〈14주차 실습〉
데이터베이스 어플리케이션 프로그래밍(2)

Database Programming

- 수강신청 시스템

- 실습 과제

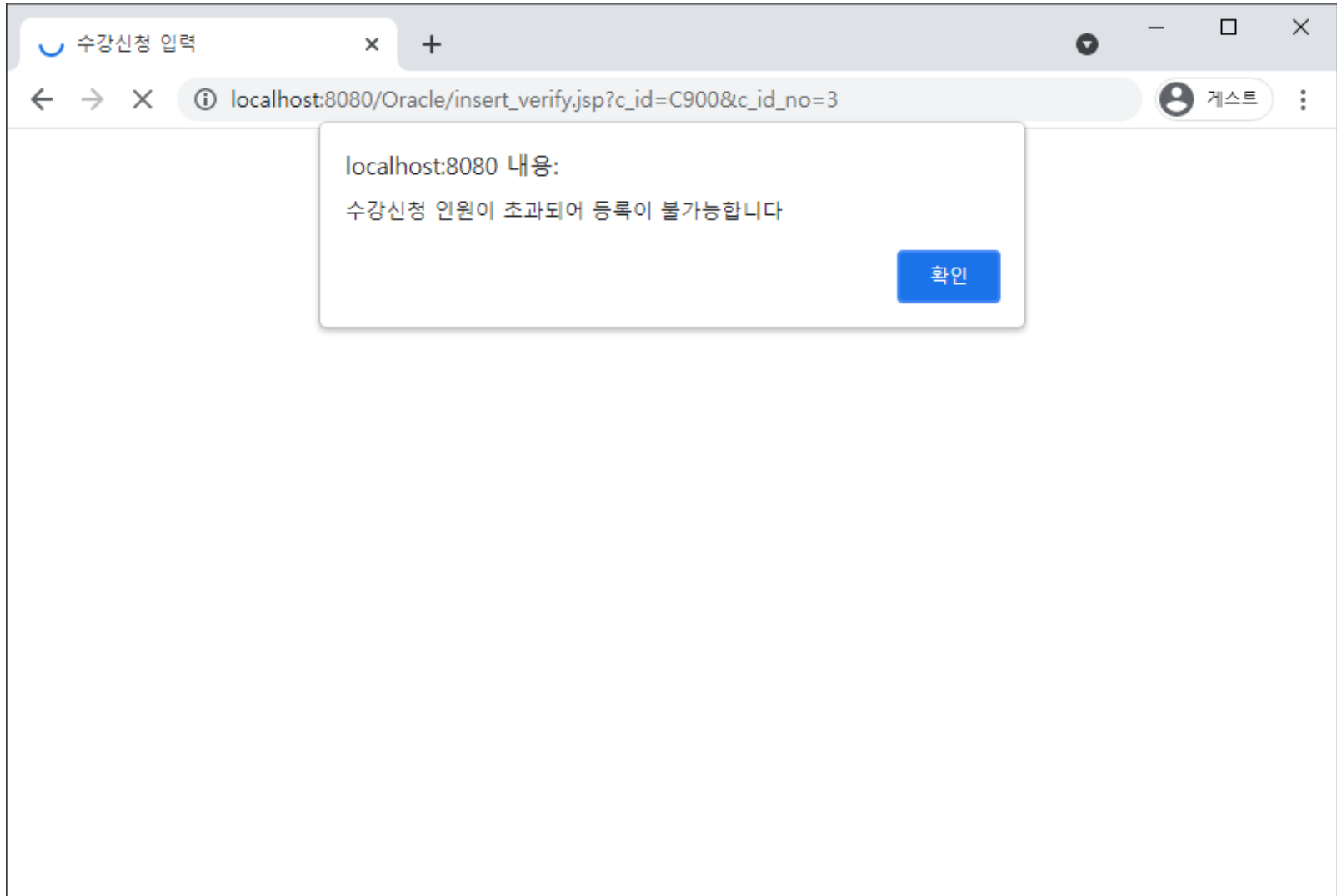- ## 수강 신청 입력

- **과목번호 'C900' 신청 후**

- **과목번호 'M100' 신청 후**

- **과목번호 'C800' 신청 후**

- **과목번호 'M700' 신청 후**

- ## 수강 신청 입력 완료

```jsp
<%@ page language="java" contentType="text/html; charset=utf-8"
    pageEncoding="utf-8"%>
<%@ page import="java.sql.*"%>
<!DOCTYPE html>

<html><head><title>수강신청 입력</title></head>
<body>

    <%@ include file="top.jsp"%>
    <% if (session_id == null)  response.sendRedirect("login.jsp"); %>

    <table width="75%" align="center" border>    <br>
        <tr>
            <th>과목번호</th>
            <th>분반</th>
            <th>과목명</th>
            <th>학점</th>
            <th>수강신청</th>
        </tr>
        <%
            Connection myConn = null;
            ResultSet myResultSet = null;
            String mySQL = "";
            String dburl = "jdbc:oracle:thin:@210.94.199.20:1521:dblab";
            String user = "사용자 계정";
            String passwd = "패스워드";
            String dbdriver = "oracle.jdbc.driver.OracleDriver";

            try {
                Class.forName(dbdriver);
                myConn = DriverManager.getConnection(dburl, user, passwd);
            } catch (SQLException ex) {
                System.err.println("SQLException: " + ex.getMessage());
            }
```
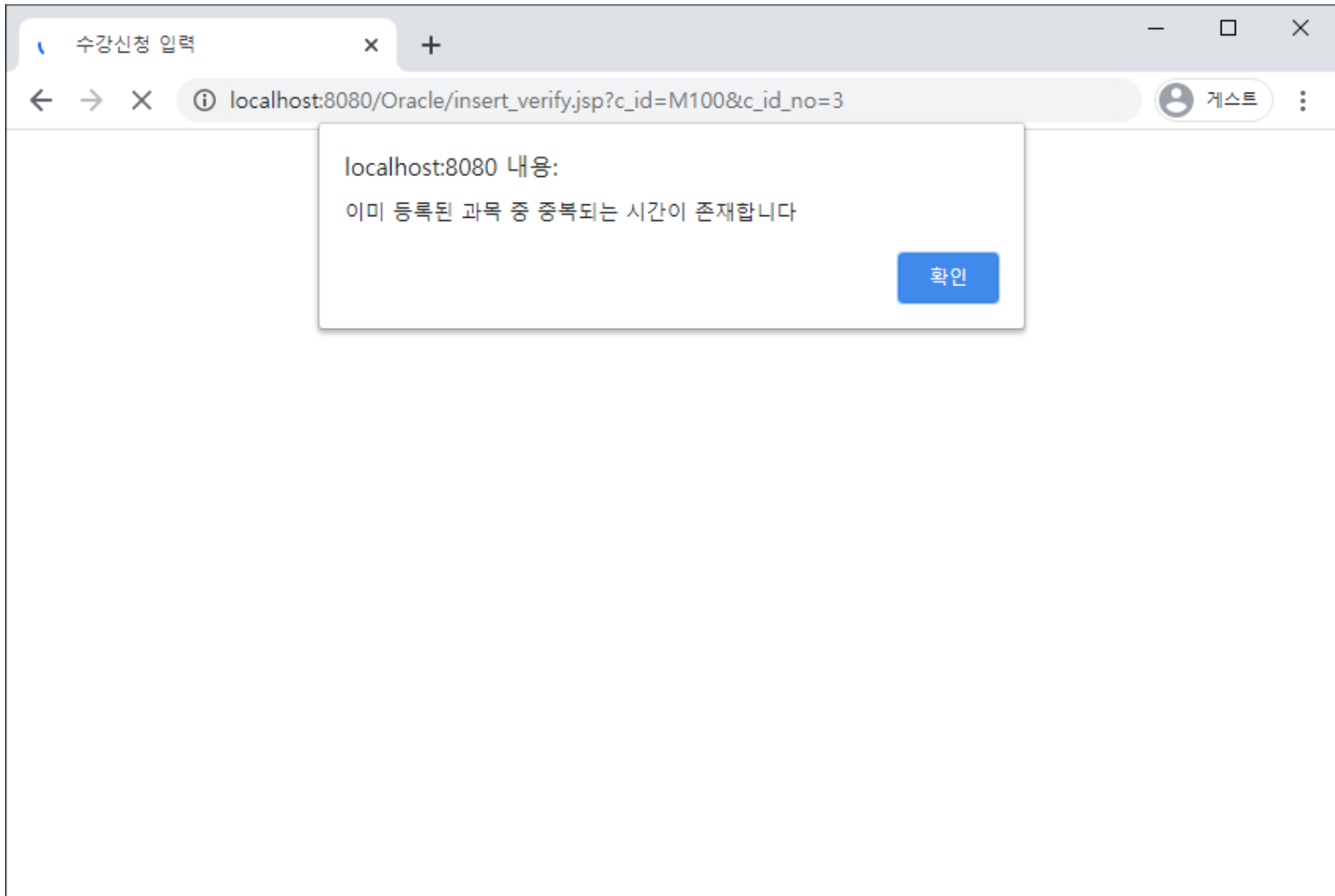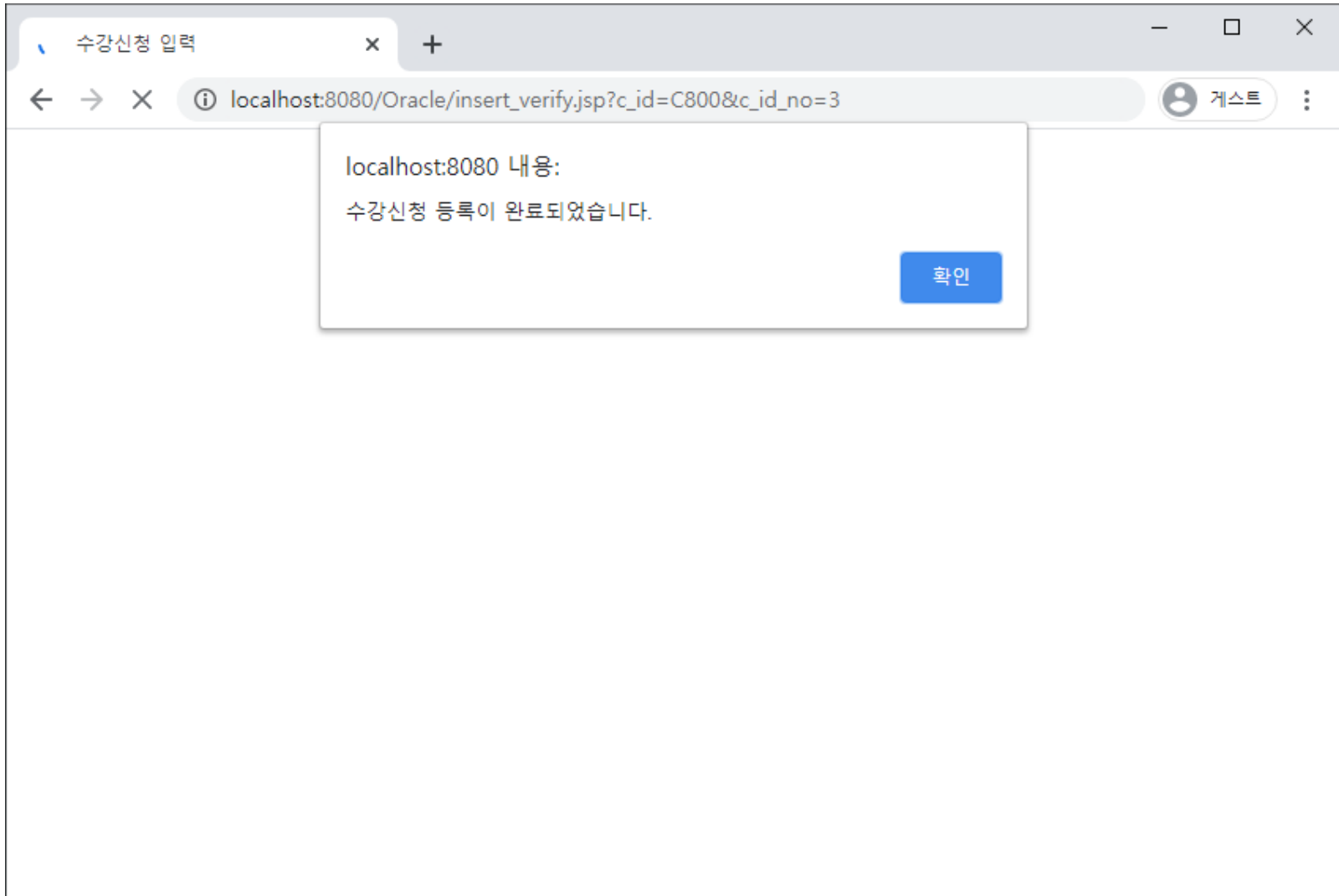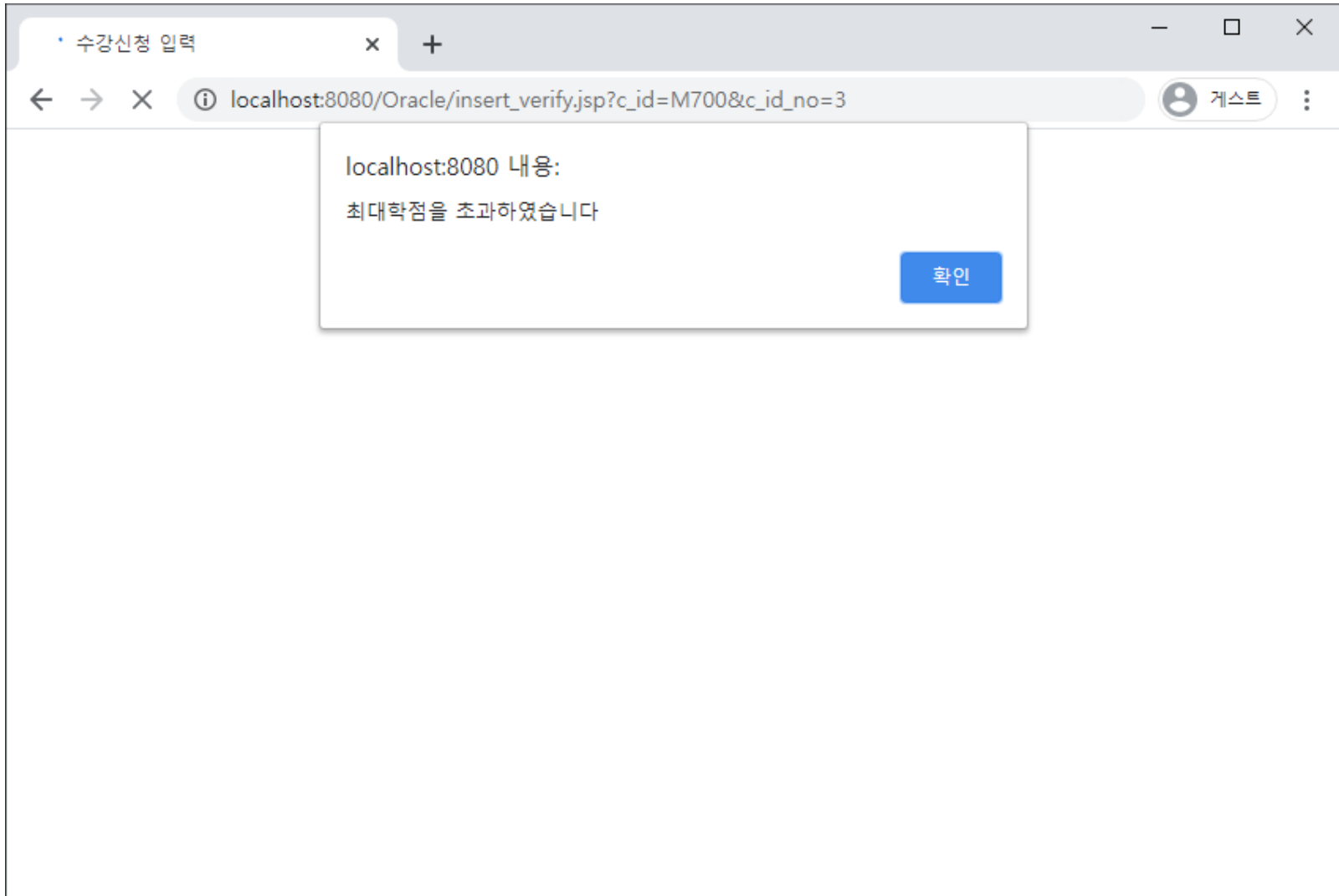
```jsp
        mySQL = "select * from course where c_id not in"
                + "(select c_id from enroll where s_id = '" + session_id
                + "' and e_year = '2022' and e_semester = '1')" + "and c_id in"
                + "(select c_id from teach where t_year = '2022' and t_semester = '1' )";

        Statement stmt = myConn.createStatement();

        myResultSet = stmt.executeQuery(mySQL);

        if (myResultSet != null) {
            while (myResultSet.next()) {
                String c_id = myResultSet.getString("c_id");
                int c_id_no = myResultSet.getInt("c_id_no");
                String c_name = myResultSet.getString("c_name");
                int c_unit = myResultSet.getInt("c_unit");
%>
    <tr>
      <td align="center"><%= c_id %></td>
      <td align="center"><%= c_id_no %></td>
      <td align="center"><%= c_name %></a></td>
      <td align="center"><%= c_unit %></td>
      <td align="center"><a href="insert_verify.jsp?c_id=<%= c_id %>&c_id_no=<%= c_id_no %>">신청</a></td>
    </tr>
    <%
            }
        }
        stmt.close();
        myConn.close();
%>
    </table>
</body>
</html>
```

```jsp
<%@ page language="java" contentType="text/html; charset=utf-8"
    pageEncoding="utf-8"%>
    <%@ page import="java.sql.*" %>
<!DOCTYPE html>
<html>
<head><title>수강신청 입력</title></head>
<body>

    <%
        String s_id = (String) session.getAttribute("user");
        String c_id = request.getParameter("c_id");
        int c_id_no = Integer.parseInt(request.getParameter("c_id_no"));

        Connection myConn = null;
        String result = null;
        String dburl = "jdbc:oracle:thin:@210.94.199.20:1521:dblab";
        String user = "사용자 계정";
        String passwd = "패스워드";
        String dbdriver = "oracle.jdbc.driver.OracleDriver";

        try {
            Class.forName(dbdriver);
            myConn = DriverManager.getConnection(dburl, user, passwd);
        } catch (SQLException ex) {
            System.err.println("SQLException: " + ex.getMessage());
        }
```

```
        CallableStatement cstmt = myConn.prepareCall("{call InsertEnroll(?, ?, ?, ?)}");
        cstmt.setString(1, s_id);
        cstmt.setString(2, c_id);
        cstmt.setInt(3, c_id_no);
        cstmt.registerOutParameter(4, java.sql.Types.VARCHAR);
        System.out.println(s_id+ "," + c_id+ "," + c_id_no+ "," + java.sql.Types.VARCHAR);
        try {
            cstmt.execute();
            result = cstmt.getString(4);
            System.out.println(result);
%>
<script>
alert("<%=result%>");
    location.href = "insert.jsp";
</script>
<%
        } catch (SQLException ex) {
            System.err.println("SQLException: " + ex.getMessage());
        } finally {
            if (cstmt != null)
                try {
                    myConn.commit();
                    cstmt.close();
                    myConn.close();
                } catch (SQLException ex) {


                }
        }
%>
</body></html>
```

Java 환경 변수 설정

- **1. JAVA_HOME 새로 만들기 클릭**
  변수이름 : JAVA_HOME
  변수값 : 자바 jdk를 설치한 위치
  예) C:\Program Files\Java\jdk1.8.0_311

- **2. PATH 기존변수 수정**
  변수이름 : Path
  변수값 : java가 설치된 디렉토리 밑의 bin 디렉토리
  예) %JAVA_HOME%\bin

- **3. CLASSPATH 새로 만들기 클릭**
  변수이름 : CLASSPATH
  변수값 : java가 설치된 디렉토리 밑의 lib 폴더 안에 tools.jar
  예) %JAVA_HOME%\lib\tools.jar

- **4. cmd 창 열어서 path, java, javac 각각 실행한 후 잘 되는지 확인**

- **JSP에서 Java Beans 규약에 맞게 작성된 클래스를 사용할 수 있음**

- **사용 이유**

  - **재사용성을 증가시켜 프로그램의 효율이 상승됨**

  - **유지 보수가 쉬우며, 코드를 재사용하기 때문에 안정성이 보장됨**

Java Beans

- **java 파일을 Tomcat 8.5\webapps\ROOT\WEB-INF\classes 경로에 배치함**
  *classes 폴더 만들어야 함

- **jsp:useBean 형태로 접근하기 위해서는 Package를 지정해 주어야 함**

- **Syntax**
  〈jsp:useBean id="reference명"
  class="package명.class명" scope="page" /〉

- **BTest.java**

```java
package BTest;

public class BTest{
    private int cnt = 0;

    public String getMsg(){
        return "getMsg() Called";
    }

    public int getCnt(){
        return ++cnt;
    }
}
```
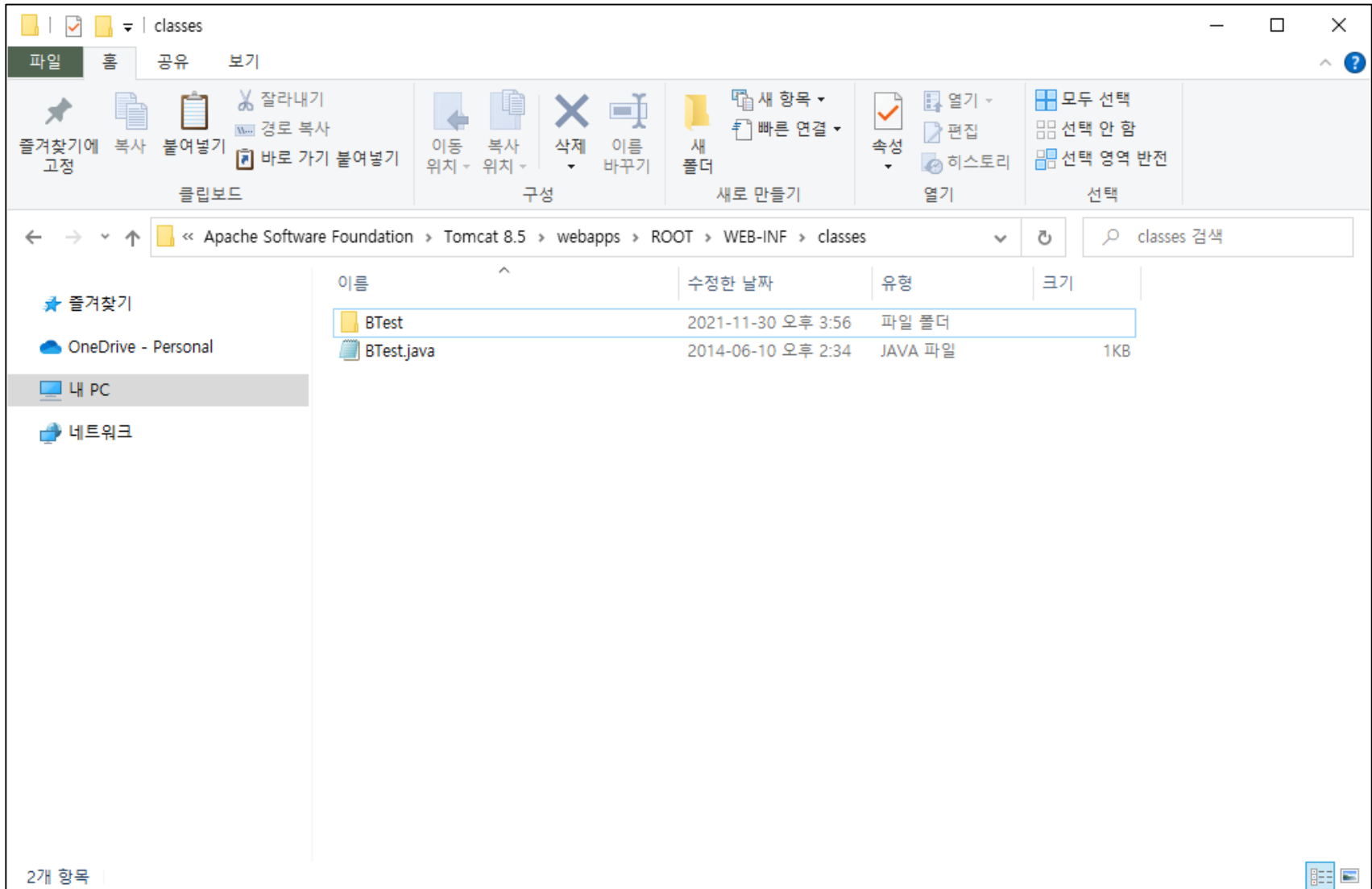
관리자: 명령 프롬프트   — □ ✕

```
c:\>cd C:\Program Files\Apache Software Foundation\Tomcat 8.5\webapps\ROOT\WEB-INF\classes

C:\Program Files\Apache Software Foundation\Tomcat 8.5\webapps\ROOT\WEB-INF\classes>javac -d . BTest.java

C:\Program Files\Apache Software Foundation\Tomcat 8.5\webapps\ROOT\WEB-INF\classes>
```
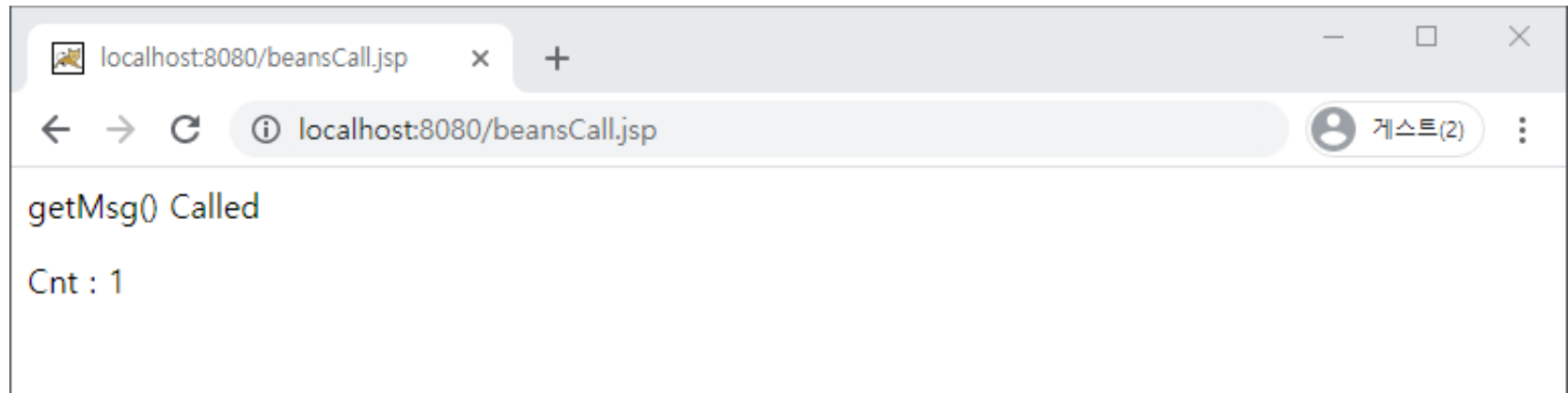
- **beansCall.jsp**

```jsp
<%@ page language="java" contentType="text/html; charset=utf-8" pageEncoding="utf-8" %>
<!DOCTYPE html>
<jsp:useBean id="bTest" class="BTest.BTest" scope="page"></jsp:useBean>
<html>
    <p><%= bTest.getMsg() %></p>
    <p>Cnt : <%= bTest.getCnt() %></p>
</html>
```



```
localhost:8080/beansCall.jsp          ×      +

←  →  C   ⓘ localhost:8080/beansCall.jsp                      게스트(2)  ⋮

getMsg() Called

Cnt : 1
```

수강신청 삭제

수강신청 조회

수강신청 입력

```java
package enrollBean;

public class Enroll
{

    private String c_id;
    private int c_id_no;
    private String c_name;
    private int c_unit;

    public Enroll(){
        c_id = null;
        c_id_no = 0;
        c_name = null;
        c_unit = 0;
    }

    public void setCId(String c_id) {
        this.c_id = c_id;
    }

    public void setCIdNo(int c_id_no) {
        this.c_id_no = c_id_no;
    }

    public void setCName(String c_name) {
        this.c_name = c_name;
    }

    public void setCUnit(int c_unit) {
        this.c_unit = c_unit;
    }

    public String getCId() {
        return c_id;
    }

    public int getCIdNo() {
        return c_id_no;
    }

    public String getCName() {
        return c_name;
    }

    public int getCUnit() {
        return c_unit;
    }
}
```

```java
package enrollBean;
import java.sql.*;
import java.util.*;
import javax.sql.*;
import oracle.jdbc.driver.*;
import oracle.jdbc.pool.*;
import enrollBean.*;

public class EnrollMgr {

    private OracleConnectionPoolDataSource ocpds = null;
    private PooledConnection pool = null;

    public EnrollMgr() {
     try{

        ocpds = new OracleConnectionPoolDataSource();

        ocpds.setURL("jdbc:oracle:thin:@210.94.199.20:1521:DBLAB");
        ocpds.setUser("사용자 계정");
        ocpds.setPassword("비밀번호");

        pool = ocpds.getPooledConnection();
       }catch(Exception e){
          System.out.println("Error : Connection Failed");
       }
    }

    public Vector getEnrollList(String s_id) {
        Connection conn = null;
        PreparedStatement pstmt = null;
        CallableStatement cstmt1 = null;
        CallableStatement cstmt2 = null;
        ResultSet rs = null;
        Vector vecList = new Vector();

         .
```

```java
        try {
            conn = pool.getConnection();

            cstmt1 = conn.prepareCall("{? = call Date2EnrollYear(SYSDATE)}");
            cstmt1.registerOutParameter(1, java.sql.Types.INTEGER);
            cstmt1.execute();
            int nYear = cstmt1.getInt(1);

            cstmt2 = conn.prepareCall("{? = call Date2EnrollSemester(SYSDATE)}");
            cstmt2.registerOutParameter(1, java.sql.Types.INTEGER);
            cstmt2.execute();
            int nSemester = cstmt2.getInt(1);

            String mySQL = "select e.c_id cid,e.c_id_no cid_no,c.c_name cname,c.c_unit cunit "
                    +"from enroll e, course c where e.s_id=? and e.e_year=? and e.e_semester=? "
                    +"and e.c_id=c.c_id and e.c_id_no=c.c_id_no";
            pstmt = conn.prepareStatement(mySQL);
            pstmt.setString(1,s_id); pstmt.setInt(2, nYear);
            pstmt.setInt(3, nSemester);
            rs = pstmt.executeQuery();

            while (rs.next()) {
                Enroll en = new Enroll();
                en.setCId(rs.getString("cid"));
                en.setCIdNo(rs.getInt("cid_no"));
                en.setCName(rs.getString("cname"));
                en.setCUnit(rs.getInt("cunit"));
                vecList.add(en);
            }
            cstmt1.close();
            cstmt2.close();
            pstmt.close();
            conn.close();

        } catch (Exception ex) {
            System.out.println("Exception" + ex);
        }

        return vecList;
    }
```

```java
public Vector getEnrollList(String s_id, int nYear, int nSemester) {
    Connection conn = null;
    PreparedStatement pstmt = null;
    ResultSet rs = null;
    Vector vecList = new Vector();

    try {
        conn = pool.getConnection();

        String mySQL = "select e.c_id cid,e.c_id_no cid_no,c.c_name cname,c.c_unit cunit "
                +"from enroll e, course c where e.s_id=? and e.e_year=? and e.e_semester=? "
                +"and e.c_id=c.c_id and e.c_id_no=c.c_id_no";
        pstmt = conn.prepareStatement(mySQL);
        pstmt.setString(1,s_id);
        pstmt.setInt(2, nYear);
        pstmt.setInt(3, nSemester);
        rs = pstmt.executeQuery();

        while (rs.next()) {
            Enroll en = new Enroll();
            en.setCId(rs.getString("cid"));
            en.setCIdNo(rs.getInt("cid_no"));
            en.setCName(rs.getString("cname"));
            en.setCUnit(rs.getInt("cunit"));
            vecList.add(en);
        }
        pstmt.close();
        conn.close();
    } catch (Exception ex) {
        System.out.println("Exception" + ex);
    }

    return vecList;
}
```

```java
public int getCurrentYear()
{
    int nYear=0;
    Connection conn = null;
    CallableStatement cstmt = null;
try {
    conn = pool.getConnection();

    cstmt = conn.prepareCall("{? = call Date2EnrollYear(SYSDATE)}");
    cstmt.registerOutParameter(1, java.sql.Types.INTEGER);
    cstmt.execute();
    nYear = cstmt.getInt(1);

    cstmt.close();
    conn.close();
    } catch (Exception ex) {
        System.out.println("Exception" + ex);
    }

    return nYear;
}
```

```java
public int getCurrentSemester()
{
    int nSemester=0;
    Connection conn = null;
    CallableStatement cstmt = null;

    try {
        conn = pool.getConnection();

        cstmt = conn.prepareCall("{? = call Date2EnrollSemester(SYSDATE)}");
        cstmt.registerOutParameter(1, java.sql.Types.INTEGER);
        cstmt.execute();
        nSemester = cstmt.getInt(1);

        cstmt.close();
        conn.close();
    } catch (Exception ex) {
        System.out.println("Exception" + ex);
    }

    return nSemester;
}
```
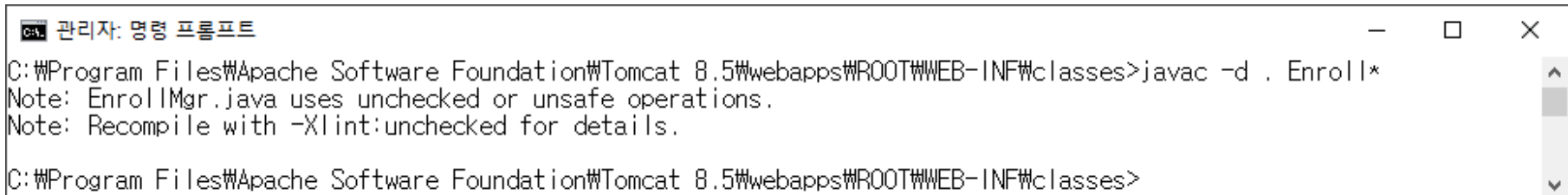
```java
public void deleteEnroll(String s_id, String c_id, int c_id_no) {
    Connection conn = null;
    PreparedStatement pstmt = null;
    try {
        conn = pool.getConnection();
        String mySQL = "delete from enroll where s_id=? and c_id=? and c_id_no=?";
        pstmt = conn.prepareStatement(mySQL);
        pstmt.setString(1,s_id);
        pstmt.setString(2, c_id);
        pstmt.setInt(3, c_id_no);
        pstmt.executeUpdate();

        pstmt.close();
        conn.close();
    } catch (Exception ex) {
        System.out.println("Exception" + ex);
    }
}
}
```

```
관리자: 명령 프롬프트                                                    —    □    ✕

C:\Program Files\Apache Software Foundation\Tomcat 8.5\webapps\ROOT\WEB-INF\classes>javac -d . Enroll*
Note: EnrollMgr.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

C:\Program Files\Apache Software Foundation\Tomcat 8.5\webapps\ROOT\WEB-INF\classes>
```

- **Package**파일이 두 개 이상일 때 한 번에 컴파일 해주어야 함

```jsp
<%@ page language="java" contentType="text/html; charset=utf-8" pageEncoding="utf-8"%>
<%@ page import="java.util.*, enrollBean.*"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="EUC-KR">
<title>수강신청 조회</title>
</head>
<body>
    <%@ include file="top.jsp"%>
    <% if (session_id == null)  response.sendRedirect("login.jsp"); %>

    <table width="75%" align="center" border>
        <tr>
            <th>과목번호</th>
            <th>분반</th>
            <th>과목명</th>
            <th>학점</th>
        </tr>
        <br>
        <jsp:useBean id="enrollMgr" class="enrollBean.EnrollMgr" />
        <%
            Vector vlist = null;
            int year, semester;

            if (request.getParameter("year") == null && request.getParameter("semester") == null) {
                year = enrollMgr.getCurrentYear();
                semester = enrollMgr.getCurrentSemester();
            } else {
                year = Integer.parseInt(request.getParameter("year"));
                semester = Integer.parseInt(request.getParameter("semester"));
            }

            vlist = enrollMgr.getEnrollList(session_id, year, semester);
            int counter = vlist.size();
            int totUnit = 0;

            for (int i = 0; i < vlist.size(); i++) {
                Enroll en = (Enroll) vlist.elementAt(i);
                totUnit += en.getCUnit();
        %>
```

```html
        <tr>
            <td align="center"><%=en.getCId()%></td>
            <td align="center"><%=en.getCIdNo()%></td>
            <td align="center"><%=en.getCName()%></td>
            <td align="center"><%=en.getCUnit()%></td>

            <%
                }
            %>

        </tr>
    </table>
    <br>
    <table width="75%" align="center" border>
        <tr>
            <th>총신청과목수</th>
            <td align="center"><%=counter%></td>
        </tr>
        <tr>
            <th>총신청학점</th>
            <td align="center"><%=totUnit%></td>
        </tr>
    </table>
    <br>
    <br>
    <table width="30%" align="center">
        <FORM method="post" action="select_verify.jsp">
            <tr>
                <td><input type="text" name="year" value=<%=year%> size=4>
                    년도 <input type="text" name="semester" value=<%=semester%> size=1>
                    학기 <INPUT TYPE="SUBMIT" NAME="Submit" VALUE="조회"></td>
            </tr>
        </FORM>
    </table>
</body>
</html>
```

```jsp
<%@ page language="java" contentType="text/html; charset=utf-8" pageEncoding="utf-8"%>
<%@ page import="java.sql.*"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="EUC-KR">
<title>수강신청 조회</title>
</head>
<body>
    <%
        String year = request.getParameter("year");
        String semester = request.getParameter("semester");

        String url = "select.jsp?year=" + year + "&semester=" + semester;

        response.sendRedirect(url);
    %>
</body>
</html>
```

```jsp
<%@ page language="java" contentType="text/html; charset=utf-8" pageEncoding="utf-8"%>
<%@ page import="java.util.*, enrollBean.*"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="EUC-KR">
<title>수강신청 삭제</title>
</head>
<body>
    <%@ include file="top.jsp"%>
    <%
        if (session_id == null)
            response.sendRedirect("login.jsp");
    %>
    <table width="75%" align="center" border>
        <tr>
            <th>과목번호</th>
            <th>분반</th>
            <th>과목명</th>
            <th>학점</th>
            <th>수강신청</th>
        </tr>
        <br>
        <jsp:useBean id="enrollMgr" class="enrollBean.EnrollMgr" />
        <%
            Vector vlist = enrollMgr.getEnrollList(session_id);
            int counter = vlist.size();
            for (int i = 0; i < vlist.size(); i++) {
                Enroll en = (Enroll) vlist.elementAt(i);
        %>
        <tr>
            <td align="center"><%=en.getCId()%></td>
            <td align="center"><%=en.getCIdNo()%></td>
            <td align="center"><%=en.getCName()%></td>
            <td align="center"><%=en.getCUnit()%></td>
            <td align="center"><a
                href="delete_verify.jsp?c_id=<%=en.getCId()%>&c_id_no=<%=en.getCIdNo()%>">삭제</a></td>
            <%
                }
            %>
        </tr>
    </table>
</body>
</html>
```

```jsp
<%@ page language="java" contentType="text/html; charset=utf-8"
    pageEncoding="utf-8"%>
<%@ page import="enrollBean.*"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="EUC-KR">
<title>수강신청 삭제 </title>
</head>
<body>
    <%
        String s_id = (String) session.getAttribute("user");
        String c_id = request.getParameter("c_id");
        int c_id_no = Integer.parseInt(request.getParameter("c_id_no"));
    %>
    <jsp:useBean id="enrollMgr" class="enrollBean.EnrollMgr" scope="page" />
    <%
        enrollMgr.deleteEnroll(s_id, c_id, c_id_no);
    %>
    <script>
        alert("삭제되었습니다.");
        location.href = "delete.jsp";
    </script>
</body>
</html>
```

Q1> 아래 그림과 같이 과목이름을 클릭하였을 때 모집인원과 현재 수강 신청을 할 수 있는 인원을 CallableStatement을 사용하여 나타내시오. (새로운 Procedure 작성해야 함)

Q2> update.jsp를 Java Beans를 사용하여 작성하시오.

- **제출 방식 : E-Class를 통하여 제출**

- **제출 내용 : ROOT 폴더 압축 파일(jsp, Java, sql 파일)**

- **제출 형식 : 학번_이름_주차**
  - **Ex)학번_홍길동_14주차.zip**

- **제출 기한 : 수업 시작 시간으로 부터 24시간 이내 제출**
  - **제출 기한 위반 시 감점 기준**
    - **지각 제출 시 과제 점수에서 40% 감점**
    - **1일 초과 당 10% 추가 감점 (단, 7일 이후 제출 불가)**