

# **CSE 510**

# **Web Data Engineering**

## **Connection Pool**

*cse@buffalo*

# 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

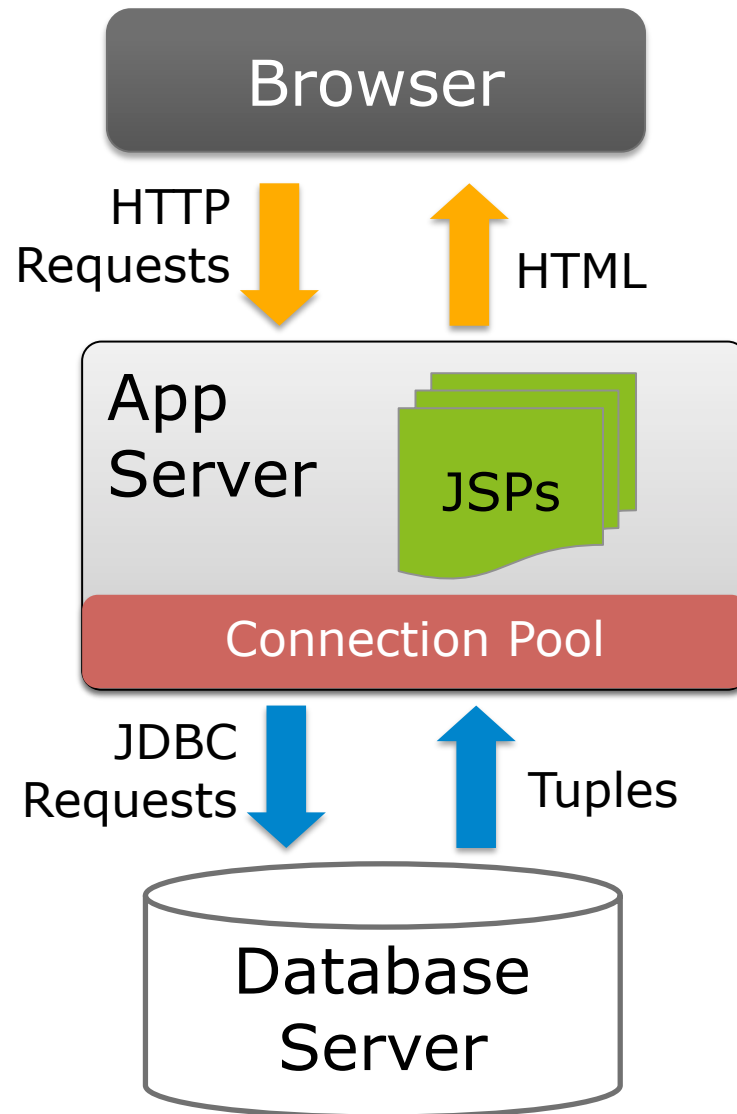
## **Within Java Servlet `init()` method:**

- 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

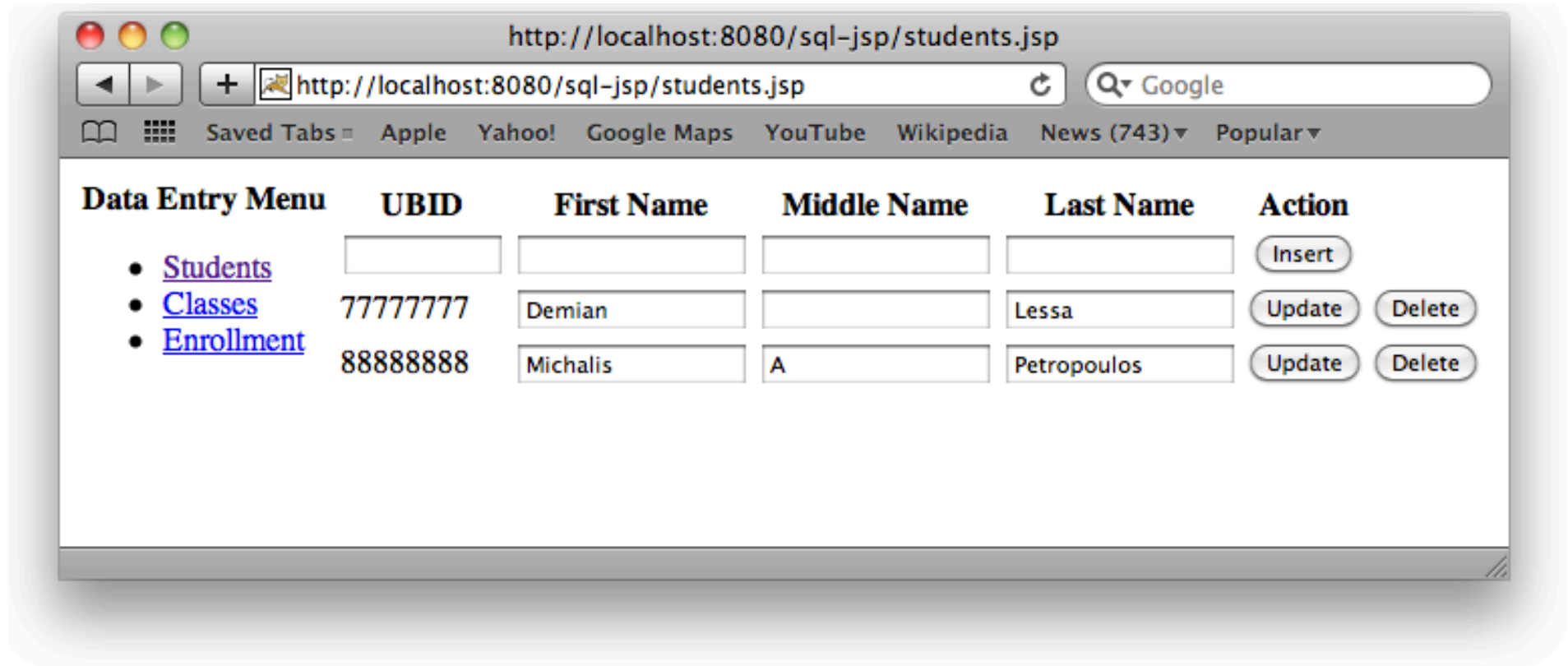
# What is a Connection Pool?

- 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



# Data Entry Form - 4<sup>th</sup> Attempt



# In META-INF/context.xml

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

# Data Entry Form - 4<sup>th</sup> Attempt

## 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>
```



# Data Entry Form - 4<sup>th</sup> Attempt

```
<%-- 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 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>
```