CSE 510
Web Data Engineering

Connection Pool
Handling Database Connections

Within a JSP:

- Opening a connection for every HTTP request penalizes the DB server (in terms of resources) and the client (in terms of waiting time)
- Hardcoded JSBC driver, database name, username and password reduce portability
- Need to repeat for every JSP accessing the DB
  - Code maintenance becomes almost impossible
- Mix HTML presentation code and DB access code
  - Bad system design
Handling Database Connections

Within Java Servlet `init()` method:

- Close connection in `destroy()`
- Not multithread-safe
- Connection open for the lifetime of the servlet
- Portability, code maintenance and HTML/DB code mixing arguments apply here too
- Bad system design
What is a Connection Pool?

• Application server creates a resource that is a pool of connections to a DBMS
• So that each web app process does not have to open and close a connection
• Developer specifies pool size
• Minimum number of open connections
  – Even if nobody asked them yet
• Minimum number of connections that will not close
• Timeouts
Three-Tier Architecture

Browser

HTTP Requests

HTML

App Server

JSPs

Connection Pool

JDBC Requests

Tuples

Database Server

HTML

Tuples
Data Entry Form - 4th Attempt

![Data Entry Form Image]

<table>
<thead>
<tr>
<th>Data Entry Menu</th>
<th>UBID</th>
<th>First Name</th>
<th>Middle Name</th>
<th>Last Name</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classes</td>
<td>77777777</td>
<td>Demian</td>
<td></td>
<td>Lessa</td>
<td></td>
</tr>
<tr>
<td>Enrollment</td>
<td>88888888</td>
<td>Michalis</td>
<td>A</td>
<td>Petropoulos</td>
<td></td>
</tr>
</tbody>
</table>
In META-INF/context.xml

```xml
<?xml version="1.0" encoding="UTF-8"?>
<Context path="" debug="5" override="true" reloadable="true">
  <Resource
    name="jdbc/ClassesDBPool"
    description="CSE Classes DB Pool"
    driverClassName="com.mysql.jdbc.Driver"
    type="javax.sql.DataSource" auth="Container"
    url="jdbc:mysql://localhost/DemoClasses"
    username="root" password="root"
    defaultAutoCommit="false"
    maxActive="10" minIdle="0" maxIdle="5" maxWait="3000"
    removeAbandoned="true" removeAbandonedTimeout="60"
    logAbandoned="true" validationQuery="SELECT 1"
  />
</Context>
```
JSP Code

<html><body><table><tr>
<td><jsp:include page="menu.html"/></td>
<td>
<Open Connection Code>
<Insertion Code>
<Update Code>
<Delete Code>
<Statement Code>
<Presentation Code>
<Close Connection Code>
</td>
</tr></table></body></html>
<%-- Import packages --%>
<%@ page import="java.sql.*, javax.sql.*, javax.naming.*"%>

<%-- Open Connection Code --%>
<%
Connection conn = null;
try {
// Obtain the environment naming context
Context initCtx = new InitialContext();
// Look up the data source
DataSource ds = (DataSource)
    initCtx.lookup("java:comp/env/jdbc/ClassesDBPool");
// Allocate and use a connection from the pool
conn = ds.getConnection();
%>
DB Specific Parameters

- MySQL closes connections after 8 hours of inactivity

```xml
<?xml version="1.0" encoding="UTF-8"?>
<Context path="" debug="5" override="true" reloadable="true">
    <Resource
        ...
        url="jdbc:mysql://localhost/DemoClasses?
            autoReconnectForPools=true"
        username="root" password="root"
        ...
    />
</Context>
```