

Beehive Controls Tutorial

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1. Introduction

1.1. Tutorial Goals

In this tutorial, you will learn:

- What Beehive Controls are for and what they do
- How to create a Beehive Control interface and implementation
- How to compile a Beehive Control
- How to use a Beehive Control as a component in a larger application
- How to use metadata annotations in Beehive Controls
- How to create custom metadata annotations

2. Step 1: Begin the Control Tutorial

2.1. To Set up the Development Environment

Complete all of the necessary and optional steps in the following topic: [Beehive Installation and Setup](#) (../setup.html)

After completing the instructions, leave the command shell open to use throughout this tutorial.

Before proceeding, confirm that you have the following variables set in your shell:

- BEEHIVE_HOME
- ANT_HOME
- JAVA_HOME
- CATALINA_HOME

Also ensure that the following elements are on your PATH:

- ANT_HOME/bin
- JAVA_HOME/bin

2.2. To Make a Control Project Folder

In this task you will make a control project folder.

On your C: drive, create a directory called **beehive_projects**.

Copy the folder BEEHIVE_HOME/samples/controls-blank into C:/beehive_projects.

Rename the folder C:/beehive_projects/**controls-blank** to the name

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C:/beehive_projects/**controls_tutorial**

Before proceeding, confirm that the following directory structure exists:

```
C:
  beehive_projects
    controls_tutorial
      src
      build.xml
```

2.3. To Create a Web Application Test Environment

In this step you create a web application that serves as the testing ground for your control. To test the control, you will import the control into the web application and invoke the control methods from the web application.

Copy the folder BEEHIVE_HOME/samples/netui-blank into

C:/beehive_projects.

Rename the folder C:/beehive_projects/**netui-blank** to the name

C:/beehive_projects/**controls_tutorial_test**

Before proceeding, confirm that the following directory structure exists:

```
C:
  beehive_projects
    controls_tutorial_test
      resources
      WEB-INF
      Controller.jspf
      error.jsp
      index.jsp
```

In this section you will edit the `build.properties` file--the file that sets the build-related properties for your test environment.

Open the file

C:/beehive_projects/controls_tutorial_test/WEB-INF/src/build.properties
in a text editor.

Edit the `beehive.home` property points to the top-level folder of your beehive installation.

Add the line **contextPath=controls_tutorial_test** (as shown below).

For example, if your beehive installation resides at

C:/apache/apache-beehive-1.0, then your `build.properties` file would appear as follows.

```
beehive.home=C:/apache/apache-beehive-1.0
contextPath=controls_tutorial_test
```

```
servlet-api.jar=${os.CATALINA_HOME}/common/lib/servlet-api.jar  
jsp-api.jar=${os.CATALINA_HOME}/common/lib/jsp-api.jar
```

2.4. To Start the Tomcat Server

At the command prompt, enter:

```
%CATALINA_HOME%\bin\startup.bat
```

3. Step 2: Compile the Template Control Implementation and Interface Files

3.1. Introduction

A Beehive Control consists of two files: an interface file (with the JAVA file extension) and an implementation file (with the JCS file extension). The interface file is the public face of your control. It lists all of the methods which can be invoked by users. The implementation file contains the implementation code for the methods listed in the interface file.

3.2. To Examine the Template Control Files

Open the file

```
C:/beehive_projects/controls_tutorial/src/pkg/HelloImpl.jcs.
```

The implementation file appears as follows. (There is no need to edit the file at this point in the tutorial.)

```
package pkg;  
  
import org.apache.beehive.controls.api.bean.*;  
  
@ControlImplementation  
public class HelloImpl implements Hello  
{  
    public String hello()  
    {  
        return "hello!";  
    }  
}
```

Open the file

```
C:/beehive_projects/controls_tutorial/src/pkg/Hello.java.
```

The interface file appears as follows. (There is no need to edit the file at this point in the tutorial.)

```
package pkg;  
  
import org.apache.beehive.controls.api.bean.*;
```

```
@ControlInterface
public interface Hello
{
    String hello();
}
```

3.3. To Edit the index.jspTest Page

To test the Hello control, you need to call the control from some other resource, such as a JAVA application, JSP page, or Page Flow web application. In this step you will call the control from a JSP page.

Edit the file C:\beehive_projects\controls_tutorial_test\index.jsp so it appears as follows. Code to edit appears in bold.

```
<%@ page language="java" contentType="text/html; charset=UTF-8"%>
<%@ taglib uri="http://beehive.apache.org/netui/tags-databinding-1.0"
prefix="netui-data"%>
<%@ taglib uri="http://beehive.apache.org/netui/tags-html-1.0"
prefix="netui"%>
<%@ taglib uri="http://beehive.apache.org/netui/tags-template-1.0"
prefix="netui-template"%>
<netui:html>
    <head>
        <title>Control Tutorial Test Page</title>
        <netui:base/>
    </head>
    <netui:body>
        <jsp:useBean class="pkg.HelloBean" id="helloBean" scope="session"/>
        <h3>Control Tutorial Test Page</h3>
        <p>
            Response from the hello() method on the Hello Control: <strong> <%=
helloBean.hello() %> </strong>
        </p>
    </netui:body>
</netui:html>
```

Save index.jsp.

3.4. To Compile and Deploy the Control

You are now ready to compile the control.

At the command prompt, enter the following Ant command.

```
ant
-f C:\beehive_projects\controls_tutorial\build.xml
build
```

Copy and Paste version:

```
ant -f C:\beehive_projects\controls_tutorial\build.xml build
```

Now copy the JAR file into the test web application.

```
copy
  C:\beehive_projects\controls_tutorial\build\mycontrols.jar
  C:\beehive_projects\controls_tutorial_test\WEB-INF\lib
```

Copy and Paste version:

```
copy C:\beehive_projects\controls_tutorial\build\mycontrols.jar
C:\beehive_projects\controls_tutorial_test\WEB-INF\lib
```

You are now ready to compile the test environment and deploy it to Tomcat.

At the command prompt, enter:

```
ant
  -f C:\beehive_projects\controls_tutorial_test\WEB-INF\src\build.xml
  clean
  build
  war
```

Copy and Paste version:

```
ant -f C:\beehive_projects\controls_tutorial_test\WEB-INF\src\build.xml
clean build war
```

To deploy the application, copy the WAR file into Tomcat's webapps directory.

```
copy C:\beehive_projects\controls_tutorial_test.war %CATALINA_HOME%\webapps
```

3.5. To Test the Control

Open a web browser and enter the following in the address bar:

http://localhost:8080/controls_tutorial_test/index.jsp

You will be directed to the index.jsp page.

Note the message on the page: "hello!"

This message is provided by the Hello control.

4. Step 3: Add a Parameterized Method to the Control

4.1. To edit the Interface and Implementation Files

Edit `HelloImpl.jcs` so it appears as follows. Code to add appears in bold.

```
package pkg;

import org.apache.beehive.controls.api.bean.*;

@ControlImplementation
```

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```
public class HelloImpl implements Hello
{
    public String hello()
    {
        return "hello!";
    }

    public String helloParam( String name )
    {
        return "Hello, " + name + "!";
    }
}
```

Save and close HelloImpl.jcs

Edit Hello.java so it appears as follows. Code to add appears in bold.

```
package pkg;

import org.apache.beehive.controls.api.bean.*;

@ControlInterface
public interface Hello
{
    String hello();

    String helloParam( String name );
}
```

4.2. To Edit the Test JSP Page

Edit index.jsp so it appears as follows. Code to add appears in bold.

```
<%@ page language="java" contentType="text/html; charset=UTF-8"%>
<%@ taglib uri="http://beehive.apache.org/netui/tags-databinding-1.0"
prefix="netui-data"%>
<%@ taglib uri="http://beehive.apache.org/netui/tags-html-1.0"
prefix="netui"%>
<%@ taglib uri="http://beehive.apache.org/netui/tags-template-1.0"
prefix="netui-template"%>
<netui:html>
    <head>
        <title>Control Tutorial Test Page</title>
        <netui:base/>
    </head>
    <netui:body>
        <jsp:useBean class="pkg.HelloBean" id="helloBean" scope="session"/>
        <h3>Control Tutorial Test Page</h3>
        <p>
            Response from the hello() method on the Hello Control: <strong> <%=
helloBean.hello() %> </strong>
        </p>
        <p>
            Response from the helloParam() method on the Hello Control:
            <strong> <%= helloBean.helloParam("Moon") %> </strong>
        </p>
    </netui:body>
</netui:html>
```

```
</p>
</netui:body>
</netui:html>
```

Save and close index.jsp

4.3. To Compile and Deploy the Control

You are now ready to compile the control.

At the command prompt, enter the following Ant command.

```
ant
-f C:\beehive_projects\controls_tutorial\build.xml
build
```

Copy and Paste version:

```
ant -f C:\beehive_projects\controls_tutorial\build.xml build
```

Now copy the JAR file into the test web application.

```
copy
C:\beehive_projects\controls_tutorial\build\mycontrols.jar
C:\beehive_projects\controls_tutorial_test\WEB-INF\lib
```

Copy and Paste version:

```
copy C:\beehive_projects\controls_tutorial\build\mycontrols.jar
C:\beehive_projects\controls_tutorial_test\WEB-INF\lib
```

You are now ready to compile the test environment and deploy it to Tomcat.

At the command prompt, enter:

```
ant
-f C:\beehive_projects\controls_tutorial_test\WEB-INF\src\build.xml
clean
build
war
```

Copy and Paste version:

```
ant -f C:\beehive_projects\controls_tutorial_test\WEB-INF\src\build.xml
clean build war
```

To deploy the application, copy the WAR file into Tomcat's webapps directory.

```
copy C:\beehive_projects\controls_tutorial_test.war %CATALINA_HOME%\webapps
```

4.4. To Test the Control

Open a web browser and enter the following in the address bar:

http://localhost:8080/controls_tutorial_test/index.jsp

You will be directed to the index.jsp page.

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Note the messages on the page: "hello!" and "Hello, Moon!"

These messages are provided by the Hello control.

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