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Introduction to Droplets

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Learning Objectives

At the end of this lesson, you should be able to:

- Identify the use of common ATG droplets.
- Embed OOTB ATG Droplets on a page passing parameters to it.
- Design custom droplets
- Create and use custom droplets
- Identify a good droplet implementation from a bad implementation
- Recognize and deal with limitations of ATG droplets.z

Agenda

- Droplet
- Custom Droplets

Section 1:
Droplets

ATG Droplet

- Most applications require a way to generate HTML from a Java Object.
- A Droplet is an ATG Servlet Bean that satisfies this requirement.
- It is a nucleus component that can be configured and used to encode business logic that should not be in the JSP (view) layer.
- ATG Droplets allow for clear separation of model, view, and controller.
- For example, it can be used to access the database for the user profile and enumerate users' preferences stored in the database.

Using ATG Droplets

- ATG ships with a range of droplets to perform common tasks.
- These droplets can be categorized as:
  - Standard servlet Beans.
  - Database and repository access servlet beans.
  - Multisite servlet beans.
  - XML servlet beans.
  - Transaction servlet beans.
  - Personalization servlet beans.
  - Business process tracking servlet beans.

Some Frequently Used Droplets

Class Name	Component Path	Description
atg.droplet.ForEach	/atg/dynamo/droplet/ForEach	Displays each element of an array.
atg.droplet.IsNull	/atg/dynamo/droplet/IsNull	Displays one of two possible outputs, depending on whether its input parameter is null.
atg.droplet.Switch	/atg/dynamo/droplet/Switch	Displays one of a set of possible outputs, depending on the value of its input parameter.
atg.droplet.CurrencyFormatter	/atg/dynamo/droplet/CurrencyFormatter	Displays a numeric value as a currency amount, formatting it based on the locale.

The ForEach Droplet

- The ForEach Droplet is used to iterate over the elements of an array property.
- ForEach droplet is a nucleus component.
  - Class Name: atg.droplet.ForEach
  - Component: /atg/dynamo/droplet/ForEach
- Specify the desired HTML for displaying each element.
  - Specify the HTML to display before and after array processing.
  - Specify the HTML to display if the array has no elements.

Example - ForEach Droplet (Cont.)

- The example below uses the ForEach droplet to loop through the elements in the array property.
- The param array is the input property.
- The param element is the output property.
- The param output and outputStart are the open parameters.

```
<dsp:droplet name="/atg/dynamo/droplet/ForEach">
  <dsp:param name="array" bean="/samples/StudentArray"/>
  <dsp:oparam name="outputStart">
    <p>The student is registered for these courses:</p>
  </dsp:oparam>
  <ul>
  <dsp:oparam name="output">
    <li><dsp:valueof param="element"></dsp:valueof></li>
  </dsp:oparam>
  </ul>
</dsp:droplet>
```

Embedding Droplets into JSPs

- **dsp:droplet** tag is used to embed the droplet in the JSP.

```
<dsp:droplet name="/atg/dynamo/droplet/ForEach">
  …
</dsp:droplet>
```

- Encapsulates programming logic in a server-side JavaBean.
- Makes logic accessible to the jsp page that calls it.
- Important attribute name:
  - name: Sets the Nucleus path and droplet to invoke.
  - param: Used to pass in/out params.
  - oparam: Used to pass open parameters.

Droplet Parameter Types

- Each droplet has a predefined set of parameters that controls the droplet's behavior. Droplets have three types of parameters:
  - Input
    - Passed into the droplet .
  - Output
    - Set by the droplet.
  - Open
    - Different stages of droplet processing.

Input Parameters

- dsp:param
  - Identifies a droplet input parameter.
  - Defines a page parameter.
- Example:
  - Input parameters accepted by ForEach Droplet which must be set by dsp:param tag:
    - array
    - sortProperties

```
<dsp:droplet name="ForEach">
  <dsp:param name="array" bean="/samples/StudentArray"/>
   …
</dsp:droplet>
```

Output Parameters

- Droplet can render data to JSP page.
- Example:
  - Output parameters provided by ForEach Droplet which can be accessed JSP/DSP Tags:
    - index
    - count
    - key
    - element
    - size

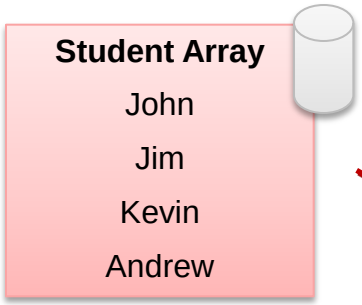
```
<li>
   <dsp:valueof param="element"></dsp:valueof>
</li>
```

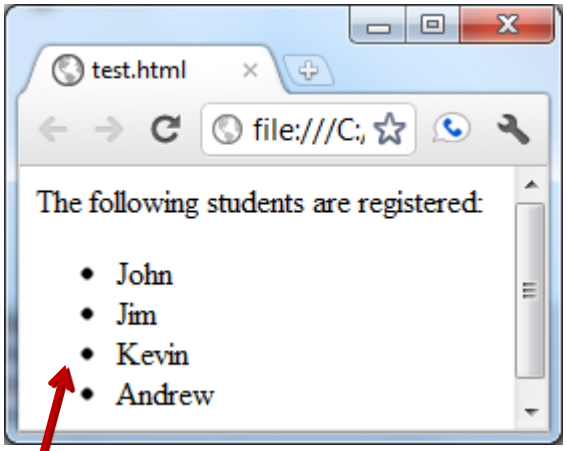
Open Parameters

- dsp:oparam
  - Supplies a parameter to the current droplet.
  - Gets processed and rendered by the droplet.
- Example:
  - Open parameters supported by ForEach Droplet are set using dsp:oparam tag:
    - output
    - outputStart
    - outputEnd
    - empty

```
<dsp:droplet name="ForEach">
  . . .
  <dsp:oparam name="output">
   ...
  </dsp:oparam>
</droplet>
```

Putting it all together






```
<dsp:droplet name="/atg/dynamo/droplet/ForEach">
  <dsp:param name="array" bean="/samples/StudentArray"/>
  <dsp:oparam name="outputStart">
    <p>The following students are registered:</p>
  </dsp:oparam>
  <ul>
  <dsp:oparam name="output">
    <li><dsp:valueof param="element"></dsp:valueof></li>
  </dsp:oparam>
  </ul>
</dsp:droplet>
```

Using the IsNull Droplet

- The parameter value is the input parameter.
- The oparam true only renders if value is not null.
- In addition oparam false is also supported.

```
<dsp:droplet name="IsNull">
  <dsp:param bean="MyProfile.email" name="value"/>
  <dsp:oparam name="true">
    <dsp:form action="address_book.jsp" method="POST">
       My email address:
       <dsp:input type="text"
                bean="MyProfileFormHandler.email"/>
       <dsp:input type="submit"
         bean="MyProfileFormHandler.update value="Update"/>
    </dsp:form>
  </dsp:oparam>
</dsp:droplet>
```

Section 1 
Check Your Understanding

What nucleus component can be embedded on a page to generate dynamic HTML content?

Answer: Droplets are nucleus components that encapsulate business logic and can be embedded on JSP Pages to generate dynamic HTML content.

Section 1 ✔
Check Your Understanding

Name a few commonly used droplets.

Answer: ForEach, IsNull, ItemLookdroplet are some commonly used examples of droplets.

Section 1 
Check Your Understanding

What is the ForEach droplet used for?

Answer: The ForEach droplet is used to iterate through an array or objects and display them.

Section 1 
Check Your Understanding

What type of parameters does any droplet accept?

Answer: A droplet typically accepts some or all of input, output, and open parameters.

Section 1 
Check Your Understanding

What tag do you use to embed a droplet on a page?

Answer: The dsp:droplet tag is used to embed a droplet on the page.

Summary

- ATG Servlet Beans or Droplet are used to encapsulate business logic.
- They can be embedded on the page to generate html dynamically.
- ATG ships with many droplets that can facilitate various activities.
- Droplets have input parameters, output parameters, and open parameters.
- Common droplets include ForEach, IsNull, IsEmpty, ItemLookupDroplet, etc.

Section 2:
Custom Droplets

Why create Custom Droplets?

- ATG ships with many droplets that provide a convenient mechanism to perform typical actions.
- Custom droplets allow you to extend this capability.
- Custom droplets can perform any action that Java Code can achieve.
- They provide an excellent mechanism to separate business logic from the view (JSP).
- By using the droplet tag and the input, output, and open parameters, complex business logic can be extracted out and reused.

Creating a New Custom Droplet

- We will execute the following steps to create a custom droplet:
  - Create a java class.
  - Register the class as a nucleus component.
  - Use the droplet tag to embed it on the java page.

- This example will use the following:
  - Send an input parameter called storename to the droplet.
  - Use the out.println method to print HTML on the page.

DropletTest.java Java Class

```
package test;

import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;
import atg.servlet.*;

public class DropletTest extends DynamoServlet {
  public DSBTest () {}
  public void service (DynamoHttpServletRequest request,
                       DynamoHttpServletResponse response)
                  throws ServletException, IOException {
    String storename = request.getParameter ("storename");
    if (storename == null) storename = "No-Name's";

    ServletOutputStream out = response.getOutputStream ();
    out.println ("<h1>Welcome to " + storename + "</h1>");
  }
}
```

The DynamoServlet

- Note that the Droplet class:
  - extended DynamoServlet class.
  - The service method took DynamoHttpServletRequest and DynamoHttpServletResponse objects as parameters.
- DynamoServlet , DynamoHttpServletRequest, and DynamoHttpServletResponse are subclasses of Servlet, HttpServletRequest, and HttpServletResponse classes.
- They extend and add several functions to access ATG Servlet functionality.
- DynamoServlet extends GenericService which allows it to be a nucleus component.
- Any class implementing the standard Servlet interface can be invoked using the droplet tag.

Registering the Droplet

- Droplets should be registered as nucleus components.
- Create a folder called “Test” in a folder that is in the CONFIGPATH of ATG.
- The class name is test.DropletTest.
- The scope is global as no state is being kept by the servlet.

/test/DropletTest.properties

```
### /test/DropletTest file
$class=test.DropletTest
$scope=global
```

The DropletTestJSP Page


```
<%@ taglib uri="/dspTaglib" prefix="dsp" %>
<dsp:page>
<html>
  <head><title>DSB Store Test</title></head>
  <body><h1>DSB Store Test</h1>
    <dsp:droplet name="/test/DropletTest">
      <dsp:param name="storename" value="Joe's Hardware"/>
    </dsp:droplet>
  </body>
</html>
</dsp:page>
```

Passing Parameters to Droplets

- String and object parameters can be passed to droplets with the param tag.

```
<dsp:droplet name="MyDroplet">
  <dsp:param name="storename" value="Joe's Store"/>
  <dsp:param name="userAge" bean="/test/Person.age"/>
<dsp:droplet>
```

- String parameters can be read in droplet as:

```
String name = request.getParameter ("storename");
```

- Object parameters can be read in droplet as:

```
Object age = request.getObjectParameter ("userAge");
```

Displaying Open Parameters

- A good way to separate code and display markup is to use open param servicing.

```
<dsp:droplet name="MyDroplet">
  <dsp:param name="storename" value="Joe's Store"/>
  <dsp:oparam name="welcome"/>
    <h1>Welcome to Joe's store</h1>
  <dsp:oparam>
<dsp:droplet>
```

- In the droplet code you can render this as:

```
request.serviceParameter("welcome", request, response);
```

- The service method obtains the value of the given parameter and displays it.
- A droplet can contain multiple open parameters. The java code can conditionally service one or more of these.

Setting Parameters

- When your ATG Servlet bean displays open parameters (oparam), dynamic elements can be passed to it.

```
<dsp:droplet name="MyDroplet">
  <dsp:param name="storename" value="Joe's Store"/>
  <dsp:oparam name="welcome"/>
    <h1>Welcome to <dsp:valueof param="storename" />.
    </h1>
  <dsp:oparam>
<dsp:droplet>
```

- A Droplet can add or change parameters using:

```
request.setParameter("storename", "Mike's Store");
```

- The above setParameter call overrides the original definition and sets a new value to it.
- These can be used as output parameters.

Local Parameters

- getLocalParameter and serviceLocalParameter can be used to create parameters that are visible only locally to an ATG Droplet.

```
<dsp:param name="notLocalForA" value="Some Store"/>
<dsp:droplet name="DropletA">
  <dsp:param name="localForA" value="Joe's Store"/>
<dsp:droplet>
```

- notLocalForA above is not local for the DropletA above.
- Local Parameters are useful to contain scope and ensure that you are reading and setting values that are specific for your droplet.

Best Practice: Separation of Java and JSP Code

- Ability to set parameters and render open parameters discussed in the previous slides provides a mechanism to separate HTML Markup from Java Code.
- JSP Formatting should be separated from Java Code.
- This allows JSP designers and Java Codes to work together and maintain autonomy.
- This also allows for reuse of droplet code.

Example of a Bad Droplet

- The code below includes HTML Markup that can change.
- This forces the designer to ask a Java Developer to change and recompile the Java Class.

```
public void service (DynamoHttpServletRequest request,
                     DynamoHttpServletResponse response)
        throws ServletException, IOException {
  ServletOutputStream out = response.getOutputStream ();
  out.println ("<ul>");
  for (int i = 0; i < 10; i++) {
    out.println ("<li>This is number " + i);
  }
  out.println ("</ul>");
}
```

A Better Way to Write the Droplet

- The Java Class

```
public void service (DynamoHttpServletRequest request,
                     DynamoHttpServletResponse response)
        throws ServletException, IOException {
  ServletOutputStream out = response.getOutputStream ();
  for (int i = 0; i < 10; i++) {
    request.setParameter ("number", new Integer (i));
    request.serviceParameter ("lineformat", request, response);
  }
}
```

- The JSP Code

```
<ul>
  <dsp:droplet name="/test/Counter2">
    <dsp:oparam name="lineformat">
       <li>This is number <dsp:valueof
             param="number"/>
    </dsp:oparam>
  </dsp:droplet>
</ul>
```

Limitations of ATG Custom Droplets

- Open parameters are not executed precisely when their service Parameter is called.
- Open parameters are called after the service method returns.
- In general avoid:
  - Setting a global or thread-state variable that is accessed by code invoked from an open parameter.
  - Opening or closing a socket or JDBC that is accessed by code invoked from an open parameter.
  - Replacing the output stream/print writer in the response with your own designed to capture the output of an open parameter.

Section 2 ✔
Check Your Understanding

What are the steps for creating a custom droplet?

Answer: Write the Java Class, register the droplet with nucleus, and embed it on the page.

Section 2
Check Your Understanding

How do you pass a parameter to the droplet from the page?

Answer: Use the dsp:param tag.

Section 2 
Check Your Understanding

What types of parameters can be passed to the droplet?

Answer: You can pass string or any other object types. getParameter can access the string parameters and getObjectParameter can access the object parameters.

Section 2 
Check Your Understanding

What are open parameters?

Answer: Open parameters are parameters that can be conditionally rendered from the Java code.

Section 2 
Check Your Understanding

What method is used to output parameters ?

Answer: SetParameter method is used to set a parameter that is visible to the open params.

Summary

- Custom droplets extend the capability of ATG droplets.
- Custom droplets are used to separate code from markup.
- Custom droplets are nucleus components.
- Parameters can be passed to and from droplets.
- Open parameters can be rendered in java code.

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