[ 12 ] 효율적인 데이터베이스 관리

1. DAO, DTO
   * DAO : Data Access Object
     + 데이터 베이스에 접속해서 데이터 추가, 삭제, 수정 등의 작업을 하는 클래스이다
     + 일반적인 JSP 혹은 Servlet 페이지 내에 위의 로직을 함께 기술할 수도 있지만, 유지보수 및 코드의 모듈화를 위해 별도의 DAO클래스를 만들어 사용한다
   * DTO : Data Transfer Object
     + DAO 클래스를 이용하여 데이터 베이스에서 데이터를 관리할 때 데이터를 일반적인 변수에 할당하여 작업 할 수도 있지만, 해당 데이터의 클래스 객체를 만들어 사용한다. 데이터만 하나로 모아 객체에 담는다.

WAS

웹브라우저

데이터베이스

Servlet/JSP

Servlet/JSP

WAS

웹브라우저

데이터베이스

Servlet/JSP

DAO

DTO

**package** com.ch.daotoex;

**public** **class** MemberDTO {

**private** String name;

**private** String id;

**private** String pw;

**private** String phone1;

**private** String phone2;

**private** String phone3;

**private** String gender;

**public** MemberDTO(){}

**public** MemberDTO(String name, String id, String pw, String phone1, String phone2, String phone3, String gender) {

**this**.name = name;

**this**.id = id;

**this**.pw = pw;

**this**.phone1 = phone1;

**this**.phone2 = phone2;

**this**.phone3 = phone3;

**this**.gender = gender;

}

**public** String getName() { **return** name; }

**public** **void** setName(String name) { **this**.name = name; }

**public** String getId() { **return** id; }

**public** **void** setId(String id) { **this**.id = id; }

**public** String getPw() { **return** pw; }

**public** **void** setPw(String pw) { **this**.pw = pw; }

**public** String getPhone1() { **return** phone1; }

**public** **void** setPhone1(String phone1) { **this**.phone1 = phone1; }

**public** String getPhone2() { **return** phone2; }

**public** **void** setPhone2(String phone2) { **this**.phone2 = phone2; }

**public** String getPhone3() { **return** phone3; }

**public** **void** setPhone3(String phone3) { **this**.phone3 = phone3; }

**public** String getGender() { **return** gender; }

**public** **void** setGender(String gender) { **this**.gender = gender; }

@Override

**public** String toString() {

**return** name+"("+id+")"+pw+" : "+phone1+phone2+phone3+gender;

}

}

**public** **class** MemberDAO {

**private** String driver = "oracle.jdbc.driver.OracleDriver";

**private** String url = "jdbc:oracle:thin:@localhost:1521:xe";

**private** String uid = "scott";

**private** String upw = "tiger";

**public** **static** MemberDAO *instance*; //자기가 자기 클래스를 참조하고 있는 변수

**public** **static** MemberDAO getInstance() {

**if**(*instance*==**null**) {

*instance* = **new** MemberDAO();

}

**return** *instance*;

}

**private** MemberDAO() {

**try** {

Class.*forName*(driver);

} **catch** (ClassNotFoundException e) {

e.printStackTrace();

}

}

**public** ArrayList<MemberDTO> memberSelectAll(){

ArrayList<MemberDTO> dtos = **new** ArrayList<MemberDTO>();

Connection conn = **null**;

Statement stmt = **null**;

ResultSet rs = **null**;

String sql = "SELECT \* FROM MEMBER";

**try** {

conn = DriverManager.*getConnection*(url, uid, upw);

stmt = conn.createStatement();

rs = stmt.executeQuery(sql);

**while**(rs.next()) {

String name = rs.getString("name");

String id = rs.getString("id");

String pw = rs.getString("pw");

String phone1 = rs.getString("phone1");

String phone2 = rs.getString("phone2");

String phone3 = rs.getString("phone3");

String gender = rs.getString("gender");

dtos.add(**new** MemberDTO(name, id, pw, phone1, phone2, phone3, gender));

}

} **catch** (SQLException e) {

e.printStackTrace();

} **finally** {

**try** {

**if**(rs!=**null**) rs.close();

**if**(stmt!=**null**) stmt.close();

**if**(conn!=**null**) conn.close();

}**catch** (Exception e) { }

}

**return** dtos;

}

}

<link href=*"css/style.css"* rel=*"stylesheet"*>

</head>

<body>

<table>

<caption>가입회원 리스트</caption>

<tr><th>이름</th><th>ID</th><th>비번</th><th>전화</th><th>성별</th></tr>

<%

MemberDAO memberDAO = MemberDAO.getInstance();

ArrayList<MemberDTO> dtos = memberDAO.memberSelectAll();

**for**(MemberDTO d:dtos){%>

<tr><td><%=d.getName() %></td><td><%=d.getId() %></td><td><%=d.getPw() %></td>

<td><%=d.getPhone1()==**null**? "": d.getPhone1()%>-

<%=d.getPhone2()==**null**? "": d.getPhone2() %>-

<%=d.getPhone3()==**null**? "": d.getPhone3() %></td>

<td><%=d.getGender() %></td>

</tr>

<% }%>

</table>

</body>

1. PreparedStatement
   * SQL문 실행을 위해 Statement객체를 이용할 단점을 보완한 PreparedStatement객체를 이용하는 경우가 많다

join.jsp (전에 만든 것 그대로 copy)

<%@ page language=*"java"* contentType=*"text/html; charset=UTF-8"*

pageEncoding=*"UTF-8"*%>

<!DOCTYPE html>

<html>

<head>

<meta charset=*"UTF-8"*>

<title>Insert title here</title>

<link href=*"../css/style.css"* rel=*"stylesheet"*>

<script>

**function** chk(){

**if**(frm.pw.value!=frm.pwChk.value){

alert('비밀번호를 확인하세요');

frm.pw.focus();

**return** **false**;

}

}

</script>

</head>

<body>

<form action=*"joinOk.jsp"* method=*"post"* name=*"frm"* onsubmit="return chk()">

<table>

<caption>회원가입</caption>

<tr><th>아이디</th>

<td><input type=*"text"* name=*"id"* required=*"required"* size=*"20"*></td>

</tr>

<tr><th>이름</th>

<td><input type=*"text"* name=*"name"* required=*"required"* size=*"20"*></td>

</tr>

<tr><th>비밀번호</th>

<td><input type=*"password"* name=*"pw"* required=*"required"* size=*"20"*></td>

</tr>

<tr><th>비밀번호 확인</th>

<td><input type=*"password"* name=*"pwChk"* required=*"required"* size=*"20"*></td>

</tr>

<tr><th>전화번호</th>

<td><select name=*"phone1"*>

<option></option><option>02</option><option>010</option>

</select> -

<input type=*"text"* name=*"phone2"* size=*"3"*> -

<input type=*"text"* name=*"phone3"* size=*"3"*>

</td>

</tr>

<tr><th>성별</th>

<td><input type=*"radio"* name=*"gender"* value=*"m"*>남

<input type=*"radio"* name=*"gender"* value=*"f"*>여

</td>

</tr>

<tr><td colspan=*"2"*>

<input type=*"submit"* value=*"가입"*>

<input type=*"reset"* value=*"취소"*>

<input type=*"button"* value=*"로그인"* onclick="location.href='login.jsp'">

</td>

</tr>

</table>

</form>

</body>

</html>

**DAO추가 사항**

**public** **int** memberInsert(MemberDto dto) {

**int** result = 0;

Connection conn = **null**;

PreparedStatement pstmt = **null**;

String sql = "INSERT INTO MEMBER VALUES (?,?,?,?,?,?,?)";

//('홍','aaa','111','02','9999','9999','남')

**try** {

conn = DriverManager.*getConnection*(url, uid, upw);

pstmt = conn.prepareStatement(sql);

pstmt.setString(1, dto.getName());

pstmt.setString(2, dto.getId());

pstmt.setString(3, dto.getPw());

pstmt.setString(4, dto.getPhone1());

pstmt.setString(5, dto.getPhone2());

pstmt.setString(6, dto.getPhone3());

pstmt.setString(7, dto.getGender());

result = pstmt.executeUpdate();

System.***out***.println(result>0? "가입성공":"가입실패");

} **catch** (SQLException e) {

e.printStackTrace();

} **finally** {

**try** {

**if**(pstmt!=**null**) pstmt.close();

**if**(conn!=**null**) conn.close();

}**catch** (Exception e) { }

}

**return** result;

}

**joinOk.jsp**

<%@page import=*"com.tj.dao.MemberDao"*%>

<%@ page language=*"java"* contentType=*"text/html; charset=UTF-8"*

pageEncoding=*"UTF-8"*%>

<!DOCTYPE html>

<html>

<head>

<meta charset=*"UTF-8"*>

<title>Insert title here</title>

<link href=*"../css/style.css"* rel=*"stylesheet"*>

</head>

<body>

<%request.setCharacterEncoding("utf-8"); %>

<jsp:useBean id=*"dto"* class=*"com.tj.dto.MemberDto"*/>

<jsp:setProperty property=*"\*"* name=*"dto"*/>

<%

MemberDao dao = MemberDao.getInstance();

**int** result = dao.memberInsert(dto);

**if**(result>0){

out.println("<h2>회원가입이 완료되었습니다</h2>");

}**else**{

out.println("<h2>회원가입이 거부되었습니다</h2>");

}

%>

<hr>

<jsp:include page=*"memberList.jsp"*/>

</body>

</html>

1. 커넥션 풀
   * 클라이언트에서 다수의 요청이 발생할 경우 데이터베이스에 부하가 발생하게 된다

웹브라우저

WAS

DTO

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DAO

웹브라우저

DTO

웹브라우저

…

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웹브라우저

* + 이러한 문제를 해결 하기 위해서 커넥션 풀(DataBase Connection Pool)기법을 이용

tomcat컨테이너가 데이터베이스 인증을 하도록 context.xml 파일에 아래의 코드를 추가

<Resource

auth=*"Container"*

driverClassName = *"oracle.jdbc.driver.OracleDriver"*

url = *"jdbc:oracle:thin:@localhost:1521:xe"*

username = *"scott"*

password = *"tiger"*

name = *"jdbc/Oracle11g"*

type = *"javax.sql.DataSource"*

maxActive = *"20"*

maxWait = *"1000"*

/>

</Context>

public class MemberConnDao {

// private String driver = "oracle.jdbc.driver.OracleDriver";

// private String url = "jdbc:oracle:thin:@localhost:1521:xe";

// private String uid = "scott";

// private String upw = "tiger";

private DataSource dataSource;

public static MemberConnDao *instance*;

public static MemberConnDao getInstance() {

if(*instance*==null) {

*instance* = new MemberConnDao();

}

return *instance*;

}

private MemberConnDao() {

/\*try {

Class.forName(driver);

} catch (ClassNotFoundException e) {

e.printStackTrace();

}\*/

try {

Context context = new InitialContext();

dataSource = (DataSource) context.lookup("java:comp/env/jdbc/Oracle11g");

} catch (NamingException e) {

e.printStackTrace();

}

}

public ArrayList<MemberDto> memberSelectAll(){

ArrayList<MemberDto> dtos = new ArrayList<MemberDto>();

Connection conn = null;

Statement stmt = null;

ResultSet rs = null;

String sql = "SELECT \* FROM MEMBER";

try {

//conn = DriverManager.getConnection(url, uid, upw);

conn = dataSource.getConnection();

stmt = conn.createStatement();

rs = stmt.executeQuery(sql);

while(rs.next()) {

String name = rs.getString("name");

String id = rs.getString("id");

String pw = rs.getString("pw");

String phone1 = rs.getString("phone1");

String phone2 = rs.getString("phone2");

String phone3 = rs.getString("phone3");

String gender = rs.getString("gender");

dtos.add(new MemberDto(name, id, pw, phone1, phone2, phone3, gender));

}

} catch (SQLException e) {

e.printStackTrace();

} finally {

try {

if(rs!=null) rs.close();

if(stmt!=null) stmt.close();

if(conn!=null) conn.close();

}catch (Exception e) { }

}

return dtos;

}

public int memberInsert(MemberDto dto) {

int result = 0;

Connection conn = null;

PreparedStatement pstmt = null;

String sql = "INSERT INTO MEMBER VALUES (?,?,?,?,?,?,?)";

//('홍','aaa','111','02','9999','9999','남')

try {

//conn = DriverManager.getConnection(url, uid, upw);

conn = dataSource.getConnection();

pstmt = conn.prepareStatement(sql);

pstmt.setString(1, dto.getName());

pstmt.setString(2, dto.getId());

pstmt.setString(3, dto.getPw());

pstmt.setString(4, dto.getPhone1());

pstmt.setString(5, dto.getPhone2());

pstmt.setString(6, dto.getPhone3());

pstmt.setString(7, dto.getGender());

result = pstmt.executeUpdate();

System.*out*.println(result>0? "가입성공":"가입실패");

} catch (SQLException e) {

e.printStackTrace();

} finally {

try {

if(pstmt!=null) pstmt.close();

if(conn!=null) conn.close();

}catch (Exception e) { }

}

return result;

}

}

과제 : 친구 추가 및 검색이 가능한 아래의 화면을 구현하시오

테이블생성(시퀀스포함), DTO, DAO, 뷰단(JSP), 프로세스단(JSP)



