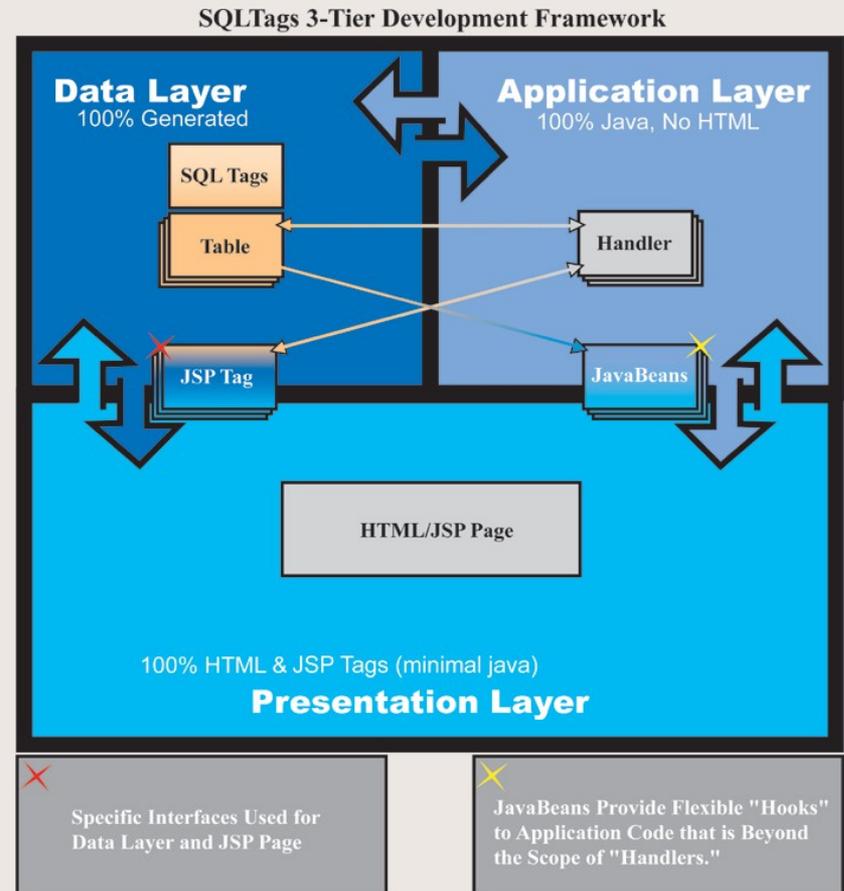
- SQLTags TAGS

- Each Table Becomes a JSP TAG

- Attributes for Each Column

- Integration with JSP "Request" object

- Class is Exposed via Scrptlet Variable

- Much, Much, More …

SQLTags Framework

SQLTags Framework

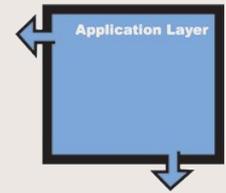- Data Layer
  - SQLTags Classes
  - 100% Generated
- Application Layer
  - SQLTagsHandler
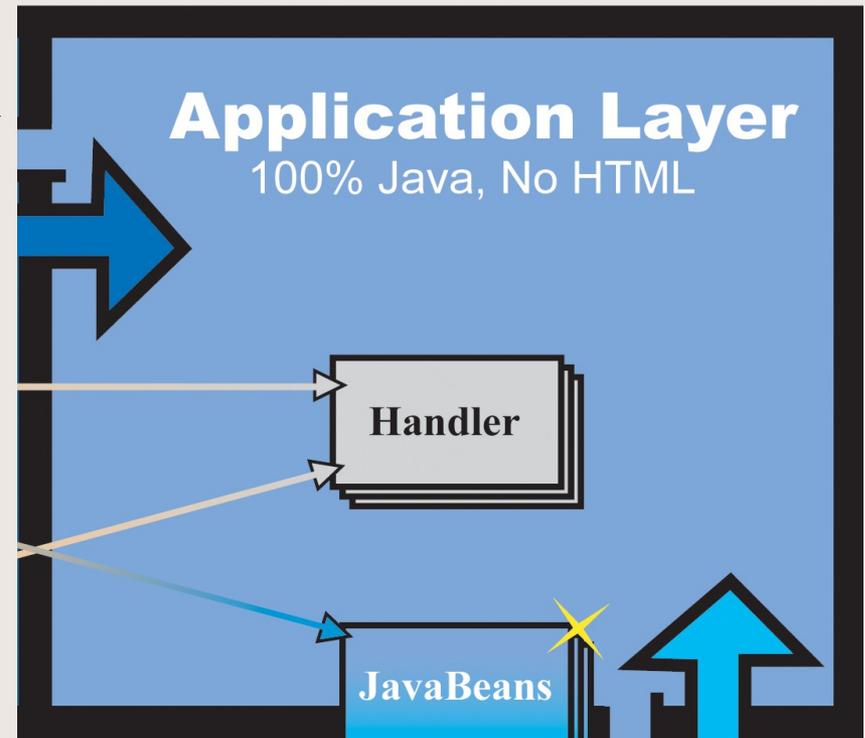 - JavaBeans
- Presentation Layer
  - HTML
  - SQLTags JSP TAGS

SQLTags 3-Tier Development Framework

Data Layer — 100% Generated

Application Layer — 100% Java, No HTML

SQL Tags

Table

Handler

JSP Tag

JavaBeans

HTML/JSP Page

100% HTML & JSP Tags (minimal java)

Presentation Layer

× Specific Interfaces Used for Data Layer and JSP Page

× JavaBeans Provide Flexible "Hooks" to Application Code that is Beyond the Scope of "Handlers."

SQLTags Framework
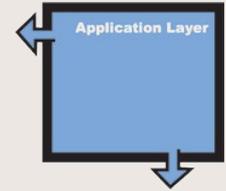
Application Layer

- Java Developers maintain
- SQLTagsHandlers "handle"
  - Database Events
  - JSP Page Events
- JavaBeans
  - Generalized Functions
- Other JSP Tags
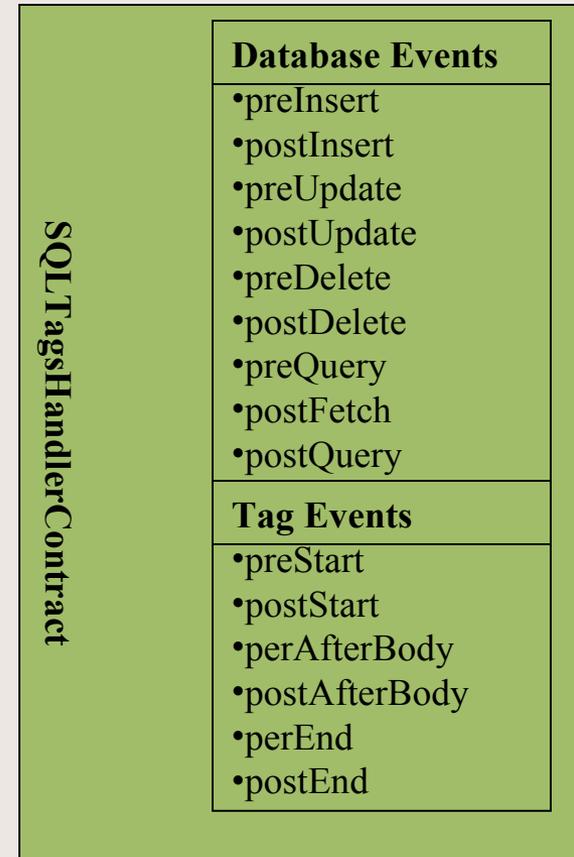 - More Generalized Functions abstracted into JSP tags

Application Layer
100% Java, No HTML

Handler

JavaBeans

SQLTags Framework
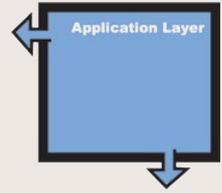
Application Layer

Application Layer

- SQLTagsHandlerContract
  - Programmers Build Java Classes that "Implement" SQLTagsHandlerContract
  - Defines specific "Triggers" where Application Specific code is called
  - Provides a Structure for **Integration with** Generated Code and JSP
  - Provides a Structure for **Separation from** Generated Code and JSP

SQLTagsHandlerContract

Database Events
•preInsert
•postInsert
•preUpdate
•postUpdate
•preDelete
•postDelete
•preQuery
•postFetch
•postQuery

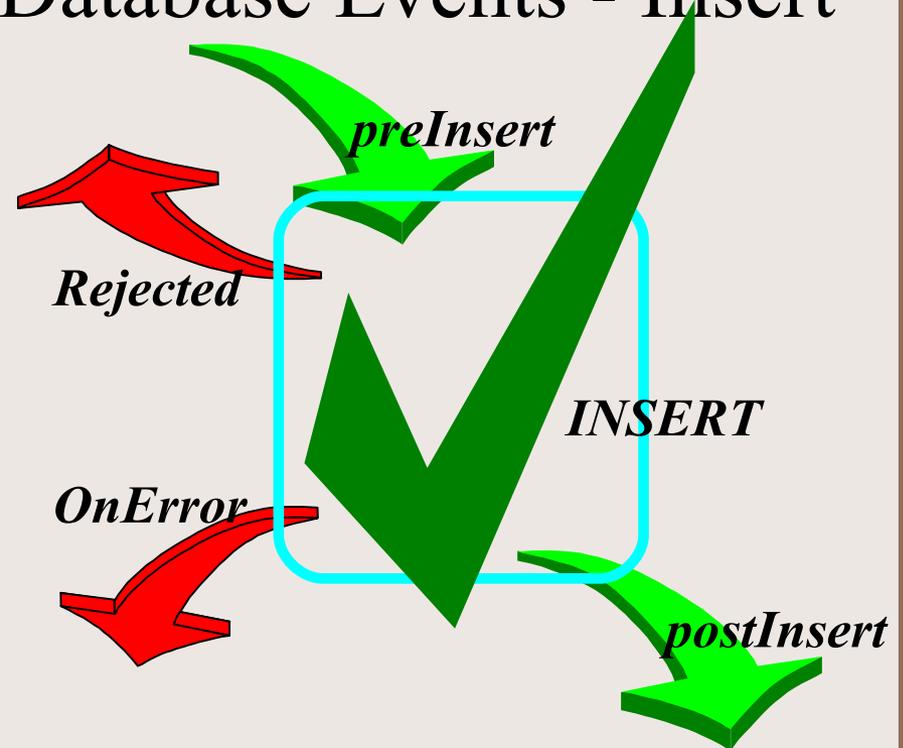| Tag Events |
|---|
| •preStart |
| •postStart |
| •perAfterBody |
| •postAfterBody |
| •perEnd |
| •postEnd |

SQLTags Framework

Application Layer

- Database Events
  - DML Events
    - Pre and Post Events for Operation;
      - preInsert, postInsert
  - Ditto Update, Delete
  - onError
    - Informs "Handler" of Database Errors
  - Provides: Validation, Logging, Error Checking, Auditing, …
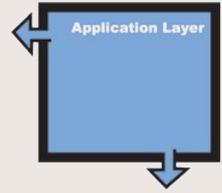
Database Events - Insert

preInsert

Rejected

INSERT

OnError
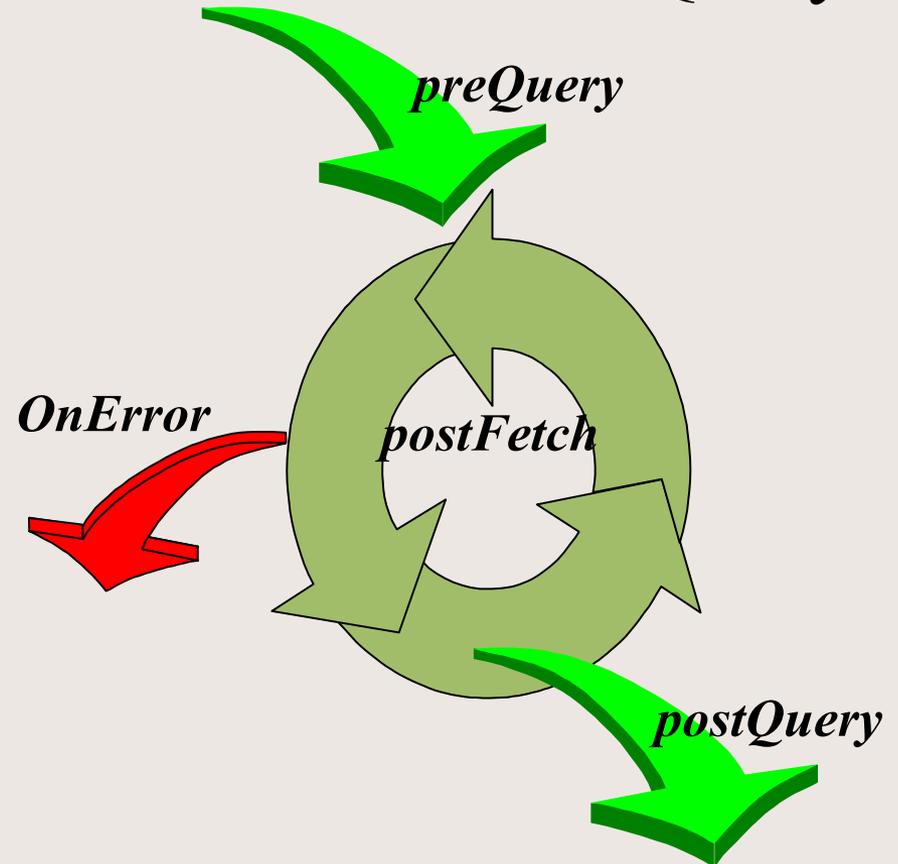
postInsert

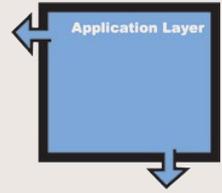SQLTags Framework

Application Layer

Database Events- Query

- Query Events
  - preQuery,
  - postFetch,
  - postQuery

  - onError
    - Informs "Handler" of Database Errors

- Follows "Cursor" Life-Cycle

preQuery

OnError

postFetch
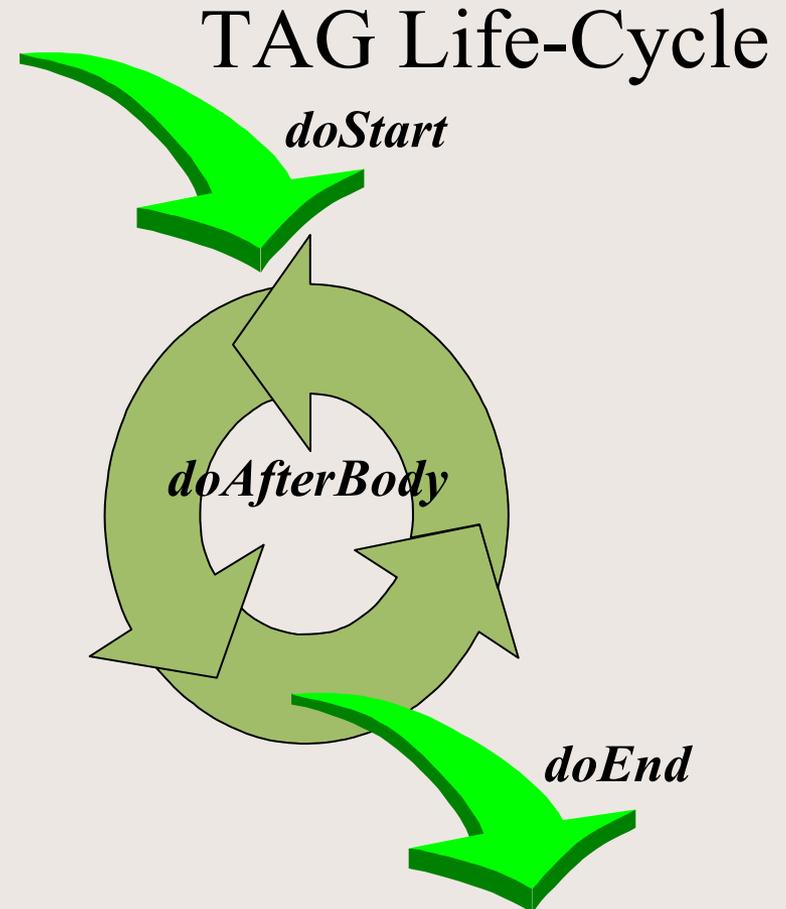
postQuery

SQLTags Framework

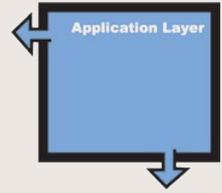# Application Layer

- TAG Events
    - preStart, postStart
    - preAfterBody, postAfterBody
    - preEnd. postEnd

- Follows TAG Life-Cycle

- Provides Mechanism for Limited Customization of TAG Behavior

TAG Life-Cycle

doStart

doAfterBody

doEnd
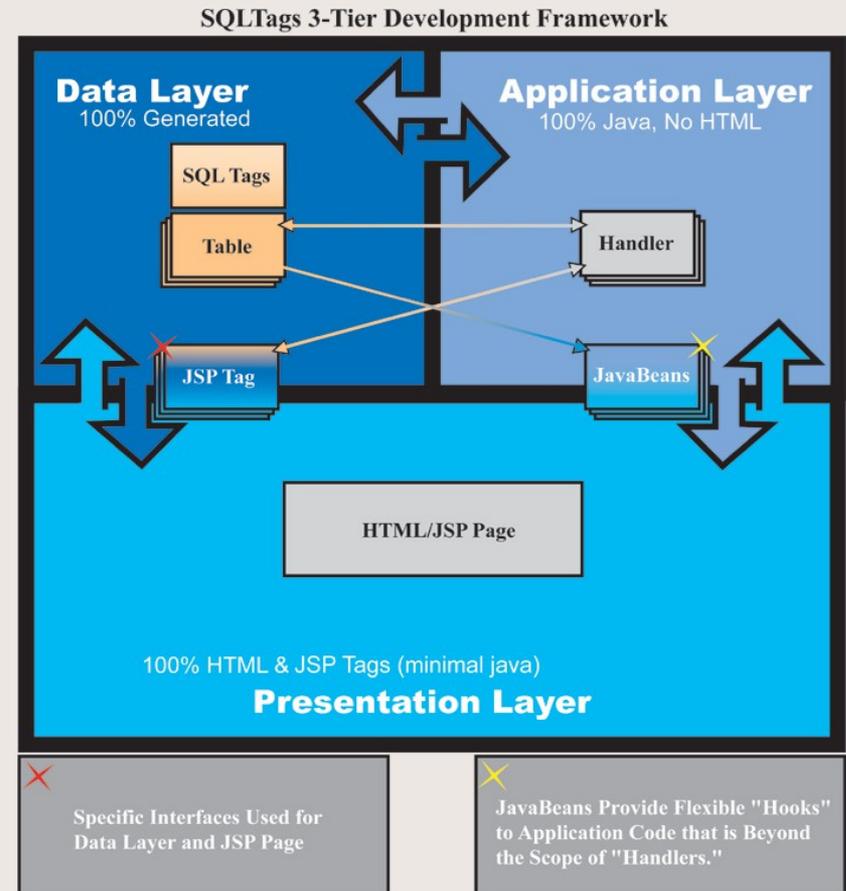
SQLTags Framework

Application Layer

- JavaBeans
  - Nothing within the SQLTags Framework Prohibits Development or use of Additional JavaBeans.
  - In fact, the generated "Table" classes <u>are</u> JavaBeans.

- JSP Tags
  - Nothing within the SQLTags Framework Prohibits Development or use of Additional JSP Tags.

SQLTags Framework

SQLTags Framework

- Data Layer
  - SQLTags Classes
  - 100% Generated
- Application Layer
  - SQLTagsHandler
  - JavaBeans
- Presentation Layer
  - HTML
  - SQLTags JSP TAGS

SQLTags 3-Tier Development Framework

SQLTags Framework

Presentation Layer

- JSP Pages are Maintained by HTML Authors using:
  - HTML, DHTML, XML
  - JavaScript
  - SQLTags TAGS
  - Other JSP TAGS
  - JavaBeans
  - Very, Very Limited Embedded Java (Scriptlets)

SQLTags Framework

Presentation Layer

- SQLTags Built-in Features
  - properties="true"
  - paging="true"
  - caching="true"
  - "handler reference"
  - scriptlet variables
  - SELECT formatting
  - BIND formatting

- Looping
  - based on "where"

- Data Manipulation:
  - Insert, Update, Delete

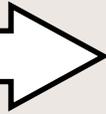- Automatic Join on Foreign Keys to:
  - Parent
  - Children

SQLTags Framework

Presentation Layer

```
<h2>Create Department</h2>
<FORM>
        <INPUT NAME="DEPTNO" SIZE="15" VALUE="10"> DEPTNO
   <BR><INPUT NAME="DNAME"  SIZE="15" VALUE="ACCOUNTING"> DNAME
   <BR><INPUT NAME="LOC"    SIZE="15" VALUE="NEW YORK"> LOC
   <BR><INPUT NAME="fop" TYPE="submit" VALUE="Insert">
</FORM>
```

Since the "properties" attribute is "true" and the field names in the Form match the column names from the DEPT table the values will automatically be assigned.

Netscape
File Edit View Go Communicator Help

Create Department

10	DEPTNO
ACCOUNTING	DNAME
NEW YORK	LOC

Insert

Processed By ➡

```
<sqltags:dept
    id="d"
    buttonName="fop"
    properties="true"
    />
```
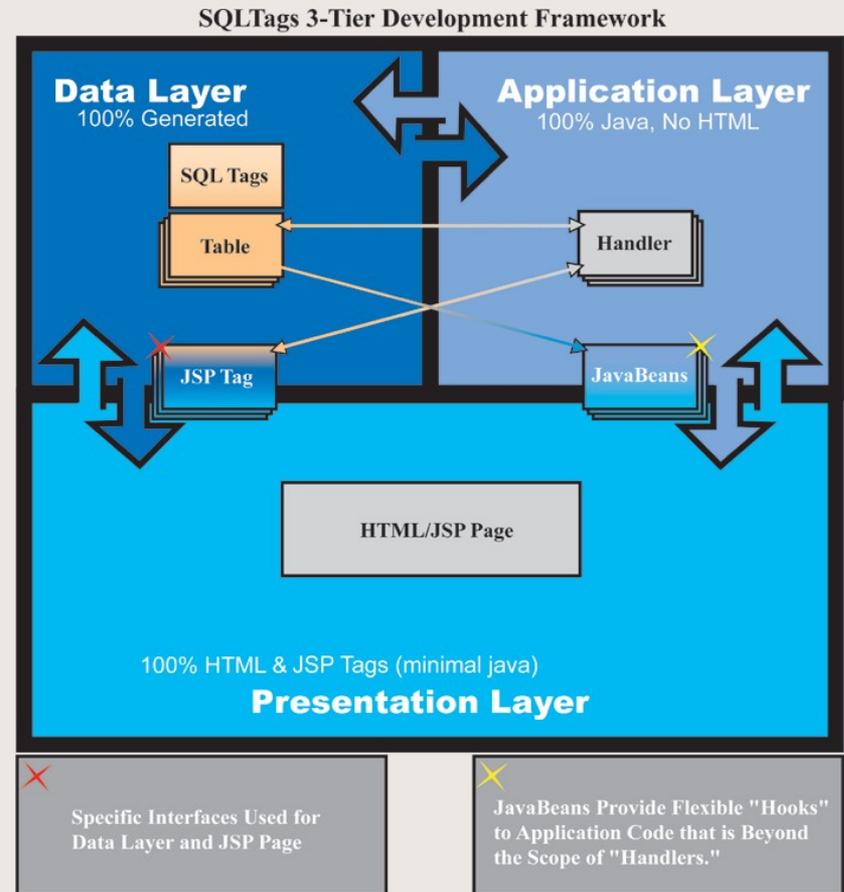
SQLTags Framework

Presentation Layer

- Support Tags
  - **Where** - defines complex where clause
  - **OrderBy** - defines order by clause on "join"
  - **Fetch** - Fetch Rows
  - **First** - First on page
  - **Last** - Last on page

- Additional Tags
  - **Connect** - Connect to database using pool
  - **Cursor** - generic cursor tag for complex queries
  - **Previous** - previous page Anchor
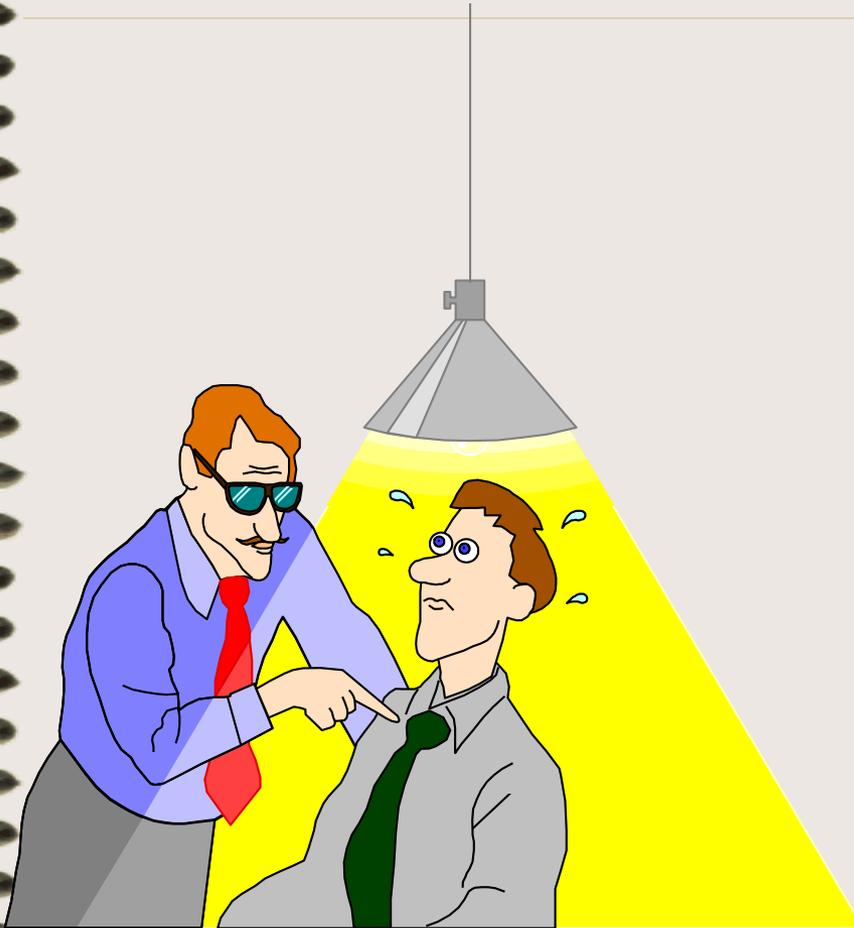 - **Next** - next page Anchor

SQLTags Framework

SQLTags Framework

- Data Layer
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- Application Layer
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  - JavaBeans
- Presentation Layer
  - HTML
  - SQLTags JSP TAGS

SQLTags 3-Tier Development Framework

Data Layer 100% Generated — SQL Tags, Table

Application Layer 100% Java, No HTML — Handler

JSP Tag — JavaBeans

HTML/JSP Page

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Presentation Layer

× Specific Interfaces Used for Data Layer and JSP Page

× JavaBeans Provide Flexible "Hooks" to Application Code that is Beyond the Scope of "Handlers."

SQLTags Framework

Questions?

- Oracle Database …

- Java/JSP …

- User Interface …

- AIT

SQLTags Framework

AIT

- Applied Information Technologies, Inc.

  Oracle on the Web since 1995

  http://www.ait-inc.com

- Web/Database Integration

- Java and JSP Development

- Oracle DBA Services

SQLTags Framework