Java Server Page

JSP程序设计(上)

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概述

- 什么是**JSP**

  JSP(Java Server Pages)是由Sun Microsystems公司开发的一种实现普通静态HTML和动态HTML混合编码的技术。

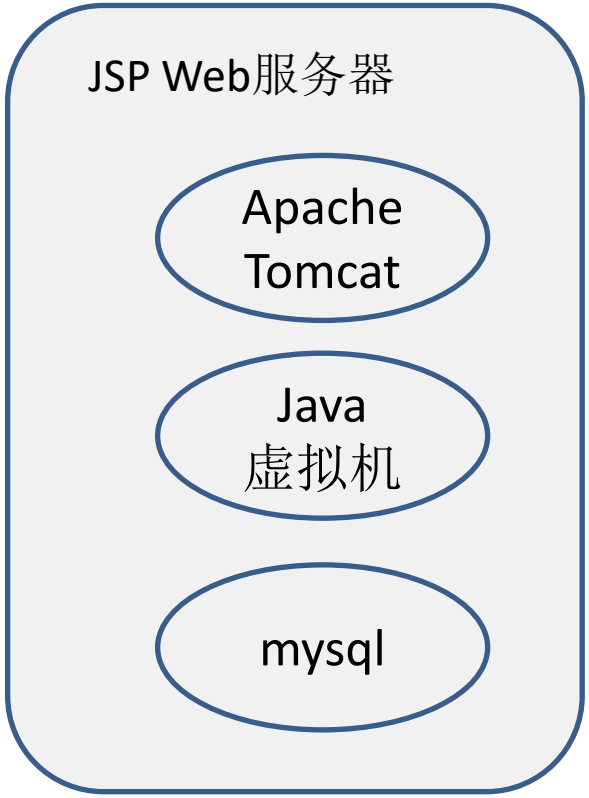
- Servlet和JSP

  Servlet是最早开始使用Java Web编程方式。Servlet编程通过扩展预定义的HttpServlet类响应HTTP的Get和Post请求。JSP建立在Servlet类的基础上。它分离了表现逻辑和业务逻辑。

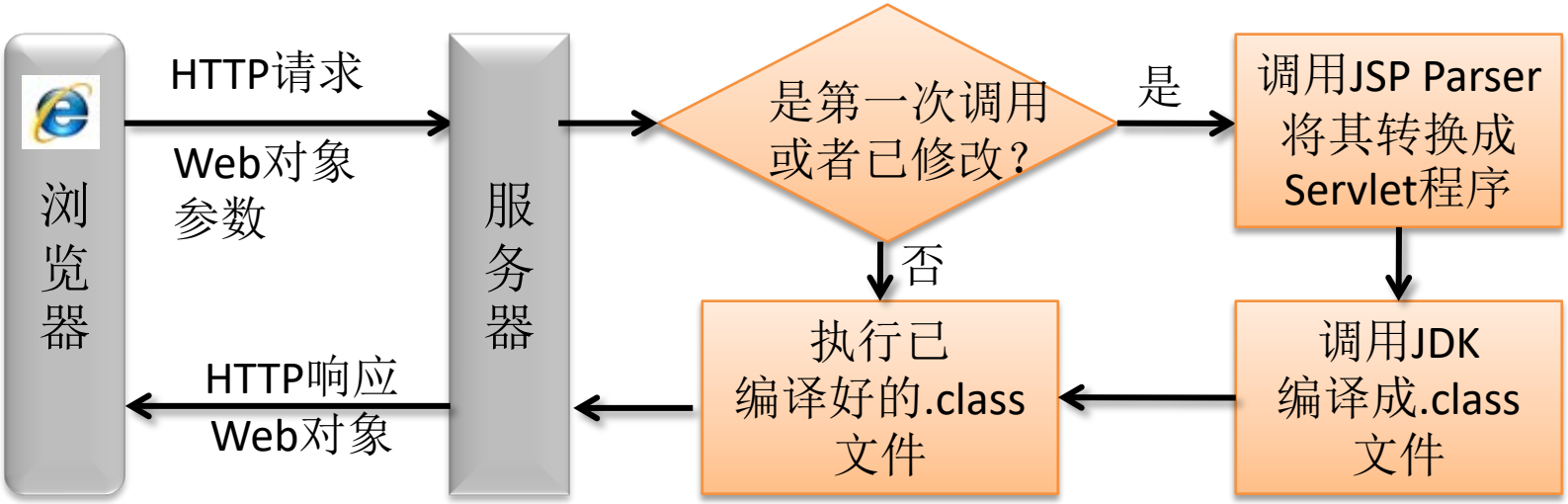
JSP教程

JSP Web服务器

Web服务器是接收HTTP请求并返回HTTP响应的软件。下面是一种JSP web服务器结构，Apache Tomcat为Web服务器，它是基于Java虚拟机的。这个结构采用了MySQL数据库。如果编程使用Eclipse，注意其内部Tomcat与外部的Tomcat可能会冲突（只能启动一个）。



JSP工作原理



（1）当Web服务器收到对JSP文件(JSP页面)的HTTP请求，如果所请求的JSP文件是修改后的第一次访问，则调用JSP Parser将其转换成Servlet程序（.java），然后调用JSDK编译成Servlet字节码（.class）。

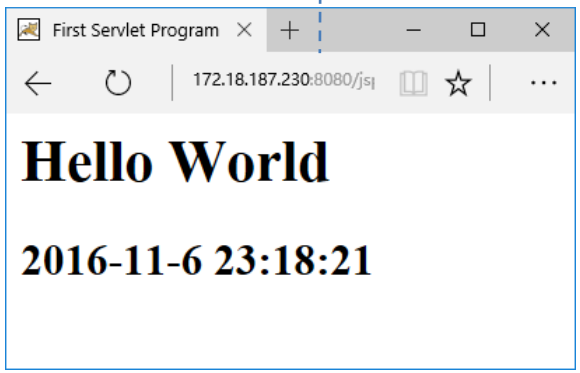
（2）Java虚拟机执行Servlet字节码发回HTTP响应。

（3）如果有多个HTTP请求发给同一个JSP文件，则Tomcat服务器会为每一个请求启动一个线程执行该文件对应的Servlet字节码。

第一个Servlet程序

下面的Servlet程序(Hello.java)继承了系统的HttpServlet类.

http://172.18.187.230:8080/jsp/servlet/Hello



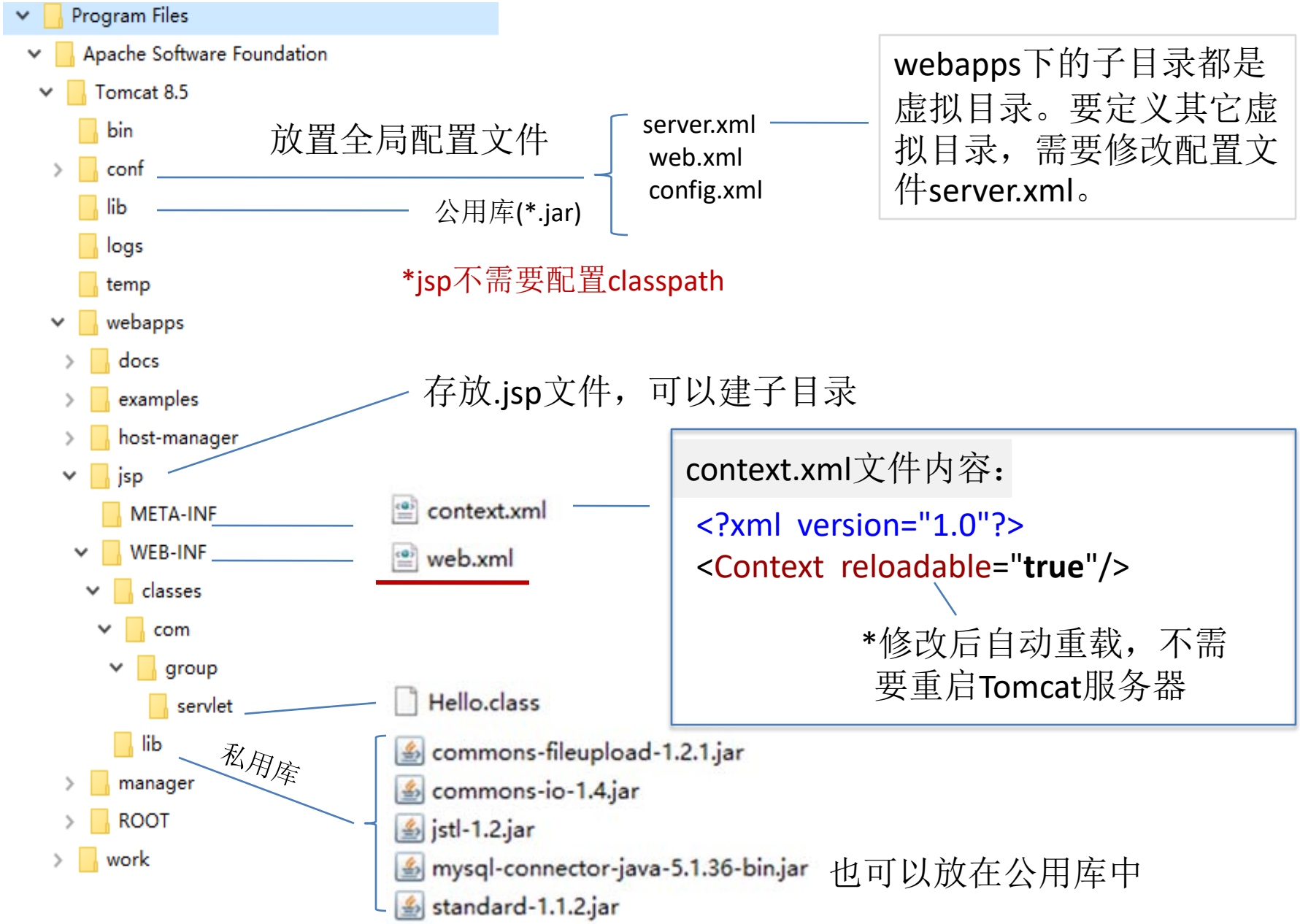

```
package com.group.servlet;
import java.io.*;
import java.util.*;
import javax.servlet.*;
import javax.servlet.http.*;

public class Hello extends HttpServlet {
    @SuppressWarnings("deprecation")
    @Override
    public void doGet(HttpServletRequest req, HttpServletResponse resp)
            throws ServletException, IOException  {
        resp.setContentType("text/html");
        PrintWriter out = resp.getWriter();
        out.println("<html><head><title>First Servlet Program</title></head>");
        out.println("<body>");
        out.println("<h1>Hello World<h1>");
        out.println("<h2>" + new Date().toLocaleString()+ "</h2>");
        out.println("</body>");
        out.println("</html>");
        out.flush();
    }
}
```

doPost

C:\java>javac -classpath .\servlet-api.jar Hello.java

* servlet-api.jar在tomcat的lib目录中

http://172.18.187.230:8080/jsp/servlet/Hello



*http://172.18.187.230:8080/jsp/**servlet/Hello***

web.xml

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<web-app>
   <description>Servletand JSP Examples. </description>
   <display-name>Servlet and JSP Examples</display-name>
   <servlet>                    （3）
      <servlet-name>HelloWorld</servlet-name>
      <servlet-class>com.group.servlet.Hello</servlet-class>
  </servlet>                    （4）
  <servlet-mapping>             （2）
      <servlet-name>HelloWorld</servlet-name>
      <url-pattern>/servlet/Hello</url-pattern>
  </servlet-mapping>                （1）URL
  <servlet>
     <servlet-name>Requ</servlet-name>
     <servlet-class>serv.RequestInfo</servlet-class>
  </servlet>
  <servlet-mapping>
     <servlet-name>Requ</servlet-name>
     <url-pattern>/servlet/request</url-pattern>
   </servlet-mapping>
</web-app>
```

一个servlet

另一个servlet

第一个JSP程序

hello.jsp

生成http响应的指示，例如，要使用的包，http响应的头部content-type.

指令元素

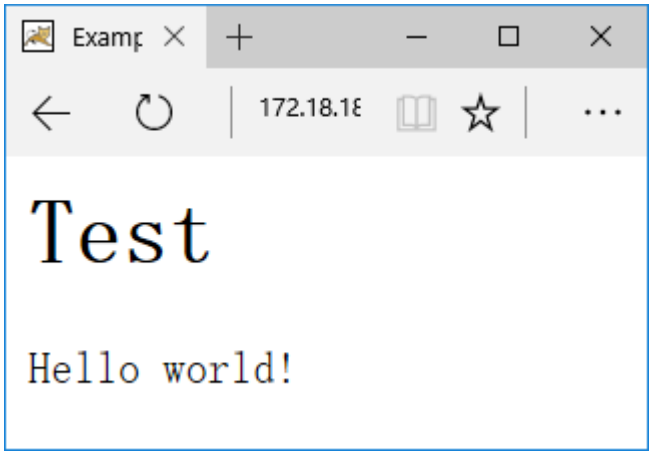
HTML模版

脚本片段
(scriptlet)

HTML模版

```
<%@ page contentType="text/html;charset=gb2312"%>
<html>
<head>
<title>Example</title>
</head>
<body>
<h1> Test </h1>
<p>
<%
   out.print("Hello world!");
%>
</p>
</body>
</html>
```

网址



Java程序放在<% %>之间。out为一个JSP的系统对象。

如果只输出一个表达式而不是语句，可以采用**<%=exp%>**输出，例如：<%="Hello World!"%>。

hello.jsp会被**自动转换**为servlet程序hello_jsp.java，放在work子目录下，然后再编译成字节码文件hello_jsp.class，并在Java虚拟机上运行，最后把运行的输出结果用**http响应**传送到客户端。

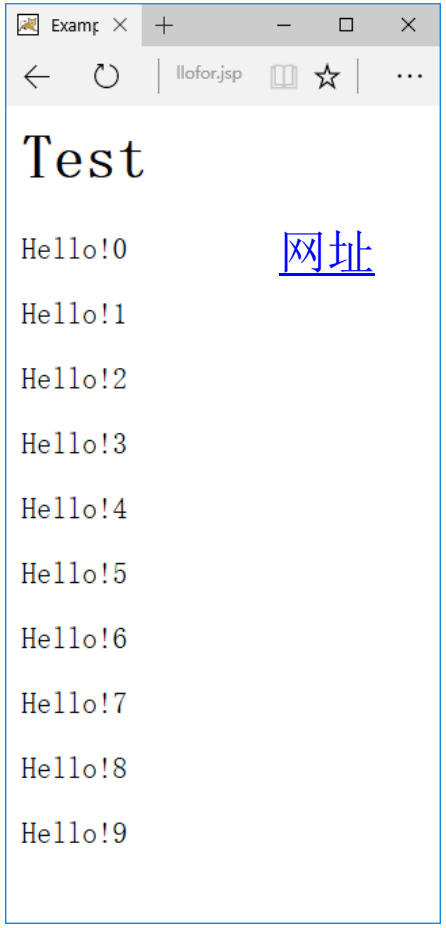
```
public final class hello_jsp extends
          org.apache.jasper.runtime.HttpJspBase{
        ...可以在这里声明<%! %>内定义全局变量、函数和类
    public void _jspService(... request,... response)
      定义了jsp内置对象：out、session、application、config
          ...
        out.write("<html>\r\n");
        out.write("<head>\r\n");
        out.write("<title>Hello world</title>\r\n");
        out.write("</head>\r\n");
        out.write("<body>\r\n");
        out.write("<h1>Test</h1>\r\n");
        out.write("<p>\r\n");
        out.print("Hello world!");
        out.write("</p>\r\n");
        out.write("</body>\r\n");
        out.write("</html>\r\n");
        out.write("\r\n");
          ...
  }
}
```

* out.print()只能输出字符，而out.write还可以输出字节流
* hello_jsp.java的详细内容见附录

为什么for语句里面可以加入html的语句？如何解释？

hellofor.jsp

```
<%@ page contentType="text/html;charset=gb2312"%>
<html>
<head>
<title>Example</title>
</head>
<body>
<h1>Test</h1>
<%for(int i=0;i<10;i++){%>
   <p>Hello!<%=i%></p>
<%}%>
</body>
</html>
```



```
   ...
out.write("\r\n");
out.write("<html>\r\n");
out.write("<head>\r\n");
out.write("<title>Example</title>\r\n");
out.write("</head>\r\n");
out.write("<body>\r\n");
out.write("<h1>Test</h1>\r\n");
for(int i=0;i<10;i++){
    out.write("\r\n");
    out.write("<p>Hello!");
    out.print(i);
    out.write("</p>\r\n");
}
out.write("\r\n");
out.write("</body>\r\n");
out.write("</html>\r\n");
out.write("\r\n");
out.write("\r\n");
out.write("\r\n");
   ...
```

也可以这样编程，先计算出变量值，再把结果代入Web页面，实现Java代码与HTML代码分离：

hellofor2.jsp

```
<%@ page contentType="text/html;charset=gb2312"%>
<% String s="";
   for(int i=0;i<10;i++){
     s=s+"<p>Hello!"+i+"</p>";
   }
 %>
<html>
<head>
<title>Example</title>
</head>
<body>
<h1>Test</h1>
<%=s%>
</body>
</html>
```

网址

测试

声明

JSP程序的函数和类只能在**声明**<%!... %>中定义，它们会被分别转换为servlet类的方法和内部类。声明中定义的变量会被所有用户线程所共享。

```
<%@ page contentType="text/html;charset=gb2312"%>
<%! int cnt=0;
    int getSum(int n){
      int sum=0;
      for(int i=1;i<=n;i++){
         sum=sum+i;
      }
      return sum;
    }
 %>
<html>
<head>
<title>getSumFunc</title>
</head>
<body>
  <h1>getSumFunc</h1>
  <%=getSum(100)%>
</body>
</html>
```

在声明中不能使用jsp内置对象，例如：out、session、request、response等。这些对象可以作为参数传入到声明中。这些对象的具体类型见附录的servlet程序。

getSumClass.jsp

```
<%@ page contentType="text/html;charset=gb2312"%>
<%! class Sum{
      int getSum(int n){
        int sum=0;
        for(int i=1;i<=n;i++){
          sum=sum+i;
        }
        return sum;
      }
    }
 %>
<html>
<head>
<title>getSumClass</title>
</head>
<body>
  <h1>getSumClass</h1>
  <% Sum sum=new Sum();
     out.print(sum.getSum(100));
  %>
</body>
</html>
```

//Sum.java

```
package com.group.jsp;
public class Sum {
      public int getSum(int n){
        int sum=0;
        for(int i=1;i<=n;i++){
          sum=sum+i;
        }
        return sum;
      }
}
```

Sum.class文件放在tomcat\webapps\jsp\WEB-INF\classes\com\group\jsp目录下

//getSumClass1.jsp

```
<%@ page import="com.group.jsp.Sum"
contentType="text/html;charset=gb2312"%>
<html>
<head>
<title>getSumClass</title>
</head>
<body>
  <h1>getSumClass</h1>
  <%
    Sum sum=new Sum();
    out.print(sum.getSum(100));
  %>
</body>
</html>
```

- JSP的类一定要指定包名，不能用默认包
- 一个网页可以出现多个import：

```
<%@ page import="a.b.*" %>
<%@ page import="x.y.*" %>
```

- 可以合并，用逗号隔开：

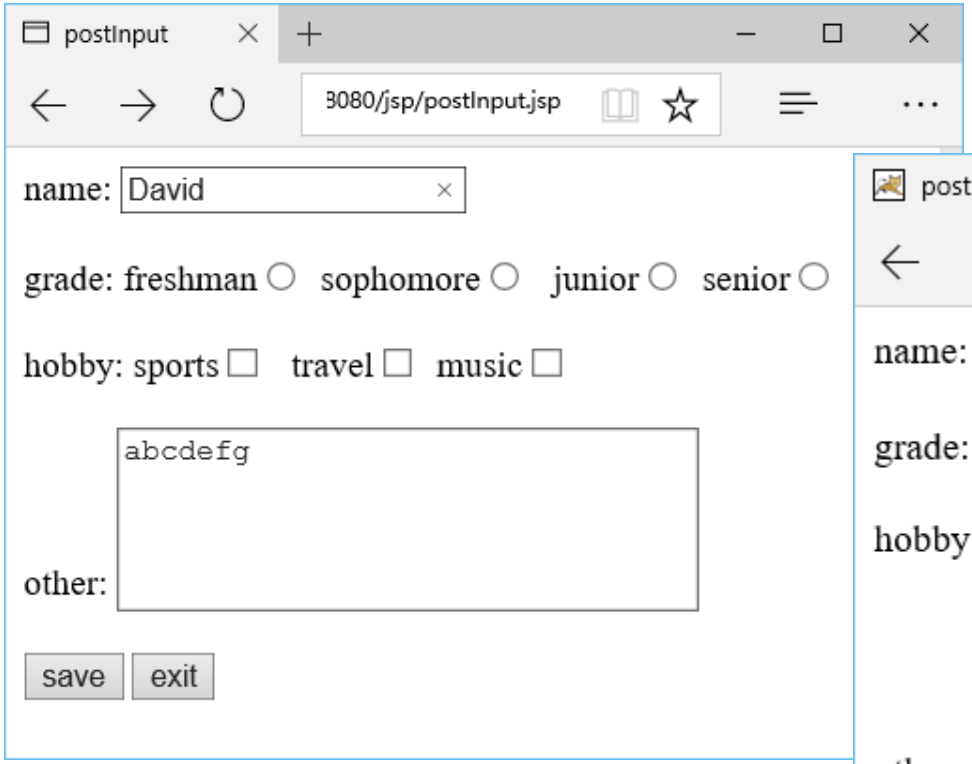
```
<%@ page import="a.b.*,x.y.*" %>
```

如何取得提交的数据

- **提交给另一个网页（必须是动态网页）**

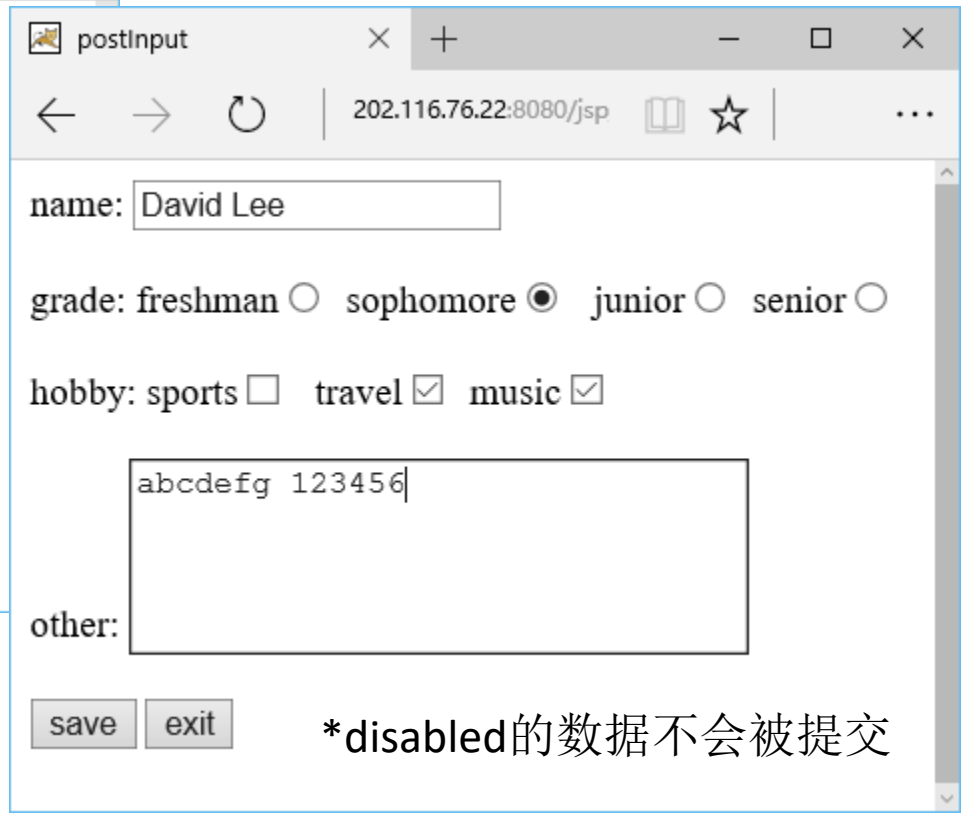
初始页面

网址



postInput.jsp

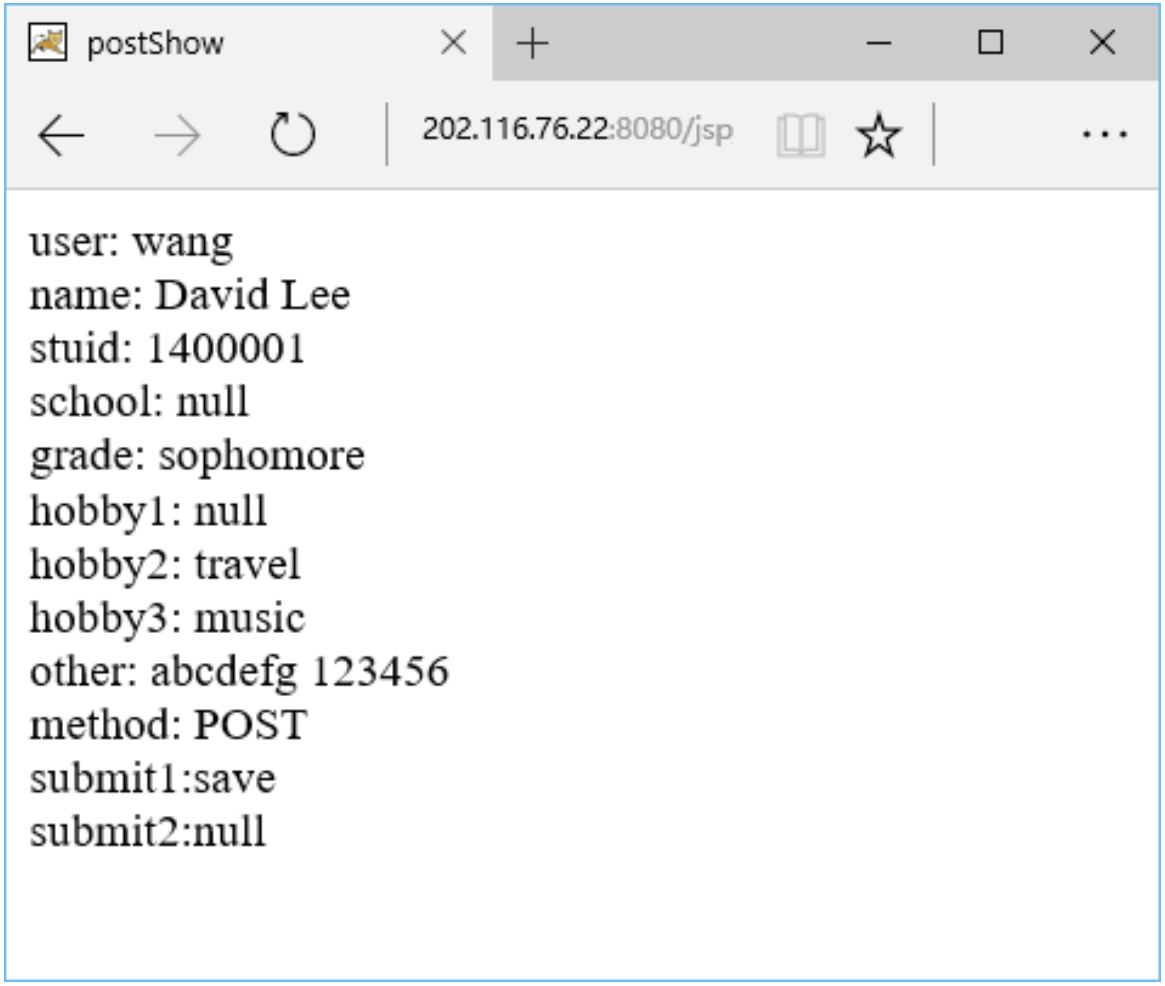
输入后页面



点击 →

*disabled的数据不会被提交

点击后进入的页面：　　postShow.jsp



postInput.jsp

```
<%@ page language="java" import="java.util.*"
         contentType="text/html; charset=utf-8" pageEncoding="utf-8"%>
<!DOCTYPE HTML>
<html>
  <head><title>postInput</title></head>
  <body>
    <form action="postShow.jsp?user=wang" method="post">
        <input type="hidden" name="stuid" value="1400001" />
        name: <input type="text" name="name" value="David"/>
        grade: freshman<input type="radio" name="grade" value="freshman"/>
               sophomore<input type="radio" name="grade" value="sophomore"/>
               junior<input type="radio" name="grade" value="junior"/>
               senior<input type="radio" name="grade" value="senior"/>
        hobby: sports<input type="checkbox" name="hobby1" value="sports"/>
               travel<input type="checkbox" name="hobby2" value="travel"/>
               music<input type="checkbox" name="hobby3" value="music"/>
        other: <textarea rows="5" cols="30" name="other">abcdefg</textarea>
        <input type="submit"  name="submit1" value="save" />
        <input type="submit"  name="submit2" value="exit" />
    </form>
  </body>
</html>
```

form没有action时，会提交给本网页，如果method为get（默认），则会自动把输入键值对作为url的参数（IE会对汉字进行编码而Chrome则不会）。

postShow.jsp

```jsp
<%@ page language="java" import="java.util.*"
         contentType="text/html; charset=utf-8"%>
<%request.setCharacterEncoding("utf-8");%>
<!DOCTYPE HTML>
<html>
  <head> <title>postShow</title></head>
  <body>user:    <%= request.getParameter("user")     %>
        name:    <%= request.getParameter("name")     %>
        stuid:   <%= request.getParameter("stuid")    %>
        school:  <%= request.getParameter("school")   %>
        grade:   <%= request.getParameter("grade")    %>
        hobby1:  <%= request.getParameter("hobby1")   %>
        hobby2:  <%= request.getParameter("hobby2")   %>
        hobby3:  <%= request.getParameter("hobby3")   %>
        other:   <%= request.getParameter("other")    %>
        method:  <%= request.getMethod()              %>
        submit1:<%= request.getParameter("submit1") %>
        submit2:<%= request.getParameter("submit2") %>
  </body>
</html>
```

页面编码确定次序：pageEncoding，charset。默认采用ISO-8859-1。ISO-8859-1为单字节编码（欧洲字符集） 参考

* 没有输入值的取值null

```
String s = request.getParameter("name");
byte[] bs = s.getBytes("iso-8859-1 ");
String s2 = new String(bs,"utf-8");
```

等价

```
request.setCharacterEncoding("utf-8");
String s = request.getParameter("name");
```

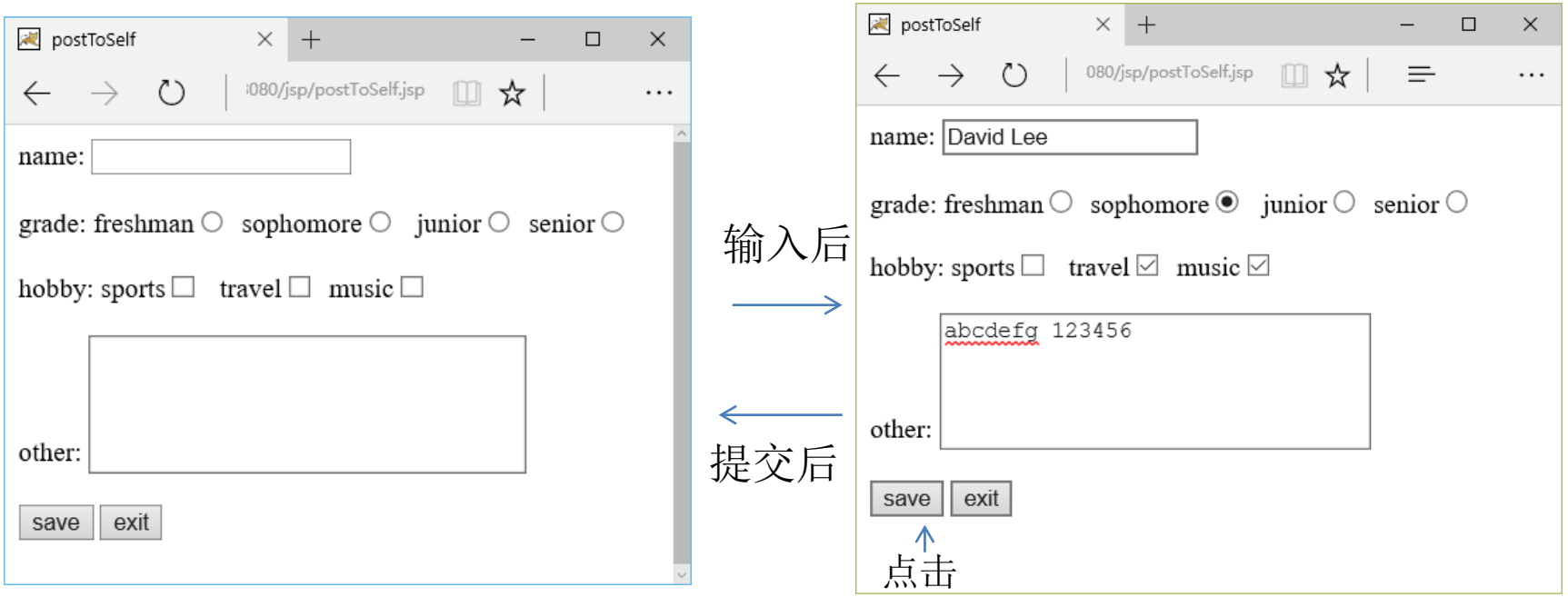
- 提交给自己

postInput.jsp 提交

```
<form action="postShow.jsp?user=wang" method="post">
```

postToSelf.jsp 提交

```
<form action="postToSelf.jsp?user=wang" method="post">
```



参考

- 保持输入

postToSelf.jsp

```
<%@ page language="java" import="java.util.*"
         contentType="text/html; charset=utf-8"%>
<%request.setCharacterEncoding("utf-8");%>
<%
  String submit1 = request.getParameter("submit1");
  String submit2 = request.getParameter("submit2");
  String method = request.getMethod();
  boolean post = method.equalsIgnoreCase(“post”);  // method:GET 或 POST

  String user = request.getParameter("user");
  if(user==null) user="";
  String name = request.getParameter("name");
  if(name==null) name="";
  String stuid = request.getParameter("stuid");
  if(stuid==null) stuid="";

  String grade = request.getParameter("grade");
  if(grade==null) grade="";
  String grades[]= {"","","",""};
```

```
if(grade.equals("freshman"))
   grades[0] = "checked";
else if(grade.equals("sophomore"))
   grades[1] = "checked";
else if(grade.equals("junior"))
   grades[2] = "checked";
else if(grade.equals("senior"))
   grades[3] = "checked";

String hobby1 = request.getParameter("ah1");
if(hobby1==null) hobby1="";
if(hobby1.equals("sports")){
    hobby1 = "checked";
}
String hobby2 = request.getParameter("ah2");
if(hobby2==null) hobby2="";
if(hobby2.equals("travel")){
    hobby2 = "checked";
}
String hobby3 = request.getParameter("ah3");
if(hobby3==null) hobby3="";
if(hobby3.equals("music")){
    hobby3 = "checked";
}
String other = request.getParameter("other");
if(other==null) other="";
%>
```

```
<!DOCTYPE HTML>
<html>
<head>
  <title>postAndKeep</title>
</head>
<body>
<form action="postToSelf.jsp?user=<%=user%>" method="post">
 <input type="hidden" name="stuid" value="<%=stuid%>" />
 name: <input type="text" name="name" value="<%=name%>"/>
 grade:
  freshman<input type="radio" name="grade" value="freshman" <%=grades[0]%>/>
  sophomore<input type="radio" name="grade" value="sophomore" <%=grades[1]%>/>
  junior<input type="radio" name="grade" value="junior" <%=grades[2]%>/>
  senior<input type="radio" name="grade" value="senior" <%=grades[3]%>/>
 hobby:
   sports<input type="checkbox" name="ah1" value="sports" <%=hobby1%>/>
   travel<input type="checkbox" name="ah2" value="travel" <%=hobby2%>/>
   music<input type="checkbox" name="ah3" value="music" <%=hobby3%>/>
   other: <textarea rows="5" cols="30" name="other"><%=other%></textarea>
   <input type="submit"  name="submit1" value="save" />
   <input type="submit"  name="submit2" value="exit" />
 </form>
</body>
</html>
```

select?

- 取到所有提交的名值对　　getParameterNames.jsp

```
<%@ page language="java" import="java.util.*"
         contentType="text/html; charset=utf-8"%>
<%request.setCharacterEncoding("utf-8");%>
<% String saveButton=request.getParameter("submit1"); //判断是否按了保存按钮
   if(saveButton!=null){
     Enumeration<String> enums=request.getParameterNames();
     while(enums.hasMoreElements()){
        String name=(String)enums.nextElement();
        out.print(name+":"+request.getParameter(name)+"<br />");
     }
   }
%>
```

- 取得同名控件提交的值　　getParameterValues.jsp

如果把前面的checkbox的name都改为hobby，就会出现多个同名的控件。

```
<%@ page language="java" import="java.util.*"
         contentType="text/html; charset=utf-8"%>
<% request.setCharacterEncoding("utf-8");%>
<% String[] values=null;
   if(request.getMethod().equalsIgnoreCase("post")){
           values=request.getParameterValues("hobby");
   }
%>
```

●获得http请求的头部内容

getHeaderNames.jsp

```
<%@ page language="java" import="java.util.*"
         contentType="text/html; charset=utf-8"%>
<%request.setCharacterEncoding("utf-8");%>
<% Enumeration<String> enums=request.getHeaderNames();
    while(enums.hasMoreElements()){
        String name=(String)enums.nextElement();
        out.println("<B>"+name+"</B>: "+request.getHeader(name)+"<br>");
    }
%>
<!DOCTYPE HTML>
<html>
  <head>
    <title>getHeaderNames</title>
  </head>
  <body>
    <form action="getHeaderNames.jsp" method="post">
        <input type="hidden" name="stuid" value="123456" />
        name: <input type="text" name="name" value=""/>
        <input type="submit" name="submit1" value="提交" />
    </form>
  </body>
</html>
```

如何操作数据库

- **浏览学生记录(简单)**

```
<%@ page language="java" import="java.util.*,java.sql.*"
         contentType="text/html; charset=utf-8"
%><% request.setCharacterEncoding("utf-8");
     String msg="";
     String table="";
     String connectString = "jdbc:mysql://172.18.187.230:3306/teaching"
                     + "?autoReconnect=true&useUnicode=true"
                     + "&characterEncoding=UTF-8";
          try {
            Class.forName("com.mysql.jdbc.Driver");
            Connection con=DriverManager.getConnection(connectString,
                          "user", "123");
            Statement stmt=con.createStatement();
            ResultSet rs=stmt.executeQuery("select * from stu");
            if(rs.next()) {
               table=rs.getString("name");
            }
            rs.close();  stmt.close();  con.close();
          }
          catch (Exception e){
            msg = e.getMessage();
          }
%>
```

```
<!DOCTYPE HTML>
<html>
<head>
<title>浏览学生名单</title>
</head>
<body>
  <h1>浏览学生名单</h1>
  <%=table%><br><br>
</body>
</html>
```

- 翻页浏览学生记录

```
String sql=String.format("select * from stu limit %d,%d", pgno*pgcnt,pgcnt);
ResultSet rs=stmt.executeQuery(sql);
```

页号

每页行数

```
<%@ page language="java" import="java.util.*,java.sql.*"
         contentType="text/html; charset=utf-8"
%><%  request.setCharacterEncoding("utf-8");
      String msg ="";
      Integer pgno = 0;                          //当前页号
      Integer pgcnt = 4;                         //每页行数
      String param = request.getParameter("pgno");
      if(param != null && !param.isEmpty()){
           pgno = Integer.parseInt(param);
      }
      param = request.getParameter("pgcnt");
      if(param != null && !param.isEmpty()){
           pgcnt = Integer.parseInt(param);
      }
      int pgprev = (pgno>0)?pgno-1:0;
      int pgnext = pgno+1;
      String connectString = "jdbc:mysql://172.18.187.230:3306/teaching"
           + "?autoReconnect=true&useUnicode=true&characterEncoding=UTF-8";
```

```
String user="user";
String pwd="123";
StringBuilder table = new StringBuilder();
try{
   Class.forName("com.mysql.jdbc.Driver");
   Connection con=DriverManager.getConnection(connectString, user, pwd);
   Statement stmt=con.createStatement();
   String sql=String.format("select * from stu limit %d,%d", pgno*pgcnt,pgcnt);
   ResultSet rs=stmt.executeQuery(sql);
   table.append("<table><tr><th>id</th><th>学号</th><th>姓名</th>"+
                "<th>-</th></tr>");
   while(rs.next()) {
      table.append(String.format(
             "<tr><td>%s</td><td>%s</td><td>%s</td><td>%s %s</td></tr>",
             rs.getString("id"),rs.getString("num"),rs.getString("name"),
             "<a href='updateStu.jsp?pid="+rs.getString("id")+"'>修改</a>",
             "<a href='deleteStu.jsp?pid="+rs.getString("id")+"'>删除</a>"
          )
      );
   }
   table.append("</table>");
   rs.close();  stmt.close();  con.close();
 }
 catch (Exception e){
   msg = e.getMessage();
 }
%>
```

```
<!DOCTYPE HTML>
<html>
<head>
<title>浏览学生名单</title>
<style>
...  见下页
</style>
</head>
<body>
  <div class="container">
     <h1>浏览学生名单</h1>
     <%=table%>
     <div style="float:left">
       <a href="addStu.jsp">新增</a>
     </div>
     <div style="float:right">
       <a href="browseStu.jsp?pgno=<%=pgprev%>&pgcnt=<%=pgcnt%>">上一页</a>
       <a href="browseStu.jsp?pgno=<%=pgnext%>&pgcnt=<%=pgcnt%>">下一页</a>
     </div>
     <br><br>
     <%=msg%><br><br>
  </div>
</body>
</html>
```

```
<style>
  table{
          border-collapse: collapse;
          border: none;
          width: 500px;
   }
   td,th{
          border: solid grey 1px;
          margin: 0 0 0 0;
          padding: 5px 5px 5px 5px
   }
   a:link,a:visited {
     color:blue
   }

  .container{
    margin:0 auto;
    width:500px;
    text-align:center;
  }
</style>
```

- 新增操作

```
<%@ page language="java" import="java.util.*,java.sql.*"
         contentType="text/html; charset=utf-8"%>
<% request.setCharacterEncoding("utf-8");
String msg = "";
String connectString = "jdbc:mysql://172.18.187.11:3306/teaching"
        + "?autoReconnect=true&useUnicode=true&characterEncoding=UTF-8";
String user="user"; String pwd="123";
String num = request.getParameter("num");
String name = request.getParameter("name");
if(request.getMethod().equalsIgnoreCase("post")){
   Class.forName("com.mysql.jdbc.Driver");
   Connection con = DriverManager.getConnection(connectString,user, pwd);
   Statement stmt = con.createStatement();
   try{
      String fmt="insert into stu(num,name) values('%s', '%s')";
      String sql = String.format(fmt,num,name);
      int cnt = stmt.executeUpdate(sql);
      if(cnt>0)msg = "保存成功!";
      stmt.close();
      con.close();
   }catch (Exception e){
      msg = e.getMessage();
   }
}
%>
```

```
<!DOCTYPE HTML>
<html>
<head>
  <title>新增学生记录</title>
  <style>
      a:link,a:visited {color:blue;}
     .container{
        margin:0 auto;
        width:500px;
        text-align:center;
     }
  </style>
</head>
<body>
  <div class="container">
        <h1>新增学生记录</h1>
        <form action="addStu.jsp" method="post" name="f">
                学号:<input id="num" name="num" type="text" >
                姓名:<input id="name" type="text" name="name" >
                <input type="submit" name="sub" value="保存">
        </form>
        <%=msg%>
        <a href='browseStu.jsp'>返回</a>
  </div>
</body>
</html>
```

附录

附录1、hello_jsp.java程序

黑色的粗体字为JSP的基本内置对象

```
package org.apache.jsp;
import javax.servlet.*;
import javax.servlet.http.*;
import javax.servlet.jsp.*;
public final class hello_jsp extends org.apache.jasper.runtime.HttpJspBase
    implements org.apache.jasper.runtime.JspSourceDependent {
    private static final javax.servlet.jsp.JspFactory _jspxFactory =
          javax.servlet.jsp.JspFactory.getDefaultFactory();
    ... //定义了对象：_jspx_dependants; _el_expressionfactory; _jsp_instancemanager;
    ...//定义了方法： getDependants() {...},_jspInit(){...}, _jspDestroy() {...}
    ...
    public void _jspService(
            final javax.servlet.http.HttpServletRequest request,
            final javax.servlet.http.HttpServletResponse response)
        throws java.io.IOException, javax.servlet.ServletException {
      final javax.servlet.jsp.PageContext pageContext;
      javax.servlet.http.HttpSession session = null;
      final javax.servlet.ServletContext application;
      final javax.servlet.ServletConfig config;
      javax.servlet.jsp.JspWriter out = null;
      final java.lang.Object page = this;
      javax.servlet.jsp.JspWriter _jspx_out = null;
      javax.servlet.jsp.PageContext _jspx_page_context = null;
```

```
try {
      response.setContentType("text/html;charset=gb2312");
      pageContext = _jspxFactory.getPageContext(this, request, response,
                        null, true, 8192, true);
      _jspx_page_context = pageContext;
      application = pageContext.getServletContext();
      config = pageContext.getServletConfig();
      session = pageContext.getSession();
      out = pageContext.getOut();
      _jspx_out = out;
      out.write("<html>\r\n");
      out.write("<head>\r\n");
      out.write("<title>Hello world</title>\r\n");
      out.write("</head>\r\n");
      out.write("<body>\r\n");
      out.print("Hello world!");
      out.write("</body>\r\n");
      out.write("</html>\r\n");
      out.write("\r\n");
```

```
      out.write("\r\n");
      out.write("\r\n");
    } catch (java.lang.Throwable t) {
      if (!(t instanceof javax.servlet.jsp.SkipPageException)){
        out = _jspx_out;
        if (out != null && out.getBufferSize() != 0)
          try { out.clearBuffer(); } catch (java.io.IOException e) {}
        if (_jspx_page_context != null)
              _jspx_page_context.handlePageException(t);
      }
    } finally {
      _jspxFactory.releasePageContext(_jspx_page_context);
    }
  }  // _jspService
} // class
```

附录2、JSP声明的源码转换

getSumFuncClass.jsp

```
<%@ page contentType="text/html;charset=gb2312"%>
<%! int cnt = 0;
    int getSum(int n){
      int sum=0;
      for(int i=1;i<=n;i++){
         sum=sum+i;
      }
      return sum;
    }
    class Sum{
      int getSum(int n){
        int sum=0;
        for(int i=1;i<=n;i++){
          sum=sum+i;
        }
        return sum;
      }
    }
 %>
<html>
<head>
<title>getSumFunc</title>
</head>
<body>
  <h1>getSumFunc</h1>
  <p>sum1:<%=getSum(100)%></p>
  <p>sum2:<% Sum sum=new Sum();%><%=sum.getSum(100)%></p>
  count:<%=++cnt%>
</body>
</html>
```

getSumFuncClass_jsp.jsp

```
package org.apache.jsp;
import javax.servlet.*;
import javax.servlet.http.*;
import javax.servlet.jsp.*;
public final class getSumfuncClass_jsp extends org.apache.jasper.runtime.HttpJspBase
    implements org.apache.jasper.runtime.JspSourceDependent,
                 org.apache.jasper.runtime.JspSourceImports {
    int cnt = 0;
    int getSum(int n){
      int sum=0;
      for(int i=1;i<=n;i++){
         sum=sum+i;
      }
      return sum;
    }
    class Sum{
      int getSum(int n){
        int sum=0;
        for(int i=1;i<=n;i++){
          sum=sum+i;
        }
        return sum;
      }
    }

  private static final javax.servlet.jsp.JspFactory _jspxFactory =
          javax.servlet.jsp.JspFactory.getDefaultFactory();
  private static java.util.Map<java.lang.String,java.lang.Long> _jspx_dependants;
  private static final java.util.Set<java.lang.String> _jspx_imports_packages;
  private static final java.util.Set<java.lang.String> _jspx_imports_classes;
  static {
    _jspx_imports_packages = new java.util.HashSet<>();
    _jspx_imports_packages.add("javax.servlet");
    _jspx_imports_packages.add("javax.servlet.http");
    _jspx_imports_packages.add("javax.servlet.jsp");
    _jspx_imports_classes = null;
  }
```

```
private volatile javax.el.ExpressionFactory _el_expressionfactory;
  private volatile org.apache.tomcat.InstanceManager _jsp_instancemanager;
  public java.util.Map<java.lang.String,java.lang.Long> getDependants() {
    return _jspx_dependants;
  }
  public java.util.Set<java.lang.String> getPackageImports() {
    return _jspx_imports_packages;
  }
  public java.util.Set<java.lang.String> getClassImports() {
    return _jspx_imports_classes;
  }
  public javax.el.ExpressionFactory _jsp_getExpressionFactory() {
    if (_el_expressionfactory == null) {
      synchronized (this) {
        if (_el_expressionfactory == null) {
          _el_expressionfactory =
              _jspxFactory.getJspApplicationContext(getServletConfig().getServletContext()).getExpressionFactory();
        }
      }
    }
    return _el_expressionfactory;
  }
  public org.apache.tomcat.InstanceManager _jsp_getInstanceManager() {
    if (_jsp_instancemanager == null) {
      synchronized (this) {
        if (_jsp_instancemanager == null) {
          _jsp_instancemanager = org.apache.jasper.runtime.InstanceManagerFactory.getInstanceManager(getServletConfig());
        }
      }
    }
    return _jsp_instancemanager;
  }
  public void _jspInit() {
  }
  public void _jspDestroy() {
  }
  public void _jspService(final javax.servlet.http.HttpServletRequest request,
                          final javax.servlet.http.HttpServletResponse response)
      throws java.io.IOException, javax.servlet.ServletException {
    final java.lang.String _jspx_method = request.getMethod();
    if (!"GET".equals(_jspx_method) && !"POST".equals(_jspx_method) && !"HEAD".equals(_jspx_method)
          && !javax.servlet.DispatcherType.ERROR.equals(request.getDispatcherType())) {
      response.sendError(HttpServletResponse.SC_METHOD_NOT_ALLOWED, "JSPs only permit GET POST or HEAD");
      return;
    }
```

```
final javax.servlet.jsp.PageContext pageContext;
   javax.servlet.http.HttpSession session = null;
   final javax.servlet.ServletContext application;
   final javax.servlet.ServletConfig config;
   javax.servlet.jsp.JspWriter out = null;
   final java.lang.Object page = this;
   javax.servlet.jsp.JspWriter _jspx_out = null;
   javax.servlet.jsp.PageContext _jspx_page_context = null;
   try {
     response.setContentType("text/html;charset=gb2312");
     pageContext = _jspxFactory.getPageContext(this, request, response,
                                       null, true, 8192, true);
     _jspx_page_context = pageContext;
     application = pageContext.getServletContext();
     config = pageContext.getServletConfig();
     session = pageContext.getSession();
     out = pageContext.getOut();
     _jspx_out = out;
     out.write('\r');
     out.write('\n');
     out.write("\r\n");
     out.write("<html>\r\n");
     out.write("<head>\r\n");
     out.write("<title>getSumFunc</title>\r\n");
     out.write("</head>\r\n");
     out.write("<body>\r\n");
     out.write("  <h1>getSumFunc</h1>\r\n");
     out.write("  <p>sum1:");
     out.print(getSum(100));
     out.write("</p>\r\n");
     out.write("  <p>sum2:");
     Sum sum=new Sum();
     out.print(sum.getSum(100));
     out.write("</p>\r\n");
     out.write("  count:");
     out.print(++cnt);
     out.write("\r\n");
     out.write("</body>\r\n");
     out.write("</html>\r\n");
```

```
   } catch (java.lang.Throwable t) {
      if (!(t instanceof javax.servlet.jsp.SkipPageException)){
        out = _jspx_out;
        if (out != null && out.getBufferSize() != 0)
          try {
            if (response.isCommitted()) {
              out.flush();
            } else {
              out.clearBuffer();
            }
          } catch (java.io.IOException e) {}
        if (_jspx_page_context != null) _jspx_page_context.handlePageException(t);
        else throw new ServletException(t);
      }
    } finally {
      _jspxFactory.releasePageContext(_jspx_page_context);
    }
  }
}
```

附录3、JSP页面构成元素

- JSP页面主要是在HTML页面中加入JSP的内容。JSP内容均在<%和%>之间定义。
- 生成响应页面时HTML模版直接输出到客户端，JSP内容要执行语句或给出编译指示，只有输出的内容会被发送到客户端。
- JSP页面由五种元素组成：
  (1) HTML模版
  (2) 指令标签
  (3) 动作标签
  (4) 脚本程序：声明片段、脚本片段和注释
  (5) 表达式

附录4、JSP页面元素

<%@ 指令%>	对后面的JSP页面给出编译指示，主要指令有：**page，include**，taglib
<% 动作 %>	用来实现特殊的功能，主要标签：<jsp:include> <jsp:forward> <jsp:useBean> <jsp:setProperty> <jsp:getProperty>
<%! 声明%>	声明全局JSP变量和方法。它们被所有线程所共享。
<% 脚本片段 %>	有效的java程序段，其中定义的变量为局部变量。
<%-- 注释--%>	JSP注释
<%= 表达式%>	计算JSP表达式的值并输出到页面。

附录5、JSP指令标签(Directive)

- 概述

JSP指令标签指示JSP引擎对JSP页面需要做什么。

- 主要指令

（1）Page指令
（2）include指令
（3）taglib指令(后面再讲)

- page指令

功能

用来定义整个JSP页面的属性。一个JSP页面可以有多条page指令。除了import属性，其它属性只能定义一次。

语法(红色为默认值)

<%@ page [language=“java”]	定义所用语言(默认为java)
[extends="package.class"]	定义JSP文件的继承类
[import="{package.class, ..."]	指明想要引入的java类包
[session="true|false"]	是否允许使用session对象
[buffer="none|8kb|*x*kb"]	输出缓冲的大小
[autoFlush="true|false"]	当缓冲满时是否自动输出
[isThreadSafe="true|false"]	采用多线程(默认)还是单线程

[info="text"] 定义JSP页面的文本信息

[contentType="text/html ; charset=ISO-8859-1"]
定义传送给浏览器的内容（或文件）类型和字符编码。

[errorPage="relativeURL"] 处理意外的页面

[isErrorPage="true|false"] 指定当前页面是否可以处理来自另一个页面的错误，缺省为"false"。

[pageCoding="ISO-8859-1"] 定义JSP源程序使用的字符编码

%>

（1）**JSP默认已引入以下包：**java.lang.*，javax.servlet.*，javax.servlet.jsp.*，javax.servlet.http.*。其它类包必须用指令引入：

```
<%@ page import="java.util.*" %>
<%@ page import="java.io.*,java.net.*,java.sql.*" %>
```

（2）**autoFlush**指明每当缓冲区满时是否自动把缓冲区的内容输出给客户端。如果autoFlush为false，当buffer不足时，会抛出错误。当buffer设置为none, autoFlush必须为true。

```
<%@ page buffer="24kb" autoFlush=false %>
```

（3）设置所支持的语言，目前**JSP支持的语言**只有java：

```
<%@ page language="java"  %>
```

（4）用`<%@ page contentType="text/html; charset=utf-8"%>`

设置http响应的内容（或文件）类型和编码。

其它文件类型：*text/plain(文本)，image/gif（gif图像），image/jpeg（jpeg图像），application/xshockwave（flash文件），application /msword（msword文件），…。*

支持的显示字符集(charset): *ISO-8859-1，GBK，GB2312，UTF-8, …。*

也可以采用`<% response.setContentType("text/html; charset=utf-8"); %>`进行设置。

这个指令会影响HTTP响应：

HTTP/1.1 200 OK\r\n
…
Content-Type: text/html; charset=utf-8\r\n
\r\n
正文

（5）用<%@ page errorPage="*errorPage.jsp*" %>指出出错处理程序为errorPage.jsp。
在这个程序中用命令 **<%@page isErrorPage="true" %>**说明是错误处理程序。用 **<%=exception.toString()%>**显示出错信息。

（6）用<%@page info="*增加学生信息*" %>定义页面信息
用**<%=getServletInfo()%>**可以显示出该信息。

（7）用<%@page pageEncoding="*GBK*" %>定义源文件编码，它和contentType如果只有一个定义了编码，则都使用该编码，如果两个都没定义，则默认使用*ISO-8859-1*。

JSP编译：把pageEncoding的JSP源代码转换为unicode的servlet(.java)程序，然后编译为字节码程序。http响应的内容要转换为contentType指定的编码。提交的内容用request.setCharacterCode()指定的编码进行解码。

附录6、JavaBean的scope

getServerTime.jsp

```
<%@ page language="java" import="java.util.*" pageEncoding="utf-8"%>
<jsp:useBean id="getServerTime" class="Java.util.Date" scope="page" />
<%= getServerTime.toString() %>
```

对象名

当scope=page/request时，每次访问该网页(刷新页面)都会创建新的JavaBean对象。
当scope=session时，只有获得新的sessionID时，才会创建新的JavaBean对象。
当scope=application时，只有重启Web服务器才会创建新的JavaBean对象。在不同主机和浏览器访问时都会取到同一个的时间。

page表示将JavaBean实例对象存储在PageContext对象中，作用范围是当前JSP页面有效。
request表示将JavaBean实例对象存储在ServletRequest对象中，即可以被属于同一个请求的所有Servlet和JSP页面访问。
session表示将JavaBean实例对象存储在HttpSession对象中，存储在HttpSession对象中的JavaBean对象可以被属于同一个会话的所有Servlet和JSP页面访问。要求当前JSP页面支持Session，即page指令的session属性设置为true（默认）。
application表示将JavaBean实例对象存储在ServletContext对象中，存储在ServletContext对象中的JavaBean对象可以被同一个Web应用程序中的所有Servlet和JSP页面访问。也就是所有用户都可以使用。

附录7、配置问题

* 如果希望jsp文件被修改后自动编译运行，就需要在子目录META-INF下新建context.xml文件，内容为：<Context reloadable="true"/>

* 所有应用程序都要使用的jar包应该放在子目录tomcat\lib中。jsp不需要配置classpath。

* 下面为增加虚拟主机和虚拟目录的方法。webapps下的子目录都是虚拟目录。要在其它地方定义虚拟目录，需要修改配置文件tamcat/conf/server.xml。为了定义lab和test两个虚拟目录，下面在server.xml增加了两个配置：

```
<Host name="localhost"  appBase="webapps" unpackWARs="true" autoDeploy="true">
  <Context path="lab" docBase="D:\Lab" reloadable="true"></Context>
  <Context path="test" docBase="D:\test" reloadable="true"></Context>
</Host>
<Host name= "www.group.com"  appBase="d:\group" unpackWARs="true"
      autoDeploy="true">
  <Context path= "tech" docBase="D:\Tech" reloadable="true"></Context>
  <Context path="teach" docBase="D:\Teach" reloadable="true"></Context>
</Host>
```