

Lecture 11

JSP Page Directive

Lecture Agenda

- 1 Understanding the purpose of the page directive
- 2 Designating which classes are imported
- 3 Specifying the MIME type of the page
- 4 Generating Excel spreadsheets
- 5 Participating in sessions
- 6 Setting the size and behavior of the output buffer
- 7 Designating pages to handle JSP errors.

Purpose of the JSP page directive

Purpose

Main Purpose of JSP page directive

- Give high-level information about the servlet that will result from the JSP page.
- Can control
 - Which classes are imported
 - What class the servlet extends
 - What MIME type is generated
 - How multithreading is handled
 - If the servlet participates in sessions
 - The size and behavior of the output buffer
 - What page handles unexpected errors

The import Attribute

Understanding the import attribute

■ Format

- `<%@ page import="package.class" %>`
- `<%@page import="package.class1, package.class2"%>`

■ Purpose

- Generate import statements at top of servlet definition.

■ Notes

- Although JSP pages can be almost anywhere on the server, classes used by JSP pages must be in normal servlet dirs (src directory → WEB_INF/classes ...).
- Example:
 - .../WEB-INF/classes or
 - .../WEB-INF/classes/directoryMatchingPackage
 - **Always use packages for Utilities that will be used by JSP!**

The Importance of Using Packages

Package Importance

- Question: What packages will the system think that **SomeHelperClass** and **SomeUtilityClass** are in?

```
...
public class SomeClass {
    public String someMethod(...) {
        SomeHelperClass test = new SomeHelperClass(...);
        String someString =
            SomeUtilityClass.someStaticMethod(...);
        ...
    }
}
```

The Importance of Using Packages Continued ...

Package Importance

- Question: What packages will the system think that **SomeHelperClass** and **SomeUtilityClass** are in?

```
...  
<%  
    SomeHelperClass test = new SomeHelperClass(...);  
    String someString =  
        SomeUtilityClass.someStaticMethod(...);  
%>
```

The **import** Attribute: Example (Code)

The import Attribute

Example JSP Code utilizing import

```
...<H2>The import Attribute</H2>
<%@ page import="java.util.*,coreservlets.*" %>
<%!
private String randomID() {
    int num = (int) (Math.random()*100000000.0);
    return("id" + num);
}
private final String NO_VALUE = "<I>No Value</I>";
%>
<%
String oldID =
    CookieUtilities.getCookieValue(request, "userID",
                                   NO_VALUE);

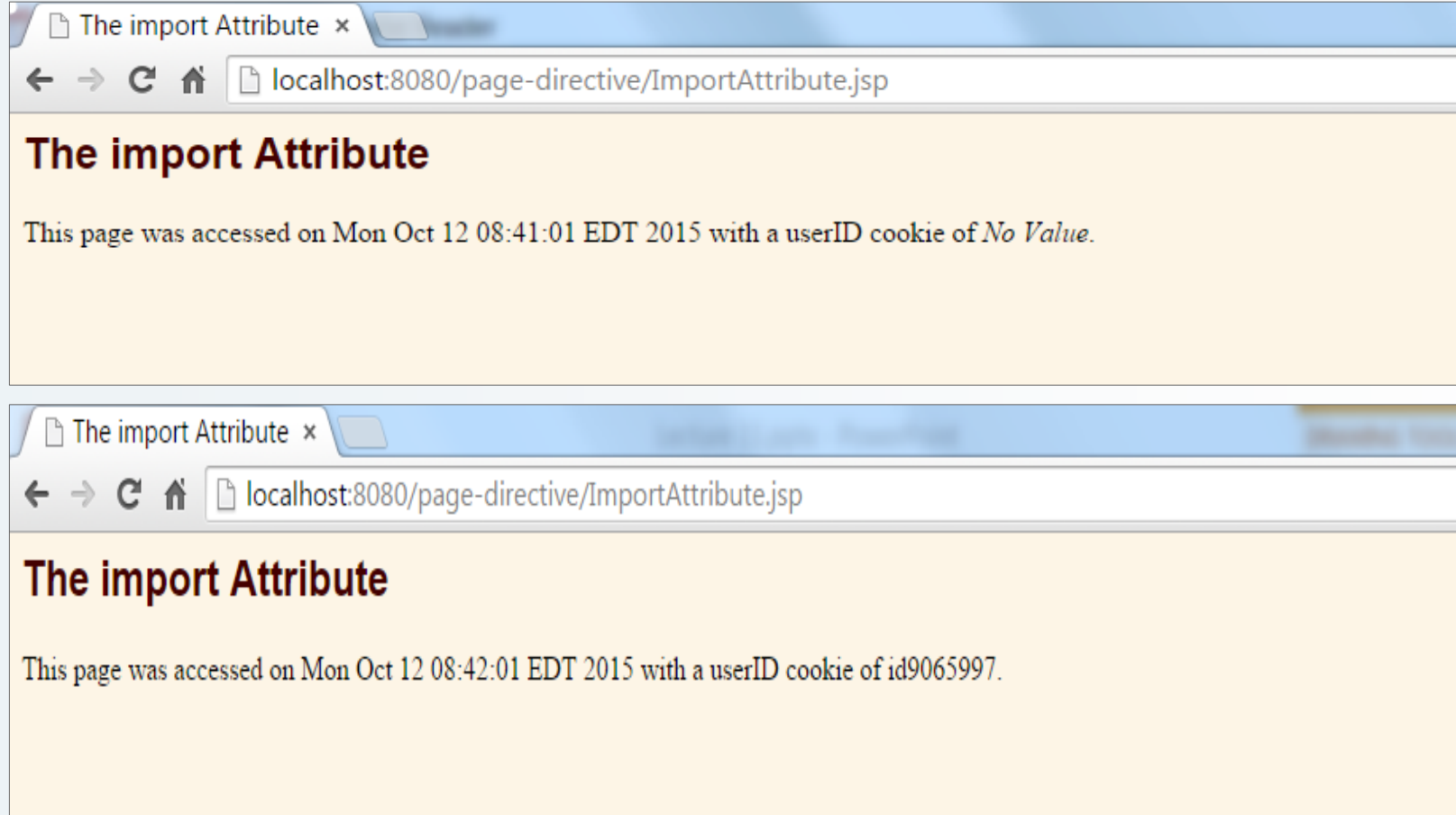
if (oldID.equals(NO_VALUE)) {
    String newID = randomID();
    Cookie cookie = new LongLivedCookie("userID", newID);
    response.addCookie(cookie);
}
%>
This page was accessed on <%= new Date() %> with a userID
cookie of <%= oldID %>.
</BODY></HTML>
```



page import

The import Attribute

Result



The contentType and pageEncoding Attributes

contentType and pageEncoding

- Format
 - `<%@page contentType="MIME-Type" %>`
 - `<%@page contentType="MIME-Type; charset=Character-Set" %>`
 - `<%@page pageEncoding="Character-Set" %>`
- Purpose
 - Specify the MIME type of the page generated by the servlet that results from the JSP page.
 - Specify page-encoding, the character encoding in which the file is encoded in.
- Notes
 - Attribute value cannot be computed at request time (not dynamic)
 - See lecture on response headers for table of the most common MIME types

Generating Excel Spreadsheets

Generating Excel Spreadsheet

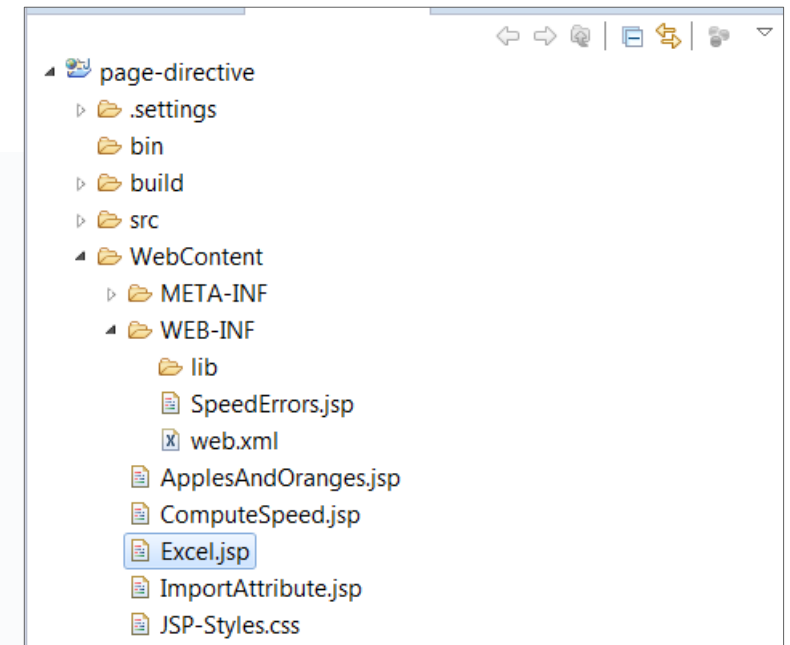
Excel Spreadsheet Revisit

FirstLast	Email	Address
John	Doe	jdoe@domain.com
Jane	Smith	jsmith@abc.com
Steve	Balmer	balmer@ibm.com
Scott	McNealy	mcnealy@microsoft.com

<%@ page contentType="application/vnd.ms-excel" %>


<%-- There are tabs, not spaces, between columns. --%>

	A	B	C	D	E
1	First	Last	Email Address		
2	John	Doe	jdoe@domain.com		
3	Jane	Smith	jsmith@abc.com		
4	Steve	Balmer	balmer@ibm.com		
5	Scott	McNealy	mcnealy@microsoft.com		



Conditionally Generating Excel Spreadsheet Code

```
...
<BODY>
<CENTER>
<H2>Comparing Apples and Oranges</H2>
<%
String format = request.getParameter("format");
if ((format != null) && (format.equals("excel"))) {
    response.setContentType("application/vnd.ms-excel");
}
%>
<TABLE BORDER=1>
  <TR><TH></TH>          <TH>Apples<TH>Oranges
  <TR><TH>First Quarter <TD>2307   <TD>4706
  <TR><TH>Second Quarter<TD>2982   <TD>5104
  <TR><TH>Third Quarter  <TD>3011   <TD>5220
  <TR><TH>Fourth Quarter <TD>3055   <TD>5287
</TABLE>
</CENTER></BODY></HTML>
```



Conditional
added

Conditionally Generating Excel Spreadsheet

Result

Comparing Apples and Oranges - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://localhost/page-directive/ApplesAndOranges.jsp>

	Apples	Oranges
First Quarter	2307	4706
Second Quarter	2982	5104
Third Quarter	3011	5220
Fourth Quarter	3055	5287

Done Local intranet

HTML
contentType

<http://localhost/page-directive/ApplesAndOranges.jsp?format=excel...>

File Edit View Insert Format Tools Data Go To Favorites Help

Address <http://localhost/page-directive/ApplesAndOranges.jsp?format=excel...>

A1 = Comparing Apples and Oranges

	A	B	C	D	E	F
1	Comparing Apples and Oranges					
2						
3		Apples	Oranges			
4	First Quarter	2307	4706			
5	Second Quarter	2982	5104			
6	Third Quarter	3011	5220			
7	Fourth Quarter	3055	5287			
8						
9						
10						

ApplesAndOranges.jsp format=exc / Unknown Zone

Excel
contentType

The **session**, **isELIgnored**, **buffer**, **errorPage** and **isErrorPage** Attribute

The Session Attribute

Session Attribute

- Format

`<%@ page session="true" %> <%-- Default %>`

`<%@ page session="false" %>`

- Purpose

- To designate the page to not to be part of a session (vice-versa).

- Notes

- By default, a page is part of a session
- Saves memory on server if you have a high-traffic site to control this
- All related pages have to do this for it to be useful

The isELIgnored Attribute

isELIgnored Attribute

- Format

`<%@ page isELIgnored="false" %>`

`<%@ page isELIgnored="true" %>`

- Purpose

- To control whether the JSP 2.0 Expression Language (EL) is ignored (true) or evaluated normally (false).

- Notes

- If you web.xml specifies servlets 2.3 or earlier (JSP 1.2), the default is true.
- If you web.xml specifies servlets 2.4 (JSP 2.0+), the default is false.

The buffer Attribute

buffer Attribute

- Format

`<%@ page buffer="sizekb" %>`

`<%@ page buffer="none" %>`

- Purpose

- To give the size of the buffer used by the out variable.

- Notes

- Buffering lets you set HTTP headers even after some page content has been generated (as long as buffer has not filled up or been explicitly flushed).
- Servers are allowed to use a larger size than you ask for, but not a smaller size
- Default is system-specific, but must be at least 8kb

The `errorPage` Attribute

`errorPage` Attribute

- Format

`<%@ page errorPage="Relative URL" %>`

- Purpose

- Specifies a JSP page that should process any exceptions thrown but not caught in the current page.

- Notes

- The exception thrown will be automatically available to the designated error page by means of the “exception” variable.
- The `web.xml` file lets you specify *application-wide* error pages that apply whenever certain exceptions or certain HTTP status codes result.
 - The `errorPage` attribute is for page-specific error pages.

The errorPage Attribute Continued ...

errorPage Attribute

Default Error page based on Exception type:

```
<error-page>
  <exception-type>java.lang.Throwable</exception-type>
  <location>/error.htm</location>
</error-page>
```

error-page based on
exception

Default Error page based on HTTP Error code:

```
<error-page>
  <error-code>500</error-code>
  <location>/internal-server-error.htm</location>
</error-page>
<error-page>
  <error-code>404</error-code>
  <location>/page-not-found-error.htm</location>
</error-page>
```

Error-page based on
status code

The isErrorPage Attribute

isErrorPage Attribute

- Format

`<%@ page isErrorPage="true" %>`

`<%@ page isErrorPage="false" %> <!-- Default -- %>`

- Purpose

- Indicates whether or not the current page can act as the error page for another JSP.

- Notes

- A new predefined variable called the **exception** is created and accessible from error pages.
- Use this for emergency backup only;
- Better to explicitly handle as many exceptions as possible.
 - Don't forget to always check query data for missing or malformed values etc ...

Error Pages

Example: ComputeSpeed.jsp

```
...<BODY>
<%@ page errorPage="/WEB-INF/SpeedErrors.jsp" %>
<TABLE BORDER=5 ALIGN="CENTER">
  <TR><TH CLASS="TITLE">Computing Speed</TH></TR></TABLE>
<%!
private double toDouble(String value) {
    return (Double.parseDouble(value));
}
%>
<%
double furlongs = toDouble(request.getParameter("furlongs"));
double fortnights =
    toDouble(request.getParameter("fortnights"));
double speed = furlongs/fortnights;
%>
<UL>
  <LI>Distance: <%= furlongs %> furlongs.
  <LI>Time: <%= fortnights %> fortnights.
  <LI>Speed: <%= speed %> furlongs per fortnight.
</UL>
</BODY></HTML>
```

errorPage directive added.
Note the lack of try/catch for
NumberFormatException if
value is malformed

Error Pages Continued

Example: SpeedError.jsp acting as error page for ComputeSpeed.jsp

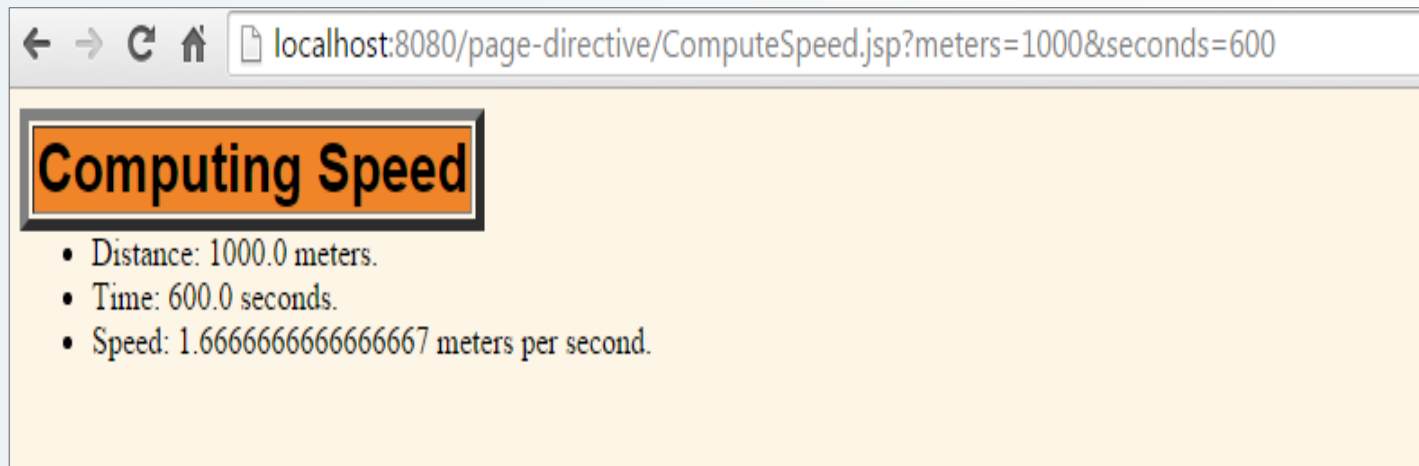
```
...<BODY>
<%@ page isErrorPage="true" %>
<TABLE BORDER=5 ALIGN="CENTER">
  <TR><TH CLASS="TITLE">
    Error Computing Speed</TH></TR></TABLE>
<P>
  ComputeSpeed.jsp reported the following error:
  <I><%= exception %></I>. This problem occurred in the
  following place:
  <PRE>
  <%@ page import="java.io.*" %>
  <% exception.printStackTrace(new PrintWriter(out)); %>
  </PRE>
</BODY></HTML>
```

`isErrorPage` directive
added to specify the
page as an error.

Inherited exception
variable store
exception thrown

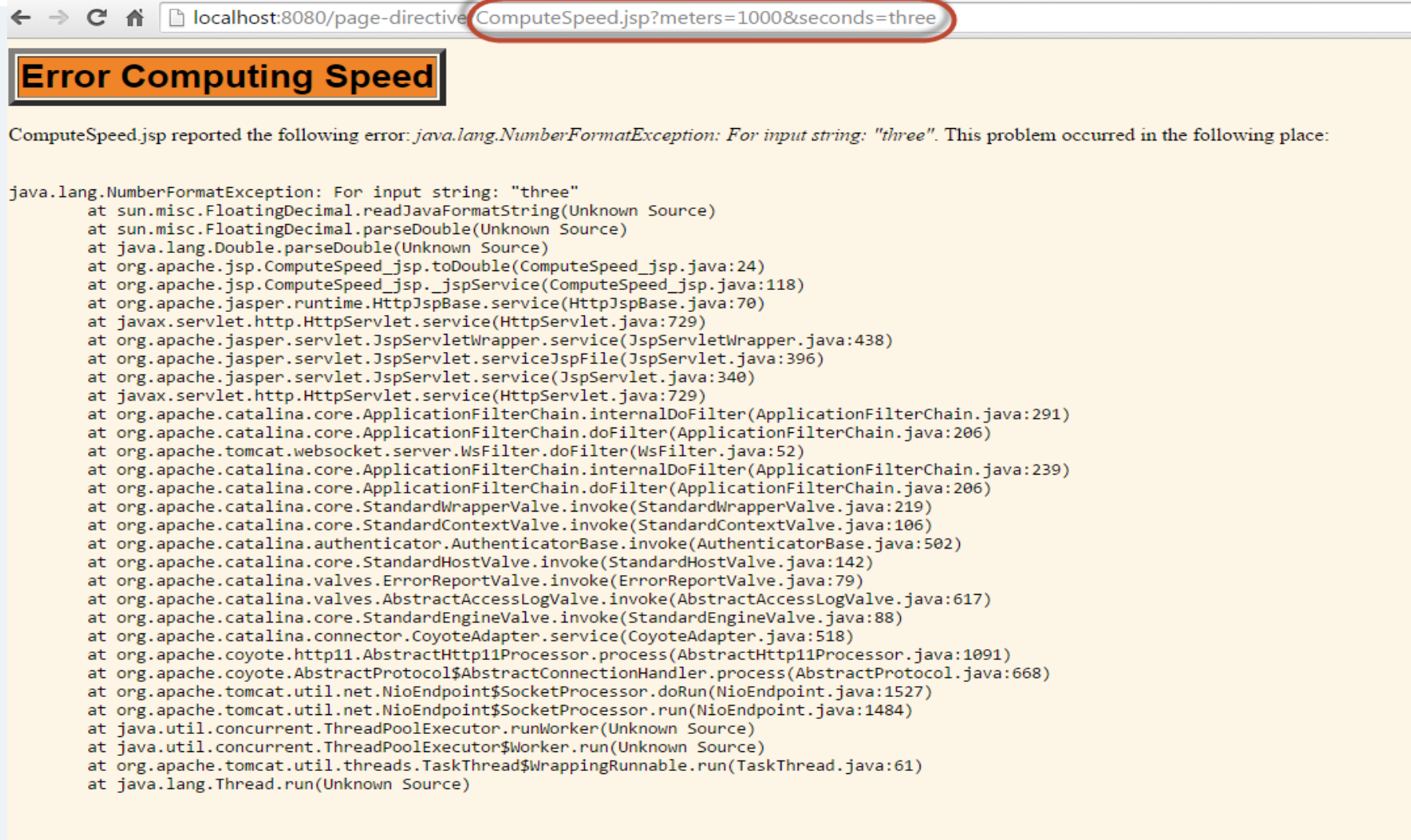
Error Pages Result

Result: No Exception



Error Pages Result Continued ...

Result: Exception InvalidNumberFormat



← → ↺ 🏠

Error Computing Speed

ComputeSpeed.jsp reported the following error: *java.lang.NumberFormatException: For input string: "three"*. This problem occurred in the following place:

```
java.lang.NumberFormatException: For input string: "three"
    at sun.misc.FloatingDecimal.readJavaFormatString(Unknown Source)
    at sun.misc.FloatingDecimal.parseDouble(Unknown Source)
    at java.lang.Double.parseDouble(Unknown Source)
    at org.apache.jsp.ComputeSpeed_jsp.toDouble(ComputeSpeed_jsp.java:24)
    at org.apache.jsp.ComputeSpeed_jsp._jspService(ComputeSpeed_jsp.java:118)
    at org.apache.jasper.runtime.HttpJspBase.service(HttpJspBase.java:70)
    at javax.servlet.http.HttpServlet.service(HttpServlet.java:729)
    at org.apache.jasper.servlet.JspServletWrapper.service(JspServletWrapper.java:438)
    at org.apache.jasper.servlet.JspServlet.serviceJspFile(JspServlet.java:396)
    at org.apache.jasper.servlet.JspServlet.service(JspServlet.java:340)
    at javax.servlet.http.HttpServlet.service(HttpServlet.java:729)
    at org.apache.catalina.core.ApplicationFilterChain.internalDoFilter(ApplicationFilterChain.java:291)
    at org.apache.catalina.core.ApplicationFilterChain.doFilter(ApplicationFilterChain.java:206)
    at org.apache.tomcat.websocket.server.WsFilter.doFilter(WsFilter.java:52)
    at org.apache.catalina.core.ApplicationFilterChain.internalDoFilter(ApplicationFilterChain.java:239)
    at org.apache.catalina.core.ApplicationFilterChain.doFilter(ApplicationFilterChain.java:206)
    at org.apache.catalina.core.StandardWrapperValve.invoke(StandardWrapperValve.java:219)
    at org.apache.catalina.core.StandardContextValve.invoke(StandardContextValve.java:106)
    at org.apache.catalina.authenticator.AuthenticatorBase.invoke(AuthenticatorBase.java:502)
    at org.apache.catalina.core.StandardHostValve.invoke(StandardHostValve.java:142)
    at org.apache.catalina.valves.ErrorReportValve.invoke(ErrorReportValve.java:79)
    at org.apache.catalina.valves.AbstractAccessLogValve.invoke(AbstractAccessLogValve.java:617)
    at org.apache.catalina.core.StandardEngineValve.invoke(StandardEngineValve.java:88)
    at org.apache.catalina.connector.CoyoteAdapter.service(CoyoteAdapter.java:518)
    at org.apache.coyote.http11.AbstractHttp11Processor.process(AbstractHttp11Processor.java:1091)
    at org.apache.coyote.AbstractProtocol$AbstractConnectionHandler.process(AbstractProtocol.java:668)
    at org.apache.tomcat.util.net.NioEndpoint$SocketProcessor.doRun(NioEndpoint.java:1527)
    at org.apache.tomcat.util.net.NioEndpoint$SocketProcessor.run(NioEndpoint.java:1484)
    at java.util.concurrent.ThreadPoolExecutor.runWorker(Unknown Source)
    at java.util.concurrent.ThreadPoolExecutor$Worker.run(Unknown Source)
    at org.apache.tomcat.util.threads.TaskThread$WrappingRunnable.run(TaskThread.java:61)
    at java.lang.Thread.run(Unknown Source)
```

Summary

JSP Page Directives

- Used Frequently

- **Import**

- Changes the packages imported by the servlet that results from the JSP page.
 - Always use packages for utility classes!

- **contentType**

- Specifies MIME type of result

- Used Moderately

- **isELIgnored**, session, buffer

- Used occasionally

- **errorPage/isErrorPage**

Questions?