



# JMEITags: A Custom JSP Tag Library

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- An effective way to bring math computability onto Web

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# 1. JSP and Custom Tag: A Quick Review

- What is JSP?
- Why JSP?
- How JSP fits in Web Server Framework?
- JSP Request/Response Flow
- JSP Custom Tag Library.



## What is JSP?

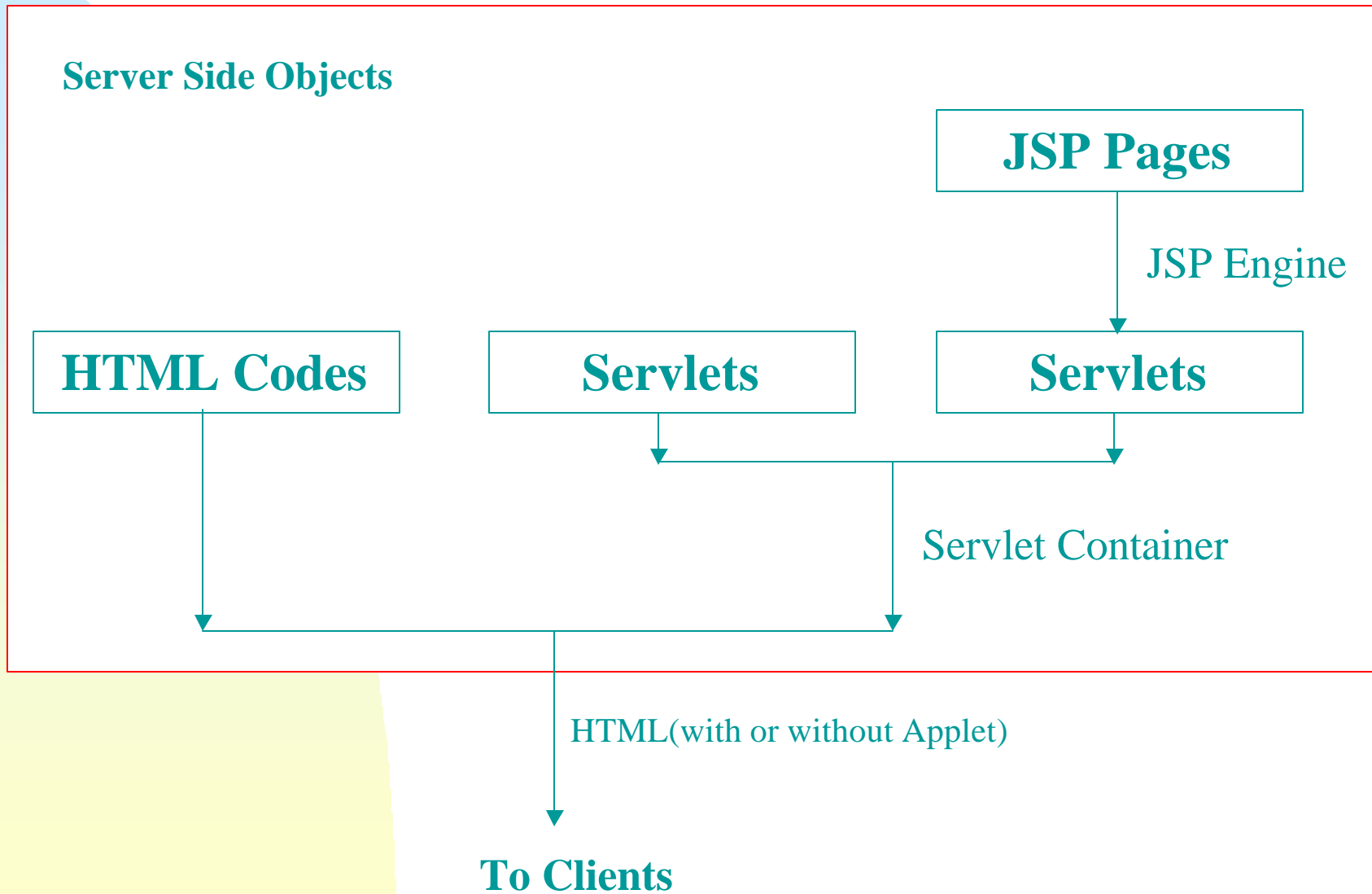
- An extension of Java Servlet;
- A textual document with Java code;
- Server-Side Scripting.

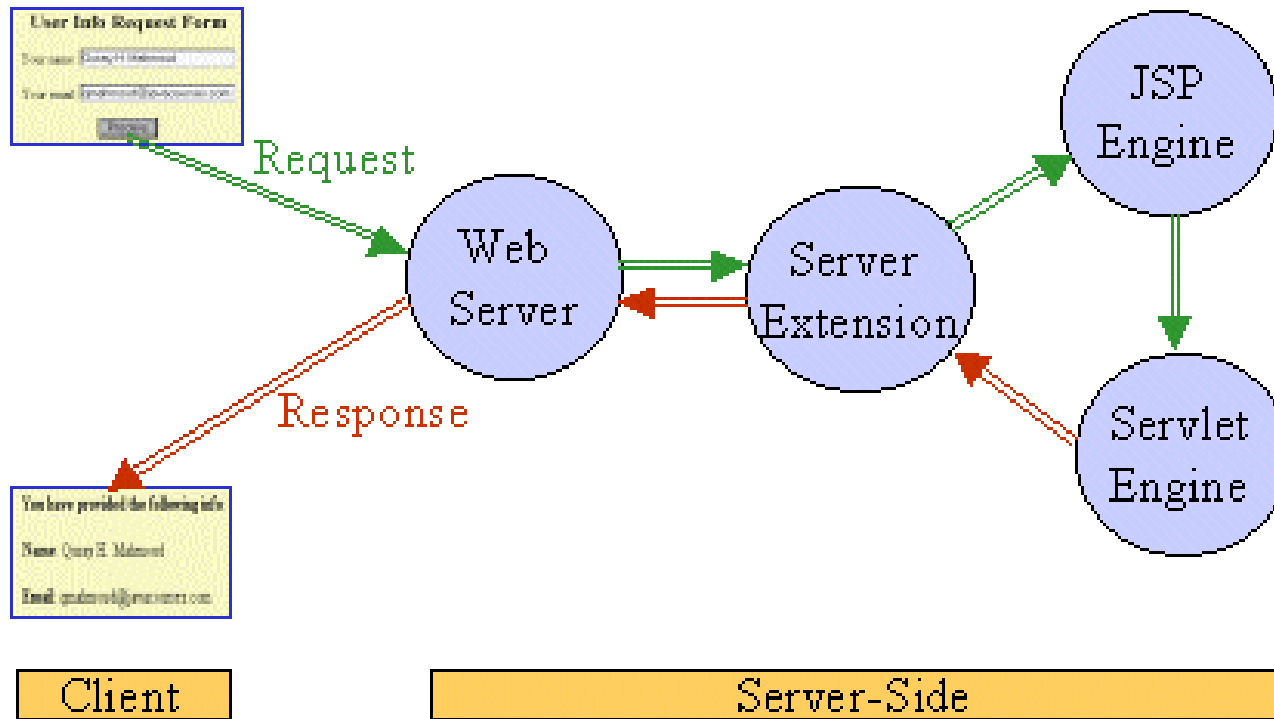


## Why JSP?

- Easier to author;
- Tool/IDE Friendly;
- Separate Developers/Authors (with Custom Tag support).

# How JSP fits in Web Server Framework?





## *JSP Request/Response Flow*

## A Sample JSP Page – Part I

```
<HTML>
<%@ page language="java" imports="java.util.*" %>

<H1>Welcome</H1>

<P>Today is </P>
<jsp:useBean id="clock" class="jspCalendar" />
<UL>
<LI>Day: <%= clock.getDayOfMonth() %>
<LI>Year: <%= clock.getYear() %>
</UL>

... to be continued in the following page
```



## A Sample JSP Page – Part 2

*... continue*

```
<%-- Check for AM or PM --%>
```

```
<%! int time = Calendar.getInstance().get(Calendar.AM_PM); %>
```

```
<%
```

```
if (time == Calendar.AM) {
```

```
%>
```

```
Good Morning
```

```
<%
```

```
}
```

```
else
```

```
{ %>Good Afternoon<%}
```

```
%>
```

```
<%@ include file="copyright.html" %>
```

```
</HTML>
```

## What is Tag Library?

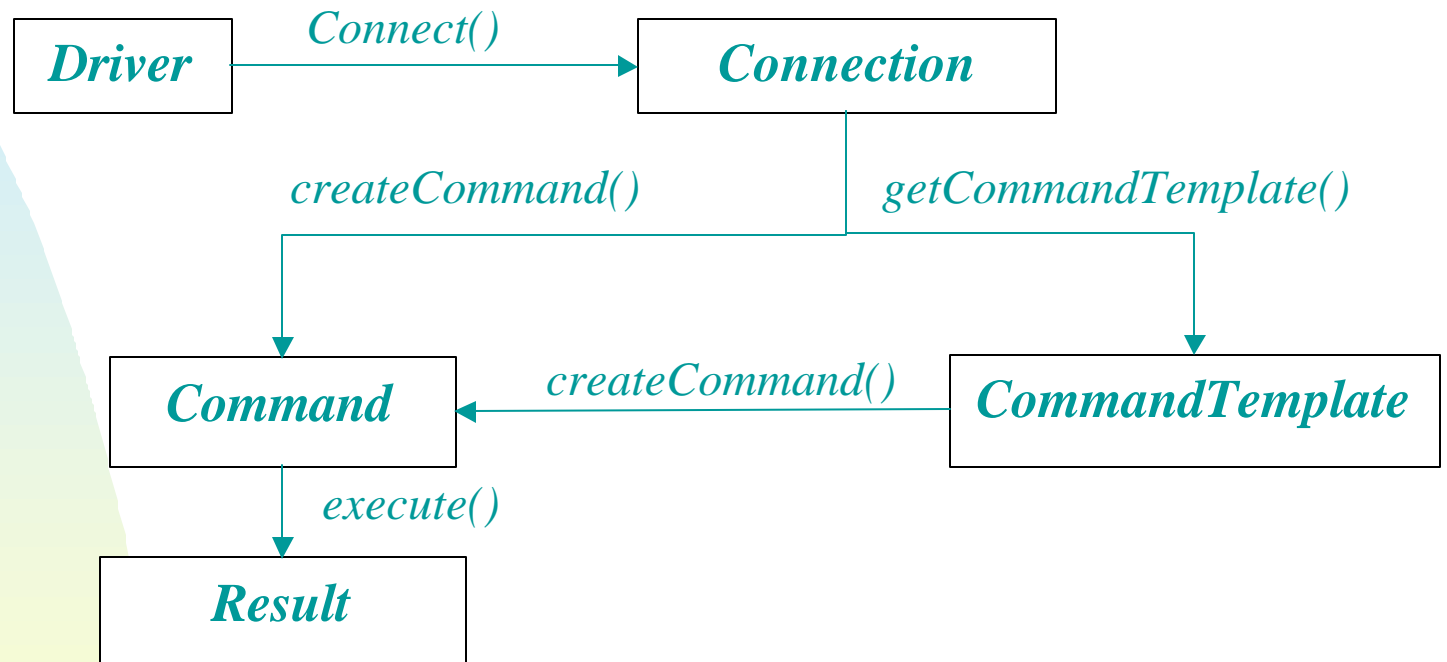
1. A mechanism to encapsulate common functionalities in JSP pages;
2. Integration into JSP Pages;
3. Managed by JSP Container such as Tomcat;
4. Easy to compose and customize.



## 2. What are JMEITags?

- A Custom JSP Tag for Mathematics;
- Based on JMEI APIs;
- Used by Web Page Developers to embed Math Computational Capabilities onto Web Pages.

## Some Basic JMEI Classes: A Review





## 3. JMEITags Specification?

1. Connection Tags

2. Expression Tags

3. Result Tags



## Connection Tags

- **connection:** *Get a Connection object*
- **url:** *JMEI URL for the corresponding engine*
- **driver:** *JMEI driver for the engine*
- **userId:** *user id*
- **password:** *password*
- **closeConnection:** *Closes a Connection*

## Expression Tags

- *expression: a top-level expression tag .*
  - *mathml\_presentation: expressions in MathML Pres encoding.*
  - *mathml\_content: expressions in MathML Content encoding.*
  - *native: native expression.*
  - *mp: expression in MP format.*
  - *openmath: expression in openmath format.*
- *result: the result expression.*



## Result Tags

- `result`: *the result expression*.
- `getResult`: *actionTag to get result*.



## 4. Implementing JMEI Tags

### Implementation Procedure:

Step 1: Describe JMEI Tags

- Tag Library Descriptor

Step 2: Build the Tags

- implement *javax.servlet.jsp.tagext*
- extend *javax.servlet.jsp.tagext.TagSupport*

Step 3: Register Tags

- web-inf/web.xml



## JMEI Tags Library Descriptor

- 1: Define JMEI Tag names and attributes;
- 2: Map JMEI Tags to Java classes;
- 3: Organized as an XML file.

## A Sample Piece of JMEI TLD

```
<? xml version="1.0" ?>
<taglib>
  <tag>
    <name>evaluate</name>
    <tagclass>org.kent.icm.getResult</tagclass>
    <info>
      Evaluate an expression and get the result
    </info>
    <attribute>
      <name>encoding</name>
    </attribute>
  </tag>
  .....
</taglib>
```

## 5. Using JMEI Tags: An Example

### Sample JSP Page source – part 1

```
<%@ taglib uri="http://horse.mcs.kent.edu/taglibs/jmeitags" prefix="jmei" %>
```

```
<%-- open a connection --%>
```

```
<jmei:connection id="conn1">
```

```
  <jmei:url>jmei:maxima://localhost/test</jmei:url>
```

```
  <jmei:driver>org.kent.icm.maxima.Driver</jmei:driver>
```

```
</jmei:connection>
```

... to be continued

## Sample JSP source - Part 2

..... continue from the previous page

```
<%-- start an evaluation --%>
<jmei:expression id="exp1" conn="conn1">
  <jmei:mathml>
    <math><apply><fn>INTEGRATION</fn> \
      <apply><sin/><ci>X</ci></apply> \
      <ci>X</ci></apply></math>"
  </jmei:mathml>
  <jmei:result id="res1">
    The result is as follows (in MathML Presentation):
    <jmei:getResult encoding="mathml-pres"/>
  </jmei:result>
</jmei:expression>

<%-- close the connection --%>
<jmei:closeConnection conn="conn1"/>
```

## 6. Roles and Supporting Tools

To deploy JSP pages with JMEI tags embedded, we need to have

- ✓ JMEITag Developers
  - ❑ to implement JMEITag library.
- ✓ Web Page Designers
  - ❑ to embed JMEITag into JSP pages.
- ✓ Containers
  - ❑ to convert JSP pages into HTML in the server side.



**Tag Library can be developed and used much easier by using supporting tools. The supporting tools include:**

√ For Developers

— Borland JBuilder, Visual Café, VisualAge, ...

√ For Web Page Authors

— Adobe GoLive, Websphere Studio, WebGain Studio

√ JSP Containers

— Apache TomCat



## 7. For More Information

1. Java Server Page

- <http://www.javasoft.com/jsp>

2. Apache Jakarta Tag Library

- <http://jakarta.apache.org/taglibs/index.html>