HPSA Extension Pack

Solution Container - Developer Reference

Release v.5.1

Legal Notices

Document id:

Table of Contents

Support

Support for the HP Service Activator Extended Pack product is available on the following mailing list:

hpsa-support@hp.com

In This Guide

This guide explains how to use the Solution Container for developers.

Audience

The audience for this guide is the Solutions Integrator (SI). The SI has a combination of some or all of the following capabilities:

Understands and has a solid working knowledge of:

- UNIX® commands
- Windows® system administration

Understands networking concepts and language

Is able to program in Java™ and XML

Understands security issues

Understands the customer's problem domain

References

HP Service Activator – Inventory Subsystem.

HP Service Activator – User's and Administrator's Guide.

Manual Organization

This guide contains the following chapters:

Chapter 1, "Introduction", provides a brief explanation about the purpose, the scope and the definitions involved in this document.

Chapter 2, "General description", provides a wide description of the tool this document is focused on.

Chapter 3, "Solution Container", describes the architecture of the Solution Container.

Chapter 4, "Application development", explains how to develop a simple application for the SC.

Chapter 5, "User structure", describes the user structure under the SC, a previous step before starting creating and managing users.

Chapter 6, "User creation", describes the way to create a user in the SC.

Chapter 7, "Permission structure", describes the different permissions that can be set for the different users.

Chapter 8, "Assigning permissions", explains how to assign permissions for a user.

Chapter 9, "Integration with HPSA", explains how to start up and track workflows running in the HPSA from the SC.

Chapter 10, "Configuration", describes how to configure the SC and its different tools.

Chapter 11, "Start up", provides an explanation of how to start up the SC.

Chapter 12, "API Reference", provides an API of each tool described in this document.

Conventions

The following typographical conventions are used in this guide.

Font	What the Font Represents	Example
Italic	Book or manual titles, and man page names	Refer to the *HP Service Activator — Workflows and the Workflow Manager* and the *Javadocs* man page for more information.
	Provides emphasis	You *must* follow these steps.
	Specifies a variable that you must supply when entering a command	Run the command: `InventoryBuilder` *<sourceFiles>*
	Parameters to a method	The *assigned_criteria* parameter returns an ACSE response.
Bold	New terms	The **distinguishing attribute** of this class...
`Computer`	Text and items on the computer screen	The system replies: `Press Enter`
	Command names	Use the `InventoryBuilder` command ...
	Method names	The `get_all_replies()` method does the following...
	File and directory names	Edit the file `$ACTIVATOR_ETC/config/mwfm.xml`
	Process names	Check to see if `mwfm` is running.
	Window/dialog box names	In the `Test and Track` dialog...
	XML tag references	Use the <DBTable> tag to...
`Computer Bold`	Text that you must type	At the prompt, type: **`ls -l`**
Keycap	Keyboard keys	Press **Return**.
[Button]	Buttons on the user interface	Click `[Delete]`. Click the `[Apply]` button.
Menu Items	A menu name followed by a colon (:) means that you select the menu, then the item. When the item is followed by an arrow (->), a cascading menu follows	Select Locate:Objects->by Comment.

Install Location Descriptors

The following names are used throughout this guide to define install locations.

Descriptor	What the Descriptor Represents
$ACTIVATOR_OPT	The install base location of Service Activator. The UNIX location is /opt/OV/ServiceActivator The Windows location is <drive>:\HP\OpenView\ServiceActivator\
$ACTIVATOR_ETC	The install location of specific Service Activator configuration files. The UNIX location is /etc/opt/OV/ServiceActivator The Windows location is <drive>:\HP\OpenView\ServiceActivator\etc\
$ACTIVATOR_VAR	The install location of specific Service Activator logging files. The UNIX location is /var/opt/OV/ServiceActivator The Windows location is <drive>:\HP\OpenView\ServiceActivator\var\
$ACTIVATOR_BIN	The install location of specific Service Activator binary files. The UNIX location is /opt/OV/ServiceActivator/bin The Windows location is <drive>:\HP\OpenView\ServiceActivator\bin\
$ACTIVATOR_THIRD_PARTY	The location for new Java components such as workflow nodes and modules. Third-party libraries can also be placed in this directory. The UNIX location is /opt/OV/ServiceActivator/3rd-party The Windows location is <drive>:\HP\OpenView\ServiceActivator\3rd-party\ Customized inventory files are stored in the following locations: UNIX: $ACTIVATOR_THIRD_PARTY/inventory Windows: $ACTIVATOR_THIRD_PARTY\inventory
$JBOSS_HOME	HOME The install location for JBoss. The UNIX location is /opt/HP/jboss The Windows location is <drive>:\HP\jboss
$JBOSS_DEPLOY	The install location of the Service Activator J2EE components. The UNIX location is /opt/HP/jboss/server/default/deploy

	The Windows location is `<drive>:\HP\jboss\server\default\deploy`
`$ACTIVATOR_DB_USER`	The database user name you define. Suggestion: `ovactivator`
`$ACTIVATOR_SSH_USER`	The Secure Shell user name you define. Suggestion: `ovactusr`
`$SOSA_HOME`	The install base location of SOSA. The default UNIX location is `/opt/OV/Sosa` The default Windows location is <drive>:\HP\OpenView\Sosa\
`$SOSA_BIN`	The install location of specific SOSA binary files. The default UNIX location is `/opt/OV/Sosa/bin` The default Windows location is `<drive>:\HP\OpenView\Sosa\bin\`
`$SOSA_ETC`	The install location of specific SOSA configuration files. The default UNIX location is `/opt/OV/Sosa/config` The default Windows location is <drive>:\HP\OpenView\Sosa\config\
`$ECP_HOME`	The install base location of Equipment Connections Pool. The default UNIX location is `/opt/OV/ECP` The default Windows location is <drive>:\HP\OpenView\ECP\
`$ECP_BIN`	The install location of specific Equipment Connections Pool binary files. The default UNIX location is `/opt/OV/ECP/bin` The default Windows location is <drive>:\HP\OpenView\ECP\bin\
`$ECP_ETC`	The install location of specific Equipment Connections Pool configuration files. The default UNIX location is `/opt/OV/ECP/conf` The default Windows location is <drive>:\HP\OpenView\ECP\conf\

1 Introduction

1.1 Purpose

This document is a manual for developers of applications designed for the Solution Container. Its purpose is to provide a wide explanation of the different features and characteristics involved in the development.

1.2 Document Scope

This document is focused on the different tools provided by the Solution Container and the designing criteria for new applications.

1.3 Definitions

1.3.1 Acronims

MWFM: Micro Work Flow Manager

HPSA: HP Service Activator

EP: Extension Pack

SC: Solution Container

WFLT: Work Flow Launcher and Tracker

CCWF: Concurrent Workflows Module

ECP: Equipment Connection Pool

SOSA: Service Order Smart Adapter

2 General Description

Solution Container, from now on SC, is an application framework for the development and deployment of user applications. Integrated into the HPSA, it provides mechanisms to integrate the applications into the activation system.

SC objectives are:

- To establish a common interface for all the user applications.
- To establish a main design which provides a clear separation between logical and presentation layers.
- To provide APIs and designing regulations for a lively and effective development of the user applications.
- To personalize the applications for each user accessing the tool.

2.1 Common Interface

This tool provides a common visual interface in which developers can deploy new user applications.

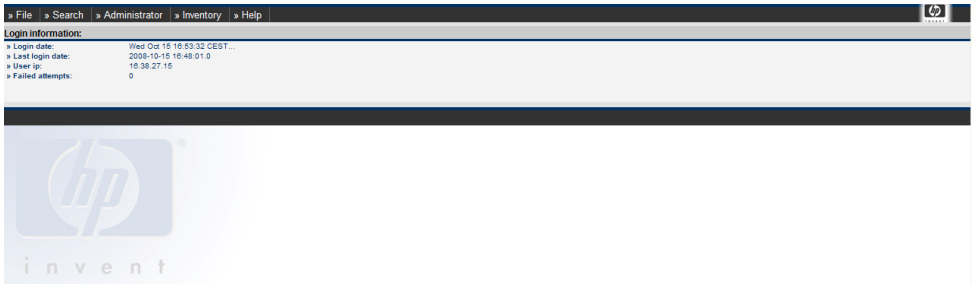


Fig. 1: SC

SC provides several APIs for developing and a designing guide which makes it easy developing and deploying new user applications. Integrated in the SC, all the applications possess the same look and feel based on configured menus.

2.2 Application design

Apart from a common interface, the user applications developed for the SC share the same designing criteria.

These applications are object-oriented. They manage every piece of data as an object and call it a "*component*". As objects, each of these components has properties and methods than are consulted and invoked in the application logic.

All the applications are based on the Struts framework, what allows setting a clear separation between logical and presentation layers. The following points provide a brief description of each of these layers in which a user application is divided.

2.2.1 The application view

The application view is the way a client can interact with the application's data. It defines what component, what properties of these components and what operations associated to these components will be accessible by every client. To simplify the process, the SC provides mechanisms for generating views from a single component information and defining operations associated to it.

As every application is integrated in the SC they share the same look and feel. The presentation layer is developed from this starting criterion using the different Tools provided by the SC.

2.2.2 The data model

The data model of an application consists in the definition of which components will be managed by the application. These components are mapped as Java Beans and usually are stored in a database.

2.2.3 Application logic

The application logic is implemented through Struts actions, which are invoked inside an application by selecting the different menu options available. SC set no criteria on the development of the application functionality, what allows opened application developments of very different natures.

2.3 Development tools

As it has been said before, SC provides several tools for developing and deploying user applications on an easy way.

These tools contain:

- A design guide for the application development.
- A maven library for the application structure definition.
- Controlling JSP files for the automatic views and status loading.
- JavaScript APIs for the automatic view generation.
- Generic Struts actions and forms for the searching performance and results presentation.
- Generic components for the integration with HPSA which makes easier the authentication process and the activation workflows launching and tracking.
- A visual tool for the user management.

2.4 User management

The SC implements its own user management, which allows setting permissions for accessing the different available applications.

There is a single entrance point to the SC from which, based on the user's account, the accessible applications and menus are loaded.

The users and menus structure will be explained in detail later.

2.5 Integration with HPSA

SC provides several mechanisms for the integration with HPSA, establishing an easy manner to access the HPSA and invoking activation tasks over the system.

There are also predefined applications integrated with HPSA that can be deployed into the SC, offering this way a high amount of Solutions based on this tool.

Further information about specific functionality related to HPSA can be found in further sections dedicated to the integration with HPSA.

2.6 Applications included in the SC

SC provides the next included user applications:

- The user management tool.

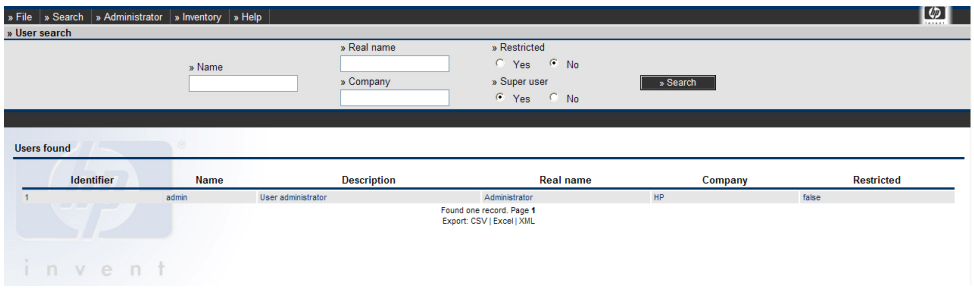


Fig. 2: User Management tool

Further information about this tool can be found in the document *HPSA Extension Pack –Solution Container – User reference*.

- The SOSA management tool.
- The SNMP management tool.
- The ECP management tool.
- A tool for Equipment configuration management.
- Access to the HPSA's Inventory window, which provides configurable database tree representations.

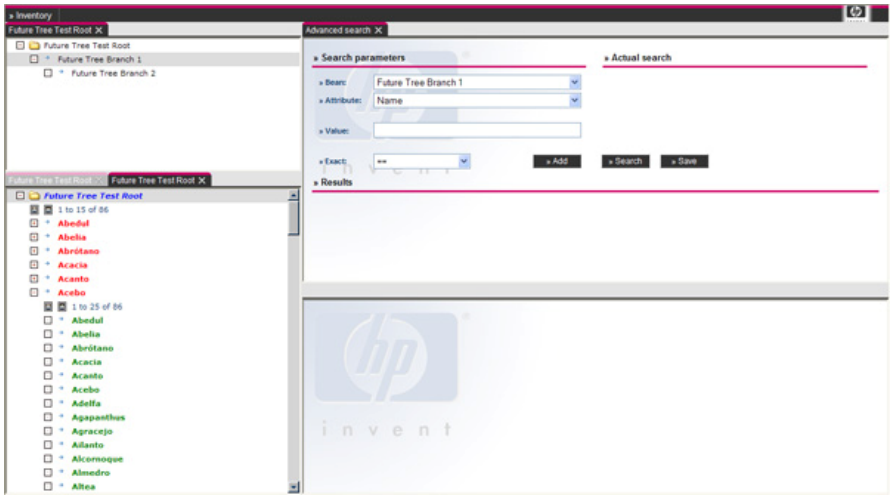


Fig. 3: Inventory application

Further information about the Inventory application can be found in the documentation provided with HPSA.

3 Solution Container

As it was explained in the previous point, every user application is deployed into the SC.

In this section there will be reviewed the main concepts involved in the SC development.

3.1 Single entrance point

There is only a single entrance point to access the SC where the user must enter a valid username and password and, in base of his account, there will be loaded the menus which of his available applications.

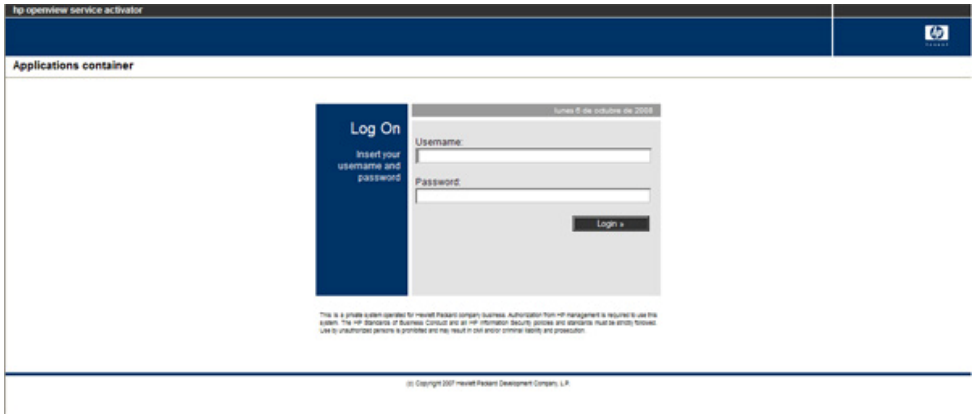


Fig. 4: Log on

3.2 SC structure

The SC has a well defined visual structure which divides the screen in several modules, each of them with a specific functionality.

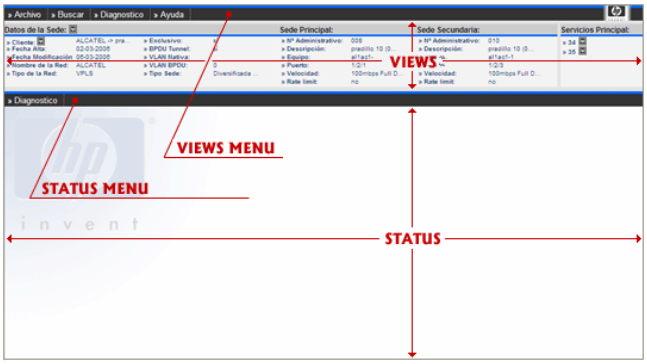


Fig. 5: SC modules

The following sections describe the main characteristics of these modules.

3.3 The views menu

Provides accesses to the different user applications. It is loaded the first time the user enters the SC (just before the log on) and remains without changes while the user session lasts. Each user application includes one or more menus in the views menu bar.

Fig. 6: Views menu

As it can be seen in the example above, the user may access to the administration GUI (menus *Search* and *Administrator*) and the Inventory application (menu *Inventory*). The other menus (*File* and *Help*) belong to the SC.

3.4 The views

Once an application has been selected in the views menu this view frame can contain:

Fig. 7: View example

- Component information: it is the one shown in the previous figure. It presents the available data of the selected component. SC provides APIs and design guides for the quick development of this kind of views.

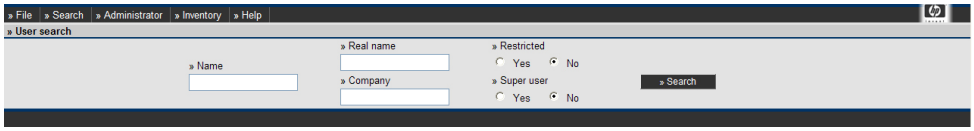


Fig. 8: Search example

- Component search: it presents a form through which a component can be located. The form submitted becomes a query to get a list of components. Once the component has been selected the SC loads its information view. The SC provides the needed functionality to automate this task.

The data load in this frame will be referred from now on this document as "*actual view*".

3.5 The status menu

The status menu is associated to the actual view and contains the operations that can be executed over the selected component which data is being showed.

They are showed just below the view space and remains there while the user is working on the same component.

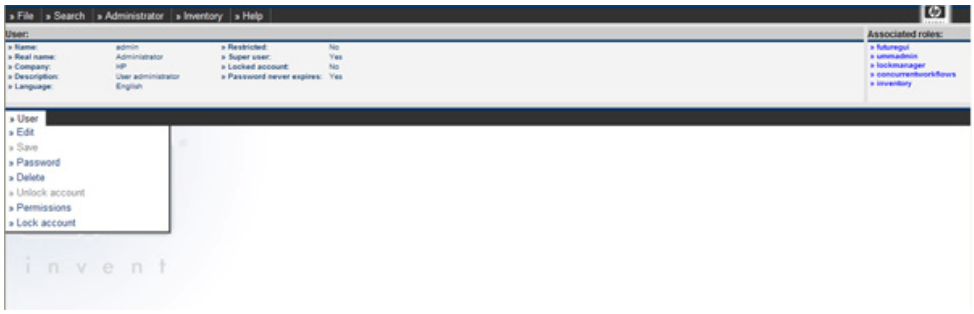


Fig. 9: Status menu

3.6 The status space

This space is placed below the status menu. Each time a task performed over a selected component is launched, the result will be shown here.

In this space there will be launched the operations over a component and the user interaction can be carried on.

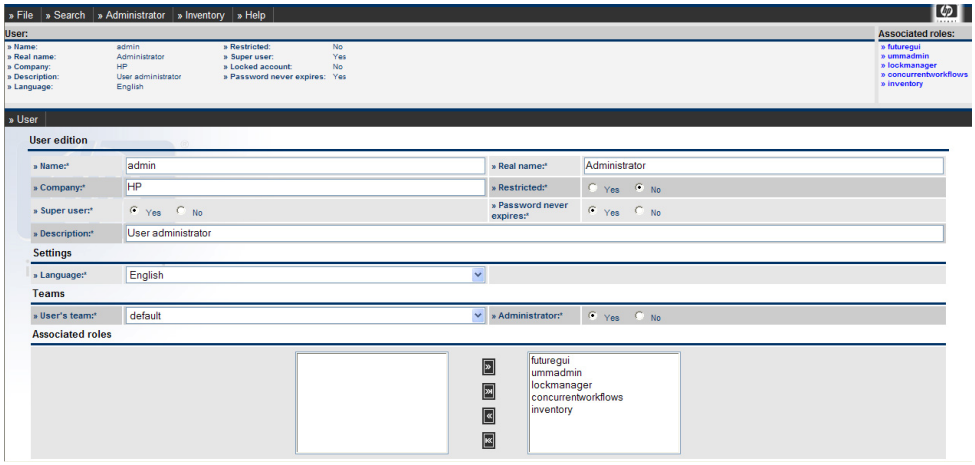


Fig. 10: Status example

Each time the user interacts with a component the status is being modified. Checking this status the SC enables or disables the available component menus.

Imagine for instance an application performed for text file edition. The *Save file* option will only be enabled when the text file has been modified. Modifying the file means a change in the status, which results in the enabling of the menu *Save file*. This principle is the same followed by the SC, which allows to define status that enable or disable certain menu options. SC provides the needed functionality for defining and managing the status changes.

4 Application development

The sections below will explain how to create a user application and deploy it into the SC.

The example that will be used employs the maven tasks provided by the futureGUI plugin (fg-plugin). These tasks allows to manage every database components of a given application, such as menus, roles, views, status and permissions. Later in this document a more detailed explanation of this plugin can be found.

Along the example there will be created an easy application (Hello World!!!) which will guide the developer through the application implementation and will show the main performance of an application. The implementation process consists in defining a component, called HelloWorldComponent, with an associated operation that will present a welcome message. The next sections will explain the needed steps for a user application definition using this example.

NOTE: Along this example different APIs provided by the SC will be used. The objective of this chapter is not to describe in detail those APIs but to introduce the developers in their use. In latest sections they will be explained in detail.

4.1 Application model definition

For the *Hello World!!!* application the model will consist in an easy component, called *HelloWorldComponent*, which must be in charge of showing a welcome message on the screen. As it was explained on a previous section, the model definition is based in Java Beans.

```
public class HelloWorldComponent
{
  private String helloMessage;
   private String author;
   private String date;

  public HelloWorldComponent(String helloMessage) {
      setHelloMessage(helloMessage);
  }

  public String getAuthor() {
    return author;
   }
   public void setAuthor(String author) {
    this.author = author;
   }
   public String getDate() {
    return date;
   }
   public void setDate(String date) {
    this.date = date;
   }
   public String getHelloMessage() {
    return helloMessage;
   }
   public void setHelloMessage(String helloMessage) {
    this.helloMessage = helloMessage;
   }
}
```

4.2 Application definition

The developer may define a new application through the futureGUI plugin, provided with the installation. Thus:

```
<futureGUI:createApplication
            name="HelloWorldApplication"
            description="Hello World Application"/>
```

4.3 Main menus definition

Once the application has been defined, the first step consists on defining the main menus that will be present in the view menu bar. As it was said before, each application should include one or more menus in this view menu bar.

In the SC every menu has to be associated to a view. All the menus which must appear in the view menu bar have to be associated to the *root* view, which is only used to set the menus of this bar.

```
<futureGUI:createMenu
            name="HelloWorld"
            description="Hello World"
            bundle="com/hp/spain/futuregui/HelloWorldApplicationResources"
            bundleKey="menu.principal"
            applicationName="HelloWorldApplication"/>

<futureGUI:asociateMenuToView
            viewName="root"
            menuName="HelloWorld"
            menuOrder="100"/>
```

This code includes a menu for our application in the views bar. As all the messages in the application are localized so when defining the menu a properties file and a key to name the menu are required.

The position of the menu in the views bar is set with the 'menuOrder' option. The order is calculated from left to right.

Next an example of another menu depending of the "HelloWorld" created in the last example:

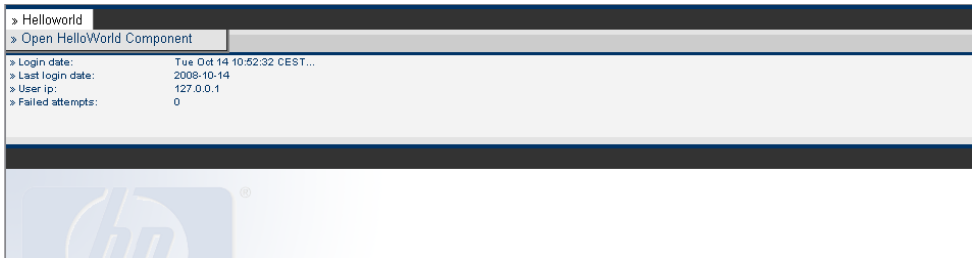
```
<futureGUI:createMenu
            name="OpenHelloComponent"
            description="Open Hello Component"
            parentMenuName="HelloWorld"
            bundle="com/hp/spain/futuregui/HelloWorldApplicationResources"
            bundleKey="menu.open"
            applicationName="HelloWorldApplication"
            action="OpenHelloComponentAction.do"/>

<futureGUI:asociateMenuToView
            viewName="root"
            menuName="HelloWorld"
            menuOrder="100"/>
```

Don't forget to add the key in the properties file 'HelloWorldApplicationResources':

```
menu.principal = Helloworld
menu.open = Open HelloWorld Component
```

As can be seen, the definition is the same has the one seen before, but with a new attribute called "parentMenuName" that sets the father menu.

At this point, the application includes a new menu in the main bar:



In this example, when clicking in the menu an action is desired to be executed. As has been seen, the functionality of the *views menu* is to load views. This view has to be loaded by a Struts action that are defined with the "action" attribute.

In the example, OpenHelloComponentAction.do, will be the action that will return our "HeloWorldComponent" and show it in the views frame.

4.4 Actions of the main menus

This section will focus on the component location and presentation actions. The actions associated to the *root* view must satisfy these two requirements:

- Provide the necessary functionality for creating or locating a component.
- Open a component view.

For the *Hello World!!!* example, the code for the *OpenHelloComponentAction* must be:

```
public class OpenHelloWorldComponentAction
extends Action
implements HelloWorldConstants
{

  public ActionForward execute(     ActionMapping mapping,
                                ActionForm form,
                                HttpServletRequest request,
                                HttpServletResponse response)
  throws IOException, ServletException {
     String target;
     HelloWorldComponent helloWorldComponent;

       try {
       helloWorldComponent = new HelloWorldComponent("Hello World!!!");
       helloWorldComponent.setAuthor("Javier");
       helloWorldComponent.setDate(new Date().toString());
       if (Context.getInstance().containsKey(MYCOMPONENT)) {
         Context.getInstance().remove(MYCOMPONENT);
       }
       Context.getInstance().add(MYCOMPONENT, helloWorldComponent);
       FGLogger.logInfo("HelloWorldComponent loaded");
       target = SUCCESS;
       }
       catch(Exception e) {
             e.printStackTrace();
       target = FAILURE;
       }
     return mapping.findForward(target);
```

```
  }
}
```

This is the code used to create the component. It creates an instance of it and stores it into the application context.

Then, it is necessary to call a view where the component information can be displayed. This is done in the *struts-config.xml* file where the Struts actions are mapped and their possible exits are set:

```
<action
      path="/OpenHelloComponentAction"
      type="com.hp.spain.OpenHelloComponentAction" cope="request">
   <forward
      name="success"
      path="/jsp/future-gui/index.jsp?viewName=HelloComponentView&
            fjsp=/jsp/helloworld/initial.jsp "/>
   <forward
      name="failure"
      path="/jsp/future-gui/index.jsp?fjsp=/jsp/error.jsp"/>
</action>
```

One of the utilities provided by the SC consists in several controlling JSP files used to manage the loaded views and their different menus.

The *index.jsp* file is the one employed to load the views and get their associated menus. As it can be seen in the code above, it is the JSP file called as the result for the action.

The *index.jsp* file receives two possible parameters:

- *viewName*: contains the view name which is going to be loaded in the view frame, if any. See the next section to learn about the view creation.
- *fjsp*: contains the URL of the JSP file which is going to be initially loaded in the status space just before the view has been loaded.

Either the view or the JSP status file are issues that will be explained in retail in further sections.

4.5 View Definition

The code below shows how to include a view into the SC.

```
<futureGUI:createApplicationView
            name="HelloComponentView"
            description="Hello Component View"
            jsp="/jsp/future-gui/hello-world/HelloComponentView.jsp"/>
```

The main attribute called "jsp" is the view JSP file target . As it was explained in a previous chapter, SC provides specific APIs for view development which consist in JavaScript objects that compose on an easy way any presentation view JSP file. Anyway, SC allows to include any kind of JSP file to show information. The only requirement is that the JSP file must be loaded into the view space and, thus, there is a limitation on the available space.

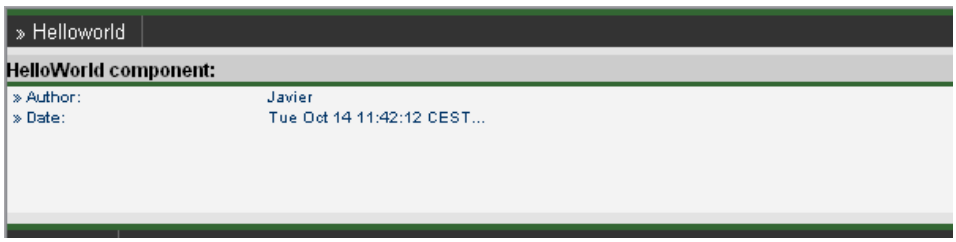
```
<%@ taglib uri = "/tags/struts-bean" prefix="bean" %>

<%@ page import =
   "com.hp.spain.example.helloworld.HelloWorldComponent" %>
<%@ page import =
   "com.hp.spain.example.helloworld.struts.HelloWorldConstants" %>
<%@ page import = "com.hp.spain.hputils.framework.Context" %>

<%
```

```
HelloWorldComponent myComponent =
  (HelloWorldComponent)Context.getInstance().get(HelloWorldConstants.MYCOMPON
ENT);
%>

<script>

var mmi = new MainMenuInfo();
mmi.addTitle(
   "<bean:message bundle="HelloWorldAR" key="helloworld.title" />",
   null);
mmi.addAttribute(
   "<bean:message bundle="HelloWorldAR" key="helloworld.author" />",
   <%= myComponent.getAuthor() %>,
   0,
   0,
   null);
mmi.addAttribute(
   "<bean:message bundle="HelloWorldAR" key="helloworld.date" />",
   <%= myComponent.getDate() %>,
   0,
   1,
   null);

new MenuInfoWriter(mmi, null, null).write();

</script>
```

Don't forget to add the key in the properties file:

```
menu.principal = Helloworld
menu.open = Open HelloWorld Component
helloworld.title = HelloWorld component
helloworld.author = Author
helloworld.date = Date
```

Once this step has been completed, the application will be able to display the view, when selecting the 'Open Hello Component' menu:



4.6 Status menu definition

The status menus are associated to the actual view and are displayed just below the view JSP file. They represent the possible operations that can be performed over the selected component which information is being showed in the view. The next code explains how must they be defined:

```
<futureGUI:createMenu
            name="HelloComponentActions"
            description="Hello Component Actions"
            bundle="com/hp/spain/futuregui/HelloWorldApplicationResources"
```

```
            bundleKey="menu.actions"
            applicationName="HelloWorldApplication"/>

<futureGUI:asociateMenuToView
            viewName="HelloComponentView"
            menuName="HelloComponentActions"
            menuOrder="100"/>

<futureGUI:createMenu
            name="SayHello"
            description="Say Hello"
            parentMenu="HelloComponentActions"
            bundle="com/hp/spain/futuregui/HelloWorldApplicationResources"
            bundleKey="menu.sayHello"
            applicationName="HelloWorldApplication"
            action="SayHelloAction"/>

<futureGUI:asociateMenuToView
            viewName="HelloComponentView"
            menuName="SayHello"
            menuOrder="100"/>
```

Every internationalized text must be placed in a properties file which has to be contained into the application JAR file, assuring this way that it will be accessible in the classpath when the SC is running.

At this point the content of this properties file should be something like this:

```
menu.principal = Helloworld
menu.open = Open HelloWorld Component
menu.actions = Actions
menu.sayHello = Say Hello

helloworld.title = HelloWorld component
helloworld.author = Author
helloworld.date = Date
```

As it can be seen, the status menu definition is very similar to the view menu one, but instead of associating them to the *root* view it has to be done to the actual view.

4.7 Application status definition

Each application can remain in a determined status in base of the operation which is being currently performed. This status sets at each moment which status menus have to be enabled.

In the *Hello World!!!* example there must be defined a single status, called *default*, that will enable every application status menu. The code needed for this can be seen below.

```
<futureGUI:createStatus
            name="default"
            description="default status"
            applicationName="HelloWorldApplication"/>

<futureGUI:asociateMenuToStatus
            menuName="HelloComponentActions"
            statusName="default"/>

<futureGUI:asociateMenuToStatus
            menuName="SayHello"
            statusName="default"/>
```

Since the two status menus have been associated to the application status, changing to this status will cause the enabling of both of them.

In the next section the necessary steps to load a given status will be explained.

4.8 Application status management

Defining a status does not mean it will be loaded just when the view is also loaded. It is the status JSP files responsibility to set the proper status and manage them. For that, the developers may employ a JavaScript API which allows to dynamically set the status inside a JSP file in an easy manner.

For instance, take the code of the initial status JSP file associated to the example view. The invocation of such JSP file was:

/jsp/future-gui/index.jsp?view=HelloComponentView&fjsp=/jsp/initial.jsp

As it can be seen, when the view is opened, far away than the view name, it was necessary to define the initial JSP file that had to be loaded into the status space.

JSP files loaded into the status space must follow the next criteria:

- Set the application status, if any. If this is not done, the application will remain in the last status defined before. Otherwise, if there was no status defined before the status menus displayed inside the status menu bar will appear disabled.
- They are in charge of displaying the information to the user, even presenting an action result or requesting data in a given form.
- They must pay attention to the events generated when a status menu is clicked.

Lets explain each of these points through the initial JSP file of the example application, *initial.jsp*.

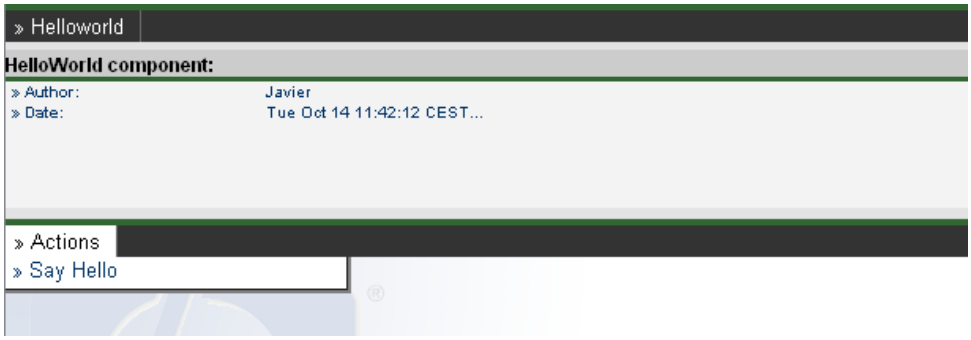
```
<%
String useRandomColor =
   (String) session.getAttribute(
      com.hp.ov.activator.mwfm.futuregui.servlet.Constants.USE_RANDOM_COLOR
   );
String mainColor =
   (String) session.getAttribute(
      com.hp.ov.activator.mwfm.futuregui.servlet.Constants.APP_MAIN_COLOR
   );
%>

<script>
function changeStatus(clickedMenuName, clickedMenuAction) {
  window.location.href = clickedMenuAction;
}
</script>

<html>

<head>
  <link
       rel="stylesheet"
       href="/activator/css/future-gui/estilos<%=
(useRandomColor.equals(com.hp.spain.futuregui.Constants.TRUE)) ? mainColor :
""%>.css">
  <link
       rel="stylesheet"
```

```
      href="/activator/css/future-gui/subestilos<%=
(useRandomColor.equals(com.hp.spain.futuregui.Constants.TRUE)) ? mainColor :
""%>.css">
</head>

<body
<%
if (useRandomColor.equals(com.hp.spain.futuregui.Constants.TRUE)) {
%>
  background="/activator/images/future-gui/fondo.gif"
<%
}
%>
  onload="window.parent.loadParticularMenu();window.parent.loadStatusParticul
arMenu('HelloWorldDefaultStatus');">

</body>

</html>
```

The selected code shows how to invoke the JavaScript API for the status Management. The most important items are:

- [`window.parent.loadParticularMenu()`] This JavaScript function displays the status menus. When a view is showed, the SC loads its associated status menus, but they will not be displayed if it is not requested using this function.
- [`window.parent.loadStatusParticularMenu('HelloWorldDefaultStatus')`] This JavaScript function sets the application status, and so, enables the menus associated to that status. As it was seen before, the default status will enable all the view menus. Even this function or the previous one must be invoked when the status JSP file has been loaded (*onLoad* event).
- The own developer's code. In this case, an empty page is shown with a background image (*fondo.gif*).
- [`function changeStatus(clickedMenuName, clickedMenuAction)`] This JavaScript function is called every time a status menu (with an associated action) is clicked, and must be implemented in each status JSP file. It receives the name of the clicked status menu and the URL of the associated action. By default, the action associated to the status menu is not invoked automatically when the menu is clicked; it is the developers responsibility to perform that invocation along the JavaScript code of the *changeStatus* function. This allows, for example, to insert different tasks before the action is executed, such as errors management or appending arguments to the action. In the example the status menu action is invoked without any previous task.

At this point, the application should be like the one in the image below:



4.9 Status menu actions

This section will focus on developing actions associated to a component, which are invoked as it has been explained previously. These actions must satisfy the next requirements:

- Contain the needed functionality for executing the component task.

The next code belongs to the *SayHelloAction*, defined in a section before.

```
public class SayHelloAction
extends Action
implements HelloWorldConstants
{

  public ActionForward execute( ActionMapping mapping,
                                ActionForm form,
                                HttpServletRequest request,
                                HttpServletResponse response)
  throws IOException, ServletException {
    String target;
    HelloWorldComponent helloWorldComponent;

    try {
      helloWorldComponent =
        (HelloWorldComponent) Context.getInstance().get(MYCOMPONENT);
      request.setAttribute(
        MYCOMPONENTMESSAGE,
        helloWorldComponent.getHelloMessage());
      target = SUCCESS;
    }
    catch(Exception e) {
      e.printStackTrace();
      target = FAILURE;
    }
    return mapping.findForward(target);
  }
}
```

This action gets the component from the Application Context and calls the *getMessage()* method to obtain the *Hello World!!!* text. Then, this String is stored as an attribute into the request. The *struts-config.xml* file contains the mapping to the JSP file where the results must be displayed.

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
```

```
<!DOCTYPE struts-config PUBLIC
          "-//Apache Software Foundation//DTD Struts Configuration 1.2//EN"
          "http://jakarta.apache.org/struts/dtds/struts-config_1_2.dtd">

<struts-config>

  <action-mappings>
      <action path="/OpenHelloWorldComponentAction"
      type="com.hp.spain.example.helloworld.struts.action.
                OpenHelloWorldComponentAction"
      scope="request">
            <forward
               name="success"
               path="/jsp/future-gui/index.jsp?viewName=HelloComponentView
                        &amp;fjsp=/jsp/helloworld/initial.jsp"/>


            <forward
                  name="failure"
                  path="/jsp/future-gui/index.jsp?
                        fjsp=/jsp/helloworld/componentError.jsp"/>
      </action>

      <action path="/SayHelloAction"
                  type="com.hp.spain.example.helloworld.struts.action.
                        SayHelloAction"
                  scope="request">
            <forward
                  name="success"
                  path="/jsp/helloworld/showHelloMessage.jsp"/>
            <forward
                  name="failure"
                  path="/jsp/helloworld/execError.jsp"/>
      </action>

  </action-mappings>

  <message-resources
      parameter="com.hp.spain.example.helloworld.struts.
                              HelloWorldApplicationResources"
                  key="HelloWorldAR"/>

</struts-config>>
```

4.10 Action result

The result of any action is displayed in a JSP file loaded into te status space. These JSP files, far away than displaying the result, must implement the status Management defined in a previous chapter.

In the example, the *ShowHelloMessage.jsp* will display the *Hello World!!!* text. This JSP's code should be:

```
<%@ taglib uri = "/tags/struts-bean" prefix="bean" %>

<%@ page import =
"com.hp.spain.example.helloworld.struts.HelloWorldConstants" %>

<%
String useRandomColor =
```

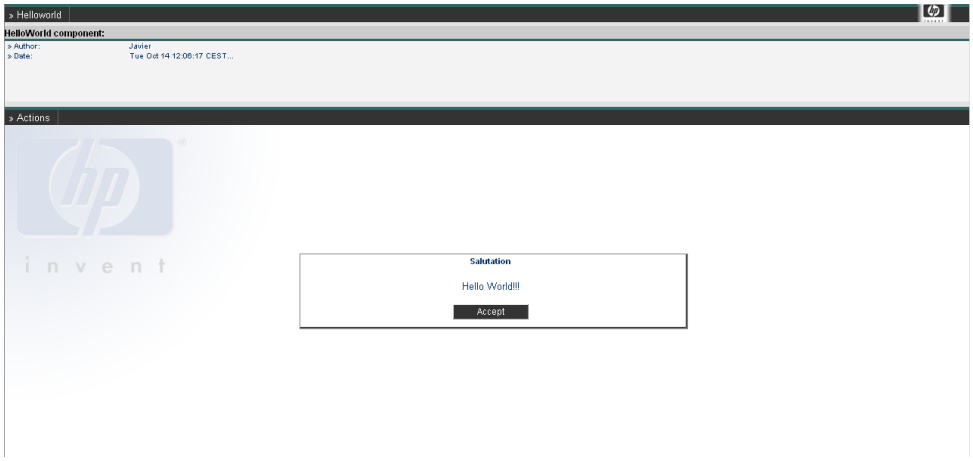
```
   (String) session.getAttribute(
      com.hp.ov.activator.mwfm.futuregui.servlet.Constants.USE_RANDOM_COLOR
   );
String mainColor =
   (String) session.getAttribute(
      com.hp.ov.activator.mwfm.futuregui.servlet.Constants.APP_MAIN_COLOR
   );
%>

<script>
function changeStatus(clickedMenuName, clickedMenuAction) {
  window.location.href = clickedMenuAction;
}
</script>

<html>

<head>
  <link
      rel="stylesheet"
      href="/activator/css/future-gui/estilos<%=
(useRandomColor.equals(com.hp.spain.futuregui.Constants.TRUE)) ? mainColor :
""%>.css">
  <link
      rel="stylesheet"
      href="/activator/css/future-gui/subestilos<%=
(useRandomColor.equals(com.hp.spain.futuregui.Constants.TRUE)) ? mainColor :
""%>.css">
</head>

<body
<%
if (useRandomColor.equals(com.hp.spain.futuregui.Constants.TRUE)) {
%>
  background="/activator/images/future-gui/fondo.gif"
<%
}
%>
  onload="window.parent.loadParticularMenu();window.parent.loadStatusParticul
arMenu('HelloWorldDefaultStatus');">

<script>
var fa = new FutureAlert(
  "<bean:message bundle="HelloWorldAR" key="helloworld.salutation.title" />",
  "<%= helloMessage %>");
  fa.setBounds(500, 100);
  fa.setButtonText("<bean:message bundle="HelloWorldAR" key="button.accept"
                   />");
  fa.show();
</script>

</body>

</html>
```

At this point the content of this properties file should be something like this:

```
menu.principal = Helloworld
```

```
menu.open = Open HelloWorld Component
menu.actions = Actions
menu.sayHello = Say Hello

helloworld.title = HelloWorld component
helloworld.author = Author
helloworld.date = Date

helloworld.salutation.title = Salutation
button.accept = Accept
```

Once all these steps have been completed, the user application would show the hello message, after selecting the 'Say Hello' menu:

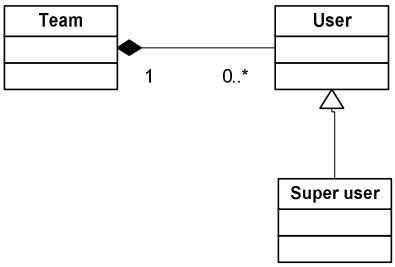


5 User structure

The SC provides its own user Management. The sections below describe each user structure component.

Further information about user management can be found in the document *HPSA Extension Pack – Solution Container – User reference*.

User structure:



5.1 Users

They define the ones allowed to access the SC. This kind of users would have restricted access to the different applications inside the SC.

5.2 User teams

A team sets a group of users with the same (or similar, at least) rights. There is an administrator user (and only one) for each team, and he will be the only one (apart from super users) allowed to manage that team. Administrators can create, update or remove users belonging to their group, and manage the permissions over them.

The Teams usage is optional and it is only available if the DatabaseAvancedAuthModule is configured as the authentication module. For further information see the HPSA documentation.

5.3 Super user

Super users have full administration privileges over any user, group, application or any other element of the SC.

5.4 System user

The system user is unique for the whole system. He can't be deleted or updated. Apart from this, the system user is treated as a super user.

6 User creation

The code below shows how to create a user using the fg-plugin:

```
<futureGUI:createUser
            name="TestUser"
            password="password"
            description="User for testing purposes"
            realName="Testing User"
            companyName="HP"/>
```

In the next step a team is created and the previous user is assigned to it.

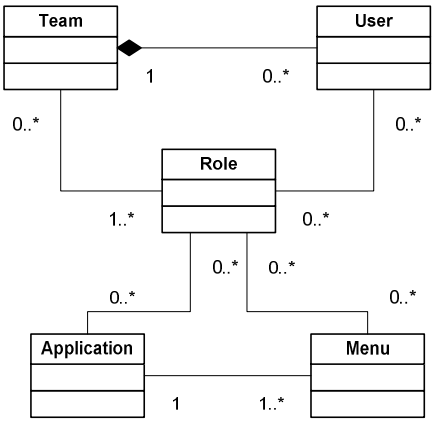
```
<futureGUI:createTeam
            name="TestTeam"
            description="Team for testing purposes"/>

<futureGUI:asociateUserToTeam
            teamName="TestTeam"
            userName="TestUser"/>
```

Once the user is defined, it is necessary to set his permissions to access the different applications. The next sections describe the permissions structure of the SC and some helpful examples.

7 Permissions structure

Permissions are established through roles. The roles define profiles for accessing the SC and set either the applications and their menus accessible for the user. Roles are assigned to teams and, for each team, there can be associated one or more users who belong to that role. This means that a user can only be associated to roles which have been assigned to his team before.

Permissions structure:



The relationships between roles and applications determine the applications accessible for those roles. There is also another relationship between roles and menus which determines the menus of an accessible application will be displayed after the user logs on into the SC. That allows not only to assign applications to users but to offer to the user different functionality inside each application.

8 Assigning permissions

Let's get over the example again to show how to create a role with which the user can access the *Hello World!!!* application.

```
<futureGUI:createRole
            name="TestRole"
            description="Role for testing purposes"/>
```

Then, it is necessary to assign the role to the team, and afterwards, also to the user who already belongs to the team.

```
<futureGUI:asociateRoleToTeam
            roleName="TestRole"
            teamName="TestTeam"/>

<futureGUI:asociateRoleToUser
            roleName="TestRole"
            userName="TeamTestUser"/>
```

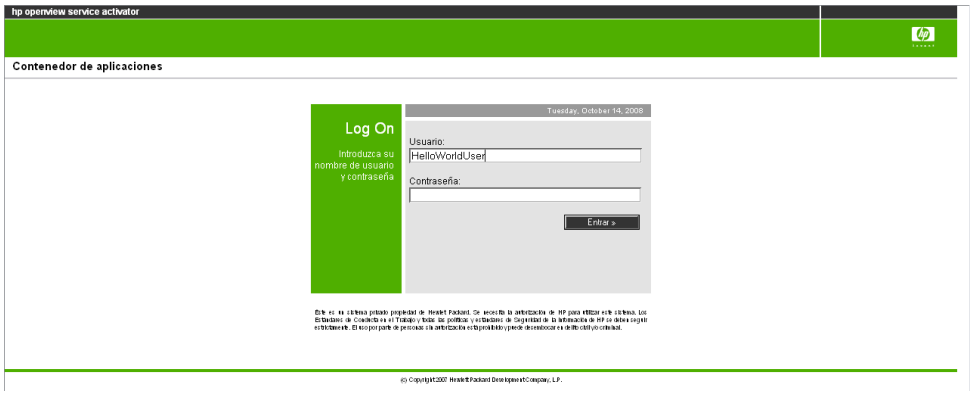
Assign the new role permission to access the *Hello World!!!* application.

```
<futureGUI:asociateApplicationToRole
            applicationName="TestApplication"
            roleName="TestRole"/>
```

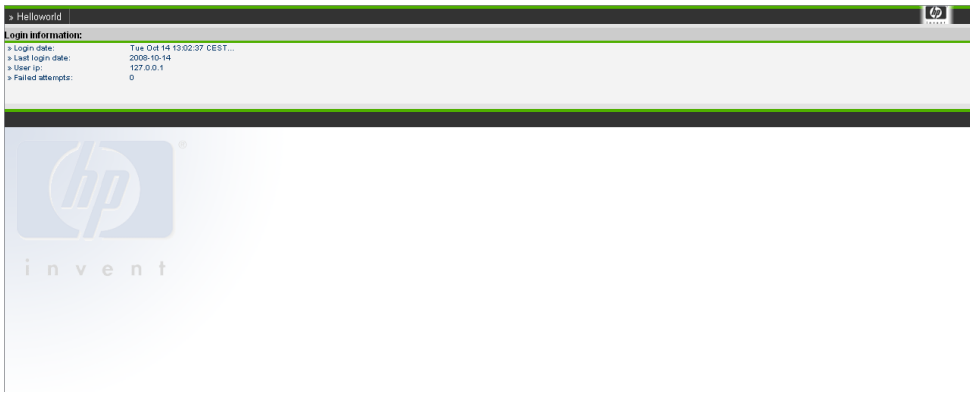
And finally, it is necessary to associate the application menus with the role.

```
<futureGUI:asociateMenuToRole
            roleName="HelloWorld"
            menuName="TestRole"/>

<futureGUI:asociateMenuToRole
            roleName="OpenHelloComponent"
            menuName="TestRole"/>

<futureGUI:asociateMenuToRole
            roleName=" HelloComponentActions"
            menuName="TestRole"/>

<futureGUI:asociateMenuToRole
            roleName="SayHello"
            menuName="TestRole"/>
```

At this point, the recently crated user will be able to access the *Hello World!!!* application.



The container loads the applications that user has access to. In this case, the 'Hello World Application':



9 Action Audit

SC provides a RMI service with methods for auditing actions. This URL is stored in the SC's Context (see section 14.1 for further information). The key needed to obtain the URL from the Context is a constant defined in the *com.hp.spain.futuregui.login.LoginConstants* interface.

Audited actions can be managed by super users using the administration GUI provided with the EP.

The next example shows how to audit an action in a java class:

```
import java.rmi.Naming;
import com.hp.spain.futuregui.login.LoginConstants;
import com.hp.spain.futuregui.users.rmi.def.SPIUserManagementRMIDef;
import com.hp.spain.hputils.framework.Context;


SPIUserManagementRMIDef userManager = null;
try {
   userManager =
      (SPIUserManagementRMIDef) Naming.lookup(
         (String) Context.getInstance().
                  get(LoginConstants.SPI_USER_MANAGER_RMI_URL)));
   userManaget.auditAction(…);
} catch (Exception e) {
   Throw new Exception ();
}
```

10 Integration with HPSA

10.1 Workflow Launcher

The EP provides mechanisms to manage the available workflows, which can be launched using a given API and tracked using a given GUI. It is also possible to interact with those workflows that need some extra information while they are running.

This document will explain the way to launch, track and interact with the workflows as it has to be done in the EP.

Workflows can be launched through SOSA, so this document will explain the way to make it. See the SOSA documentation for more information about SOSA.

Tracking of children workflows can be also done. There are two different ways for making this: using the database or using the CCWF. Both are supported by the WFLT and will be explained in further sections.

10.1.1 What is the WFLT?

The WFLT is a tool provided with the EP to make easy and possible the start up of workflows on any specified MWFM and track them.
The workflow's launching and tracking is performed using Struts actions which will execute the different tasks required in the process.

10.1.2 What is SOSA?

Service Order Smart Adapter (SOSA) is a flexible adapter to manage the influx of Service Orders, which are aimed at the transactional activation engine called Service Activator. In this way, SOSA provides additional features for the treatment of these requests compared to a traditional system.

10.1.3 Starting up a workflow

A workflow can be launched either from the Application Environment or from the Inventory. The launching is executed calling Struts action *WFLTAction.do*. This is the action used to start a workflow or to start tracking a workflow which has been already started up. This action has to be invoked with the necessary parameters or attributes which will be discussed later, but it is important to say that every parameter explained in this document can be retrieved either as a request parameter or an attribute, and this makes possible the invocation of the *WFLTAction.do* either from a JSP file or from another Struts action. If the workflow start up with SOSA is intended, it will be expressed in the parameters used with the action.

The parameters/attributes accepted by *WFLTAction.do* to start up a workflow are:

- *__wfname*: name of the workflow to be started up. This parameter is mandatory for starting up a workflow, but it is not used when the WFLT is only invoked for tracking an already started up workflow.
- *__wfmwfmname*: name of the MWFM engine where the given workflow must be started up. The names of the different MWFM engines are configured in the *auth.properties* file (see the *Configuration* section for more information). If no MWFM engine name is specified, the default name specified in the *auth.properties* file will be taken.

Ex:

This example shows how to launch a workflow from the inventory defining an operation. The following example shows its appearance.

```
<Operation>
  <Name Bundle="com/hp/spain/wflauncher test/ApplicationResources">
       launch.wf
  </Name>
  <Image>newtool.gif</Image>
  <Object>WfLauncherTest</Object>
  <OperationType>Lanzamiento</OperationType>
  <Action>
       <Page>/activator/WFLTAction.do</Page>
       <Param>
             <Name>__wfname</Name>
             <Value>WfLauncherTest.Name</Value>
       </Param>
       <Param>
             <Name>__wfmwfmname</Name>
             <Value>constant:localmwfm</Value>
       </Param>
       <Param>
             <Name>__wfsosacheck</Name>
             <Value>constant:true</Value>
       </Param>
  </Action>
</Operation>
```

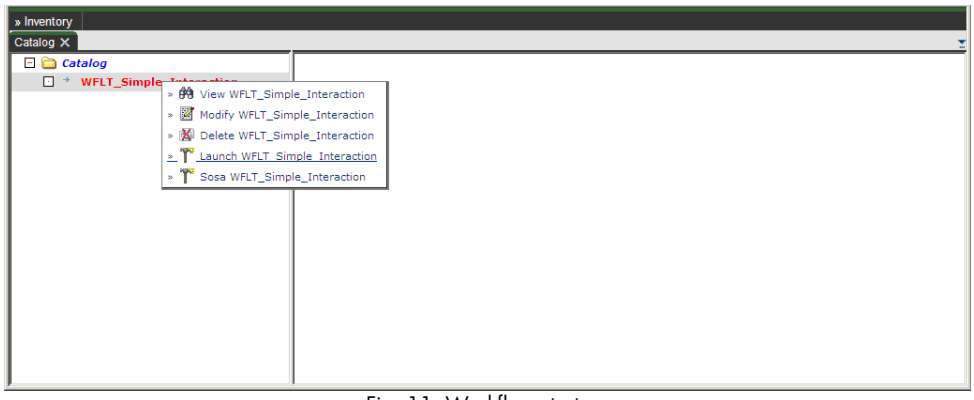


Fig. 11: Workflow start up

After starting up a workflow, *WFLTAction.do* will be followed by the tracking process.

10.1.3.1 Case packet values specification

Initial values for the workflow's case packet can be specified when invoking the *WFLTAction.do* and a *HashMap* will be automatically composed with them and sent to the workflow to start it up properly. It is possible to specify each case packet entry and value or to specify a *HashMap* already filled with the needed values.
The parameters/attributes accepted by the *WFLTAction.do* for the case packet composition are:

- *__wfCP*: a *HashMap* already filled that will be sent as the initial case packet for the workflow start up. If there are also specified some other parameters/attributes for the case packet, this *HashMap* will be extended with the new retrieved entries. Note that this *__wfCP* attribute can

never be received as a request parameter, because it is not possible to receive a Java object that way. It must be specified as a request attribute, and this means that in this case the invocation of the *WFLTAction.do* has to be made from a previous Struts action, never from a JSP file.

- *wfvar__<<key_name>>*: indicates a new entry for the initial case packet. In the HashMap will be inserted a new key <<key_name>> associated to the specified value of this parameter/attribute. Note that if this is received as a request parameter, it will be inserted into the case packet as a String. If it is received as a request attribute, it will be inserted as it is received and any king of Object can be inserted.

Ex.:
From a JSP file, a workflow called *InsertEquipment* is started up indicating two values for the case packet: one called *name*, another called *model* and a third one called *version*.

```
WFLTAction.do?__wfname=InsertEquipment&wfvar__name=EQ0&wfvar__model=HP&wfvar
__version=2.4
```

This will generate a *HashMap* with three entries:

- name: EQ0
- model: HP
- version: 2.4

10.1.3.2 Backwards compatibility

There is a Struts action called *DeprecatedWFLTAction.do* which provides some extra functionality that is actually deprecated and should be never more used, but is still supported here to maintain the backwards compatibility. This action is followed by the *WFLTAction.do*, so the same parameters explained for it are accepted by this one.
This action is used to compose in an automatic way either *HashMaps* or Arrays of Strings which must be inserted into the case packet.
The *HashMap* composition is made getting from the request parameters (and only parameters, never attributes) those starting by *wfvar__hashmapX*, where X is a number beginning from 0. This way, every request parameter name starting by *wfvar__hashmap0* will be inserted in a *HashMap*, those starting by *wfvar__hashmap1* in another one, and so on.
Ex.:
The next invocation generates two *HashMaps*, one with the entries *location* and *country*, and the other with the entries *name*, *model* and *version*:

```
DeprecatedWFLTAction.do?__wfname=InsertEquipment&wfvar__hashmap0name=EQ0&wfv
ar__hashmap0model=HP&wfvar__hashmap0version=2.4&wfvar__hashmap1location=Madr
id&wfvar__ hashmap1country=Spain
```

The Array of Strings composition is very similar, but the parameter names now must begin with *wfvar__arrayiteratorX*, where X is a number beginning from 0.
Ex.
The next invocation generates an Array of Strings composed by "Madrid" and "Spain":

```
DeprecatedWFLTAction.do?__wfname=InsertEquipment&wfvar__arrayiterator0=Madri
d&wfvar__arrayiterator1=Spain
```

Since the previous versions of the WFLT used some initial JSP files from where all this process started, those JSP files have been maintained, but they should never more be used because actually the *WFLTAction.do* is considered the single entry point for the WFLT tool.

There are two JSP files which automatically redirect the user to the *WFLTAction.do*, and they are called *startWorkflow.jsp* and *inventoryStartWorkflow.jsp*.
There is another JSP file, called *hashmapStartWorkflow.jsp*, which automatically redirects the user to the *DeprecatedWFLTAction.do*.

10.1.4 Tracking workflows

Once a workflow has been started up and its job id has been obtained, it can be tracked. The appearance of the workflow tracking can be seen in the figure below.

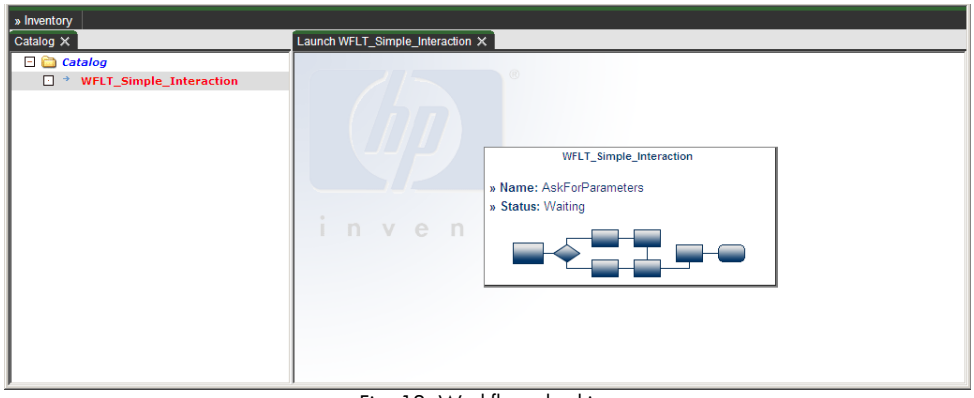


Fig. 12: Workflow checking

It is also possible to track children workflows started up by the parent one, and there is no limitation on the depth of children workflows that starts up another grandchildren workflows.

There are two ways to make the tracking of children workflows: using the database or the CCWF.

a. Tracking through database

When using the database, the job id of the workflow that has to be tracked is stored in a given database table. It is the responsibility of the workflows to change the job id stored in that table. That means that when a workflow is started up, its job id is stored in database, and if that workflow starts up a child workflow, this child workflow must replace the job id stored in database with its own job id, and just before it is finished it must restore the original job id of the parent workflow. This way, the workflow tracking will always track the workflow whose job id is stored in the database each time it is requested.

There are three parameters/attributes that must be specified when calling the *WFLTAction.do* to perform this kind of tracking:

- *__wfDatasource*: the name of the data source to be used. This data source must have been defined previously and the user must have access to it.
- *__wfServiceName*: the name of the database table.
- *__wfServicePk*: the primary key of the entry where the job id has to be stored.

b. Tracking through the CCWF

When using the CCWF a flag is specified as a parameter/attribute. This means that the children workflows are started up using the nodes provided by the CCWF. See the section about the CCWF for further information.

Tracking workflows with the CCWF

__wfConcurrentCheck: it is "true" when the CCWF has to be employed to track the children workflows. The default value if not specified is "false".

10.1.4.1 ECP Command tracking

Using the WFLT is possible to track the commands sent and received by the Equipments Connection Pool (ECP). When a workflow launches an activation through the ECP the executed commands can be shown in the screen. By default only the last 20 commands will appear in the screen, but this number is configurable in the *wflt.properties* file.

In order to activate the ECP command tracking is necessary to include an identifier for that specific activation in the request under the key *__wf_command_id*. This id must be unique and will be used to filter the received messages and show only the ones related to a specific activation. At the same time, this identifier must be provided to the ECP under the same key (See the document "ECP Developers reference", section "3.4 Monitoring ECP commands through JMS" for further details). If no id is provided the jobId value will be taken by default.

It is also necessary to include the parameter *__wf_command_audit_active* with value "true" in order to activate the command tracking.

This example shows how to launch a workflow from the inventory with the command tracking feature activated defining an operation. The following example shows its appearance.

```
<Operation>
  <Name
Bundle="com/hp/spain/wflauncher test/ApplicationResources">launch.wf</Name>
      <Image>newtool.gif</Image>
      <Object>WfLauncherTest</Object>
      <OperationType>Lanzamiento</OperationType>
      <Action>
                  <Page>/activator/WFLTAction.do</Page>
                  <Param>
                        <Name>__wfname</Name>
                        <Value>WfLauncherTest.Name</Value>
                  </Param>
                  <Param>
                        <Name>__wfmwfmname</Name>
                        <Value>constant:localmwfm</Value>
                  </Param>
                  <Param>
                        <Name>__wfConcurrentCheck</Name>
                        <Value>constant:true</Value>
                  </Param>
                  <Param>
                        <Name>__wf_command_audit_active</Name>
                        <Value>constant:true</Value>
                  </Param>
                  <Param>
                        <Name>__wf_command_id</Name>
                        <Value>constant:garemo</Value>
                  </Param>
      </Action>
</Operation>
```

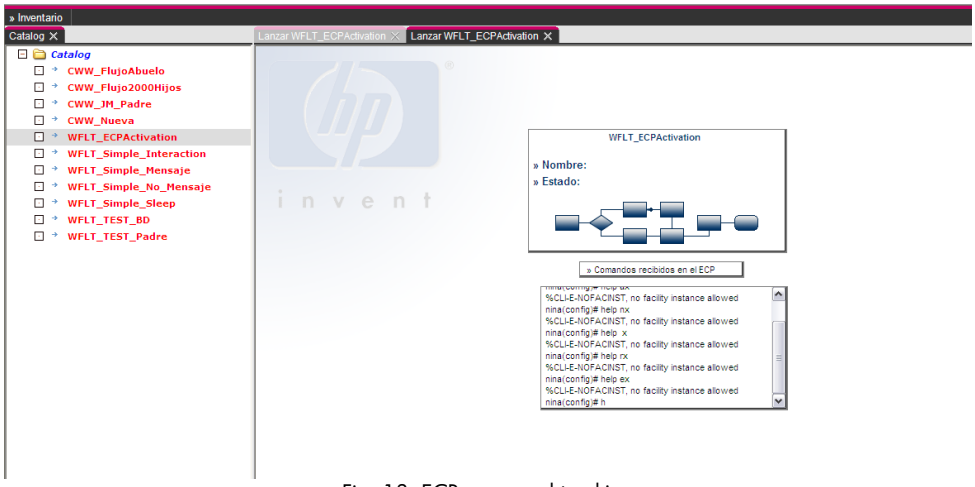


Fig. 13: ECP command tracking

10.1.4.2 Interacting with workflows

There are two reasons to assume that a workflow is waiting for user interaction: the workflow must be in the "waiting" status (see the HPSA documentation for further information about the workflow status) and the step name. There are many reasons why a workflow can be set in a "waiting" status, so that cannot be the only reason to assume that the workflow is trying to interact with the user.

As it is explained in the Configuration section, in the *wflt.properties* file there can be specified several step names that will not be considered as interactive nodes, so those step names starting with any of these configured names will never be considered as interactive nodes.

The typical interactive nodes used for user interaction are the *AskFor* nodes. If a workflow has one *AskFor* node and its name is does not start with any of the configured step names it will show one screen like the one below.

When an interactive node is found, a JSP file is generated and placed below the *customJSP* directory.

The custom JSP file will only be generated once, so if a previous custom JSP file already exists that will be used. This way, a custom JSP file can be changed and new functionality can be added to it.

The figure below shows an example of a custom JSP.

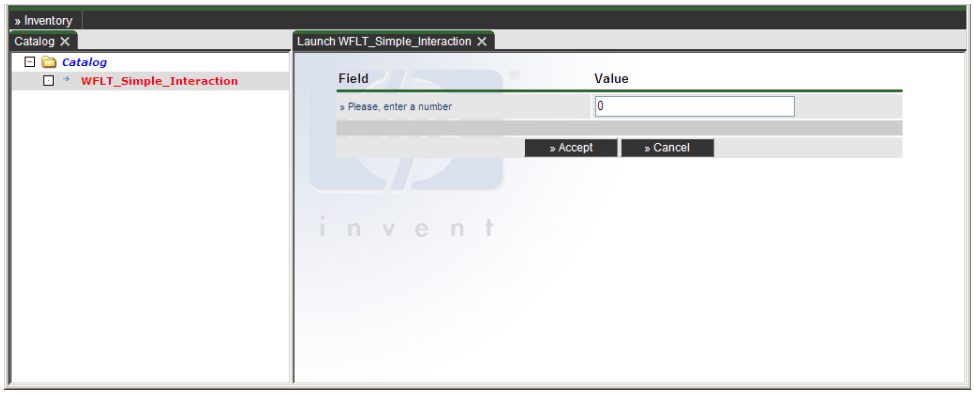


Fig. 14: Workflow interaction

10.1.4.3 Tracking error

If a workflow execution fails, the WFLT will warn the user with a message like the one below.

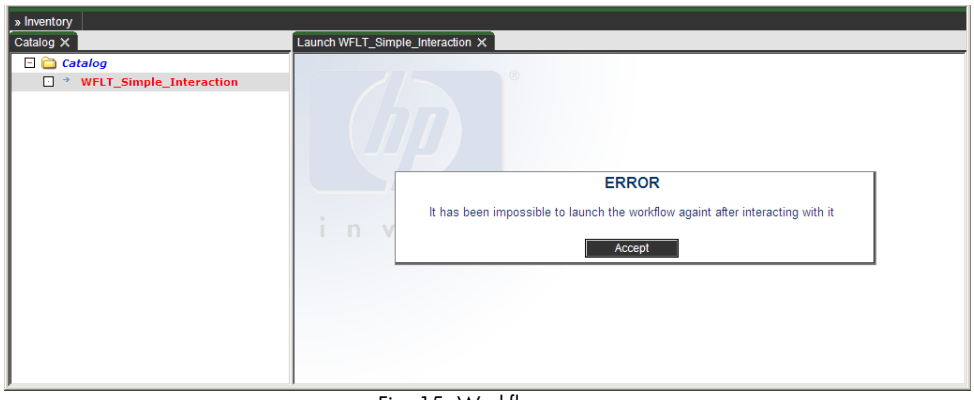


Fig. 15: Workflow error

10.1.4.4 Ending messages

The WFLT assumes that a workflow has finished when there cannot be found any workflow in the specified MWFM engine with the given job id.

When a workflow execution ends, every message belonging to the workflow and its children is displayed. Messages are typically thrown using the *PutMessage* node.

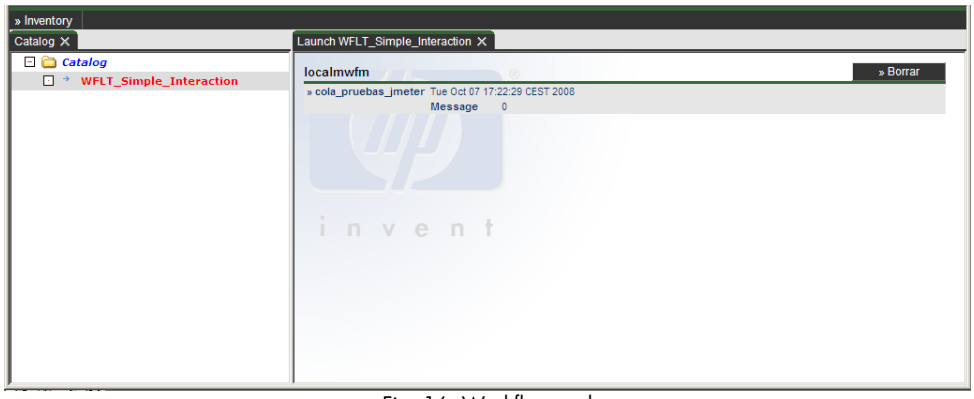


Fig. 16: Workflow end

11 ECP Console

The ECP Console is a web application that allows establishing connections with remote equipments through the ECP, using several available protocols such as telnet or SSH, for example.

The ECP Console application is prepared to analyze execution permissions on any typed command for every user and thus, the operations that can be performed on remote equipments are strictly controlled.

The ECP Console application allows the use of command scripts for each user and remote equipment.

There is also a administration GUI which allows the users to define hosts, command filters and scripts and store them in the database. The access to this GUI is associated with the roles "futuregui" and "ECP", any user accessing the GUI must have both roles.

11.1 Functionality

11.1.1 Command scripts

Command scripts are predefined command sequences which are executed using a different ECP template than typed commands do. They permit a high degree of complexity, allowing the users to define loops and create variables. Thanks to them it's possible to save complex structures and execute them with a single click.

The command scripts are stored in the database and accessible only for the desired users.

Check the document "*SPI for Service Providers – ECP Console - User reference.pdf*", section 3.2 for further information about command scripts.

11.1.2 Opening an ECP Console

In order to open a console the ECP configuration must be properly set at the *ecp.properties* file. There are three properties that must be set:

- ecpmanager.service.host: the ECP name or IP.
- ecpmanager.service.port: the ECP port number.
- ecpmanager.service.name: the ECP RMI service name.

The ECP Console must be opened through the provided *OpenConsoleECP* struts action. In order to obtain the available scripts for a given user from database and the remote host to which the commands will be send it is necessary to provide the action with the next parameters:

- *hostManufacturer*: the remote host manufacturer.
- *hostModel*: the remote host model.
- *hostVersion*: the remote host version.

This parameters constitute the necessary data to define a host (Check the document "*SPI for Service Providers – ECP Console - User reference.pdf*", section 3.1 for further information about hosts).

Depending on the connection class that will be established later in the remote host there are different parameters that must be specified. See the section below for further information.

11.1.3 Connecting to the remote equipment

The ECP provides two ways to obtain connections to a remote host: through a static pool or through a dynamic one. In this way, several parameters must be specified at the ECP Console opening action for the successful connection setup.

Needed parameters for a static pool connection:

- *poolName*: the ECP static pool name used to get an available connection.
- *queueId*: the ECP queue to be used. This parameter is optional and its default value if not specified is 1.

For example:

```
http://localhost:8089/activator/OpenConsoleECP.do?hostmanufacturer=alcatel&h
ostModel=riverstone&hostVersion=1&hostname=16.38.0.136&poolName=testingpool
```

Needed parameters for a dynamic pool connection:

- *hostname*: the remote host name or IP.
- *port*: the remote host port.
- *login*: the remote host login username.
- *password*: the remote host password.
- *passwordEnable*: the remote host password used to change the session mode once the remote host has been connected.
- *protocol*: the remote host connection protocol, typically telnet or SSH.
- *connectionResourceClassName*: the java class which implements the driver used for the remote host connection.
- *poolName*: the dynamic pool name. This is an optional parameter because dynamic pool names can be automatically generated by the ECP.
- *maxCon*: the maximum number of connections to be contained by the dynamic pool. It is an optional parameter.
- *minCon*: the minimum number of connections to be contained by the dynamic pool. It is an optional parameter.
- *initOnCreate*: boolean value which indicates if the connection must be initialized on instantiation instead of on the first time it is used. It is an optional parameter.
- *overMinimumConnTimeout*: the timout (in milliseconds) for the not used temporary connections over the minimum before they are closed. It is an optional parameter.
- *reservedConnTimeout*: the time (in milliseconds) that a connection may be in use by a single operation. It is an optional parameter.
- *poolTimeout*: the timeout (in milliseconds) for a not used dynamic pool before it is closed. It is an optional parameter.
- *additionalData*: some additional data, if needed. It is an optional parameter.
- *queueId*: the ECP queue to be used. This parameter is optional and its default value if not specified is 1.

For example:

```
http://localhost:8089/activator/OpenConsoleECP.do?hostmanufacturer=alcatel&h
ostModel=riverstone&hostVersion=1&hostname=16.38.0.136&port=23&login=guest&p
assword=gpwd&passwordEnable=egpwd&protocol=telnet&connectionResourceClassNam
e=com.hp.spain.connection.RiverstoneRSConnectionResource
```

12 Configuration

Alter installing the SC it is compulsory to check that the configuration is correct in order for all the projects that make up the SC work properly.

There are three configuration files that we must draw special attention: *web.xml*, where the servlets, taglibs and ejbs are defined among other things; *mwfm.xml*, where the MWFM is configured with all its modules, among them the user authentication module (see this module documentation for more information); and the datasource configuration files.

12.1 *DB* module

In the *mwfm.xml* we can define as many access modules to different databases as are needed, but one of them must be necessarily called just db, which is the one the MWFM will use.

Through this module we configure the connection pool parameters to the database the MWFM and the rest of defined modules are going to interact with.

Keep in mind the MWFM runs in a different virtual machine to the one that runs the JBoss, which is the one that holds both the SC and the different applications involved with it, and that each can access one or several databases residing in different machines. Each virtual machine is independent from the rest, so the db module here configured (and all the other database modules that can be defined with this one) will only influence the MWFM and the modules that are running in this virtual machine.

To configure an access module to the database in the *mwfm.xml* we have to indicate a name for the module (db in this case) and the Java class that implements the *DataSource* (in this case *com.hp.spain.engine.module.DatabaseModule*, though this is not the only possibility). Additionally we must indicate the other parameters, which for an Oracle database are:

- *server_name*: the IP or name of the machine where the database is kept.
- *user*: the name of the database user.
- *password*: the password of the database user
- *database_name*: the name of the database. It is generally called HPSA.
- *port_number*: the access port to the database. The default is 1521.
- *url*: the access URL to the database. It is composed using the previous parameters.
- *driver*: the Java class which implements the access driver to the database. If we use Oracle, the driver is *oracle.jdbc.driver.OracleDriver*.
- *connections*: indicates the number of connections to the database that the pool will keep open.
- *max_usages*: the maximum number of times that a connection can be reused before being closed to open a new connection. This is important due to the problems that arise with Oracle drivers.
- *connection_quantum*: unknown description.

A configuration example of the db module is shown below.

```
<Module>
    <Name>
      db
    </Name>
    <Class-Name>
```

```
      com.hp.spain.engine.module.DatabaseModule
    </Class-Name>
    <Param
      name="server_name"
      value="172.16.2.70"/>
    <Param
      name="user"
      value="vpls"/>
    <Param
      name="password"
      value="pass4vpls"/>
    <Param
      name="database_name"
      value="HPSA"/>
    <Param
      name="port_number"
      value="1521"/>
    <Param
      name="url"
      value="jdbc:oracle:thin:@172.16.2.70:1521:HPSA"/>
    <Param
      name="driver"
      value="oracle.jdbc.driver.OracleDriver"/>
    <Param
      name="connections"
      value="2"/>
    <Param
      name="max_usages"
      value="0"/>
    <Param
      name="connection_quantum"
      value="300"/>
</Module>
```

Since HPSA 5.x provides a single JVM for both the JBoss and the MWFM, it is possible to use a previously defined JBoss' data source as the one used as DB Module. Thus, let's suppose that there is a data source defined in the JBoss with the name *mwfm-default*. Setting it as DB Module will be made this way:

```
<Module>
   <Name>
     db
   </Name>
   <Class-Name>
     com.hp.ov.activator.mwfm.engine.module.OracleDatabaseModule
   </Class-Name>
   <Param
     name="datasource_name"
     value="mwfm-default-ds.xml"/>
</Module>
```

12.2 Authentication module

In the Authentication module we indicate the login system for the users, which can depend on the operating system or any other factor.

HPSA provides three different authentication systems validating the user against a specific operating system:

- *HPUXAdvancedAuthModule*
- *SolarisAdvancedAuthModule*
- *WindowsAdvancedAuthModule*

These authentication systems validate the user against the corresponding operating system and guarantee that the user exists and belongs to a role with access permissions to HP Service Activator, but none of them consults the permissions in the User Administration Module. To do this there is another authentication system:

- *DatabaseAdvancedAuthModule*

This validates the user against a database and guarantees that its username and password are valid.

In principle we can use the one we feel is more convenient, but only the last one applies the authentication against the User Administration Module.

For more information about the Authentication module please see the HPSA documentation.

12.3 MWFM Multiple

The SC can manage different MWFM, each of them residing in a machine with an IP and with its corresponding configuration file *auth.properties*.

In order to configure the available MWFMs in the system, you have to edit the *auth.properties* file. There, the next parameters should be filled:

- *mwfm_rmi_authX*: [X takes consecutive values starting from 0 onwards]: these parameters, numbered consecutively, indicate the RMI services of the different Master MWFM. (Ej. //localhost:2000/auth). This parameter has the same meaning here as the *mwfm_rmi_auth* parameter has in the Authentication Module configuration (see the section above).
- *mwfm_nameX* [X takes consecutive values starting from 0 onwards]: these parameters, numbered consecutively, indicate the names of the different MWFM which can be accessed from the HP Service Activator. Each parameter specified here must have its corresponding URL, which is indicated in the parameter *mwfm_urlX* similarly numbered. It is necessary that at least the first MWFM is defined, so the parameter mwfm_name0 must always be indicated.
- *mwfm_urlX* [X takes consecutive values starting from 0 onwards]: these parameters, numbered consecutively, indicate the URL in which each MWFM Publisher its methods using RMI. As in previous parameter, we need at least one *mwfm_nameX* parameter with the same numbering and so we necessarily have to define a *mwfm_url0*.
- *default_mwfm*: indicates which of the MWFM specified we will use as default. This parameter is not compulsory and if is not specified the value taken as default is the one that is defined by *mwfm_name0* and *mwfm_url0*.

12.4 Web application doctype

SC uses a new version of the DTD employed to validate the web.xml. This DTD is property of Sun Microsystems, Inc., as always has been, and the new 2.3 version is located under a different URL: http://java.sun.com/dtd/web-app_2_3.dtd.

At the header of the web.xml file there must be placed this XML code:

```
<!DOCTYPE web-app
```

```
  PUBLIC "-//Sun Microsystems, Inc.//DTD Web Application 2.3//EN"
  "http://java.sun.com/dtd/web-app_2_3.dtd">
```

12.5 Session management

SC provides a new feature that allows to manage the sessions of the logged on users. This is done declaring inside the *<web-app>* tags of the *web.xml* file, just before the servlet's declaration, the next Listener:

```
<listener>
   <listener-class>
      com.hp.spain.futuregui.session.SessionManagerImpl
   </listener-class>
</listener>
```

This feature is optional and will only be performed if this listener is defined. The class which implements the listener features belongs to the SC.

It is also possible to determine the number of users with the same username who can be logged on the SC at the same time. This value is established through an attribute of the HPSA_TEAM table called *userspersession*, so it will affect to every users of the team.

A value of 1 indicates that only one user can be logged on the SC with the same username, so the last logged on user will cause the log off of the first one. A value greater than 1 will have a similar effect, but will allow the specified number of users to be logged on. A value of 0 will set no limitation on the number of users with the same username logged on the SC.

Use the User Administration GUI to set the value of this attribute.

12.6 Struts

Nowadays there exist loads of Technologies which implement the Model-View-Controller paradigm and Struts is one of them. The SC bases its functionality on Struts, so its configuration is important.

Struts provides a separation between the presentation and business layers, as is specified in the MVC model, so that the JSP must take care of the first, and the actions and forms (extensible Java classes which Struts uses) take care of the second. Struts allows, among other things, to establish validation systems and access to automatic actions, and is constituted by a servlet called *ActionServlet* which listens to all requests directing the flow of execution towards the corresponding action. All actions are mapped in configuration files whose usual name is struts-*config.xml*.

The SC provides an extension to Strut's basic servlet that searches automatically for all the configuration files where the different applications specify the actions and forms which constitute them, in such a way that all configuration files that are stored in *WEB-INF/struts-config* are mapped without any need to specify each of them in the web.xml, as happens with Strut's *ActionServlet*. In order to make this extension of the Action Servlet available it's necessary to indicate it between the *<servlet-class>…<servlet-class>* tags of the servlet definition.

The name of the Struts servlet is, by common use, action.

Also, it's necessary to indicate a series of initial parameters which determine the servlet configuration. Currently the following are necessary, although there are other which can be specified (see the Struts documentation for more information):

- *locale*: indicates whether we have to take into account the user's operating system regional configuration for the internationalization of the texts. In the SC case this parameter must have value true as it is one of the main characteristics of the new interface.
- *umm_remote_url*: indicates the URL in which the user administration module Publisher its methods using RMI. Specifying it is mandatory in order for the *RequestProcessor* can consult the execution permissions of the different actions.
- *check_permissions*: indicates if we are going to user the *RequestProcessor* before executing any action. Currently this feature is in development, so it must be given value false.

According to this, Strut's extended servlet's configuration in the web.xml is as follows:

```
<servlet>
   <servlet-name>
      action
   </servlet-name>
   <servlet-class>
      com.hp.ov.activator.mwfm.futuregui.servlet.AdvancedActionServlet
   </servlet-class>
   <init-param>
      <param-name>
         locale
      </param-name>
      <param-value>
         true
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         umm_remote_url
      </param-name>
      <param-value>
         //localhost:2000/usrmngr
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         check_permissions
      </param-name>
      <param-value>
         false
      </param-value>
   </init-param>
   <load-on-start-up>
      1
   </load-on-start-up>
</servlet>
```

Alter this, in the area of the web.xml dedicated to the mapping of the servlets, we must copy the following:

```
<servlet-mapping>
   <servlet-name>
      action
   </servlet-name>
   <url-pattern>
      *.do
   </url-pattern>
</servlet-mapping>
```

This allows us to refer to Strut's actions with the .do extensions, in the same way that for the JSP we use the extension *.jsp*, for example.

12.7 Login

The user login system is carried out through a servlet called Login Servlet which gets its name from the user and his password, and communicates with the authentication module to authenticate him. Once the access is granted, it is obtained at any given moment the applications, menus, inventory views, and the operations on the views the user has access to, and other information.

When the authentication module tells the Login Servlet that the user is valid, the next information is obtained:

- Menu structure from the application environment the user has access to. This structure is kept in the session.
- Inventory views and operations the user has access to. This structure is also stored in the session.
- Datasources the user can access. Each of these datasources is stored in the session using its names as key.
- Also stored in the session is the username under the key "user".
- Apart from the previous, the session also keeps the different MWFM in a *HashMap* under the key "mwfms". Each wmfm uses as key its name (see the *auth.properties* file). Under the key "mwfm_session" is stored the default MWFM. In order to maintain backward compatibility, we also keep each MWFM in session individually, using its name as key.

To configure the Login Servlet we must indicate the name with which it will be mapped (it will necessarily be called login), the Java class that will implement the servlet (*com.hp.spain.futuregui.login.LoginServlet*) and the following parameters:

- *classic_inventory_view*: indicates if the inventory must be viewed with the four window model or with the two window model. The classic view was the one with two windows, only the instances were shown, whilst in the new system with four windows the distinction between hierarchies and instances is made. It is not necessary and its default value is *false,* that is, by default the four window model is used.
- *init_url*: indicates the URL to which we will redirect the user when the login process ends successfully. In the case of the SC, the URL by default is the one for the application environment (*/activator/jsp/future-gui/index.jsp?frst=true*). It is a mandatory parameter and cannot be null or empty.
- *superuser_init_url*: it ahs the same meaning as *init_url,* but in this case it only applies to suer and system users. If not specified, it takes the same value assigned to *init_url*.
- *future_gui_login_failure*: indicates the URL to which we will redirect the user when the login process fails. In the SC case this URL points to a JSP error page (*/activator/jsp/future-gui/loginError.jsp*). It is a mandatory parameter and cannot be null or empty.
- *future_gui_change_password*: indicates the URL to which we will redirect the user when his password has been expired.
- *use_random_color*: this parameter indicates whether or not we must use the eight colour palette of the interface. It is not mandatory and its default value is *true,* that is, the eight colour palette.

- *maxReturnedValues*: indicates the maximum number of results that a search can show. It is not mandatory and its default value is 2000 results.
- *inventory_tabs*: indicates the maximum number of tabs that can be opened on a single window of the inventory. A number zero (the default value if this parameter is not specified) indicates that there is no limitation on the number of tabs.
- *max_filters*: indicates the maximum number of filters that can be assigned to each user. A value of 0 (default value) means no limitation on this.
- *max_stored_searches*: indicates the maximum number of stored advanced searches that can be associated to each user. A value of 0 (default value) means no limitation on this.
- *spi_user_manager_rmi_url*: the RMI URL which provides methods to create users remotely. It is an optional parameter. Its default value if not specified is *//localhost:2000/userrmi*. This parameter becomes mandatory when there are more than one *diagnostic* JBoss instances running. When the specified URL is set to *localhost* or the equipment IP, the RMI will be started up by the Login Servlet allocated here. Since there can only be defined a single user management RMI, in this case any other Login Servlet allocated in any other IP should be configured to use the RMI configured here. The RMI service at this location provides also methods for action audit.

As is explained on top, the Login Servlet should be configured as is shown below:

```
<servlet>
   <servlet-name>
      login
   </servlet-name>
   <servlet-class>
      com.hp.spain.futuregui.login.LoginServlet
   </servlet-class>
   <init-param>
      <param-name>
         classic_inventory_view
      </param-name>
      <param-value>
         false
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         init_url
      </param-name>
      <param-value>
         /activator/jsp/future-gui/index.jsp?frst=true
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         future_gui_login_failure
      </param-name>
      <param-value>
         /activator/jsp/future-gui/loginError.jsp
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         future_gui_change_password
      </param-name>
      <param-value>
```

```
         /activator/SetNewUserPasswordActionFG.do
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         use_random_color
      </param-name>
      <param-value>
         true
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         spi_user_manager_rmi_url
      </param-name>
      <param-value>
         //localhost:2000/userrmi
      </param-value>
   </init-param>
</servlet>
```

Once the servlet has been defined, in the section of the web.xml dedicated to the mapping of servlets we must copy the following:

```
<servlet-mapping>
   <servlet-name>
      login
   </servlet-name>
   <url-pattern>
      /login
   </url-pattern>
</servlet-mapping>
```

This mapping allows us to refer to the *Login Servlet* from JBoss's root directory (*/activator*) using the name *login*.

From this moment on the servlet invocations will be similar to:

`http://localhost:8089/activator/login?username=xxx&password=yyy`

12.8 Multiple JBoss instances

It is possible to start up different JBoss instances and establish different configurations for satisfying the client solutions. When there are more than one *diagnostic* JBoss instance running it is necessary to specify which one of them is going to provide the RMI used for the user management. Only one of the available JBoss instances can start it up.

Check the description of the *spi_user_manager_rmi_url* parameter specified in the *web.xml* file for the *Login Servlet* definition.

12.9 Flow interaction

The servlet which permit the interaction with the user during the flow execution is used extensively and it is a good idea to explain its configuration, in the same way we did for the Future Tree.

To perform the user interaction with a running workflow the flow of execution is paused and waits for new orders, and the *interact* servlet is invoked, whose mission is to generate a JSP where all the fields the user must fill in are shown.

To configure this servlet it is necessary to know the role of the following parameters:

- *customizeAskForNodeJSP*: indicates whether the interaction JSP should be generated or not.
- *webRoot*: indicates the directory where the interaction JSP generated by the servlet must be located.
- *fileSavedInfo*: it's only useful when *customizeAskForNodeJSP* is *true*. Indicates whether the JSP must be stored for later use.
- *mandatory*: text with which the mandatory parameters will be indicated. It is not mandatory and if no value is given the mandaroty parameters will appear in red. It generally has an asterisk (*) as value.
- *showAllInformation*: indicates whether all the information relating to the flow and the node must be shown in the JSP.
- *submit*: text that should appear in the Submit buttons. Currently this text is not used has it has become deprecated by Struts' internationalization.
- *clear*: text that should appear in the Delete buttons. Currently this text is not used has it has become deprecated by Struts' internationalization.
- *cancel*: text that should appear in the Cancel buttons. Currently this text is not used has it has become deprecated by Struts' internationalization.
- *allowCancel*: indicates whether the JSP should show the operation cancel option. If the value is false, the button will not be shown.

The servlet's configuration is as follows:

```
<servlet>
   <servlet-name>
      interact
   </servlet-name>
   <servlet-class>
      com.hp.spain.wflt.interact.PageGenerator
   </servlet-class>
   <init-param>
      <param-name>
         customizeAskForNodeJSP
      </param-name>
      <param-value>
         true
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         webRoot
      </param-name>
      <param-value>
         C:/hp/jboss/server/diagnostic/deploy/hpovact.sar/activator.war
      </param-value>
   </init-param>
   <init-param>
       <param-name>
         fileSavedInfo
      </param-name>
       <param-value>
         true
      </param-value>
```

```
   </init-param>
   <init-param>
      <param-name>
         mandatory
      </param-name>
      <param-value>
         *
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         showAllInformation
      </param-name>
      <param-value>
         false
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         submit
      </param-name>
      <param-value>
         Enviar
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         clear
      </param-name>
      <param-value>
         Cancelar
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         allowCancel
      </param-name>
      <param-value>
         true
      </param-value>
   </init-param>
   <init-param>
      <param-name>
         cancel
      </param-name>
      <param-value>
         flujo_cancelado
      </param-value>
   </init-param>
</servlet>
```

Apart from the definition it is necessary to include the mapping of both servlets in the *web.xml*.

```
<servlet-mapping>
   <servlet-name>
      interact
   </servlet-name>
   <url-pattern>
      /interact
   </url-pattern>
```

```
</servlet-mapping>
```

12.10 Taglibs

A taglib allows the generation of code in a web page using user defined tags. It is formed by a TLD (Tag Library Descriptor) where the XML definition of the tags and its attributes is established, and a Java implementation for each tag, so the result is HTML code generated automatically in an easy way.

12.10.1 Taglibs belonging to HP Service Activator

HP Service Activator uses several customary taglibs that are not relevant at the moment, but which must be defined in the *web.xml* and the TLD must be deployed in *WEB-INF/taglib* (this last step is done automatically when doing a reset or when installing the *HP Service Activator*).

The taglib definition inside the web.xml must be like this:

```
<taglib>
   <taglib-uri>
      /WEB-INF/taglibs/core
   </taglib-uri>
   <taglib-location>
      /WEB-INF/taglibs/c.tld
   </taglib-location>
</taglib>
<taglib>
   <taglib-uri>
      /WEB-INF/taglibs/core_rt
   </taglib-uri>
   <taglib-location>
      /WEB-INF/taglibs/c-rt.tld
   </taglib-location>
</taglib>
<taglib>
   <taglib-uri>
      /WEB-INF/taglibs/jstl/xml
   </taglib-uri>
   <taglib-location>
      /WEB-INF/taglibs/x.tld
   </taglib-location>
</taglib>
<taglib>
   <taglib-uri>
      /WEB-INF/taglibs/jstl/xml_rt
   </taglib-uri>
   <taglib-location>
      /WEB-INF/taglibs/x-rt.tld
   </taglib-location>
</taglib>
<taglib>
   <taglib-uri>
      /WEB-INF/taglibs/xtags-1.0
   </taglib-uri>
   <taglib-location>
      /WEB-INF/taglibs/taglibs-xtags.tld
   </taglib-location>
</taglib>
```

The content of the *<taglib-location>…</taglib-location>* tags indicate the TLD which is being referred to.

12.10.2 Taglibs belonging to Struts

The version 1.2.7 of Struts which is currently used in the SC provides various taglibs with several functionalities. For more detailed information about each of them refer to Strut's documentation.

The TLDs of these taglib are deployed in the WEB-INF and its definition inside the *web.xml* is as follows:

```
<taglib>
   <taglib-uri>
      /tags/struts-bean
   </taglib-uri>
   <taglib-location>
      /WEB-INF/struts-bean.tld
   </taglib-location>
</taglib>
<taglib>
   <taglib-uri>
      /tags/struts-html
   </taglib-uri>
   <taglib-location>
      /WEB-INF/struts-html.tld
   </taglib-location>
</taglib>
<taglib>
   <taglib-uri>
      /tags/struts-logic
   </taglib-uri>
   <taglib-location>
      /WEB-INF/struts-logic.tld
   </taglib-location>
</taglib>
<taglib>
   <taglib-uri>
      /tags/struts-nested
   </taglib-uri>
   <taglib-location>
      /WEB-INF/struts-nested.tld
   </taglib-location>
</taglib>
<taglib>
   <taglib-uri>
      /tags/struts-tiles
   </taglib-uri>
   <taglib-location>
     /WEB-INF/struts-tiles.tld
   </taglib-location>
</taglib>
```

12.10.3 Belonging to the SC

The SC provides some taglibs that generate HTML code following the interface's own style. All the TLDs in this section can be found inside the ovsa41-utilities project and are deployed in the WEB-INF.

12.10.3.1 Button taglib

This taglib allows the generation of buttons following the style of the SC and shows the internal text internationalized.

The TLD is called *button-taglib.tld* and the necessary configuration is:

```
<taglib>
   <taglib-uri>
      /tags/button-taglib
   </taglib-uri>
   <taglib-location>
      /WEB-INF/button-taglib.tld
   </taglib-location>
</taglib>
```

12.10.3.2 Table taglib

This taglib allows the generation of tables following the style of the SC.

The TLD is called *table-taglib.tld* and the necessary configuration is:

```
<taglib>
   <taglib-uri>
      /tags/table-taglib
   </taglib-uri>
   <taglib-location>
      /WEB-INF/table-taglib.tld
   </taglib-location>
</taglib>
```

12.10.3.3 Block taglib

This taglib allows the generation of information request views for the application environment.

The TLD is called *block-taglib.tld* and the configuration needed is:

```
<taglib>
   <taglib-uri>
      /tags/block-taglib
   </taglib-uri>
   <taglib-location>
      /WEB-INF/block-taglib.tld
   </taglib-location>
</taglib>
```

12.10.3.4 Combotext taglib

This taglib is a combination between a text field and a combo box. With it, any text may be typed into the text field, but there are some suggested options by default, as it happens with a combo box, which are displayed as they match the already typed text.

The TLD is called combotext-taglib.tld and the configuration needed is:

```
<taglib>
   <taglib-uri>
      /tags/combotext-taglib
   </taglib-uri>
   <taglib-location>
```

```
      /WEB-INF/combotext-taglib.tld
   </taglib-location>
</taglib>
```

12.10.3.5 Display tag

This taglib is property of *Jakarta*, it has not been developed by HP. It allows the generation of tables with more features than the *table taglib,* as it allows the possibility of paginating the results and to order them by columns either in ascending or in descending order. Also it provides functionality to retrieve the results in different formats, such as PDF, CSV or XLS.

The TLD is called *displaytag.tld* and the configuration in the *web.xml* is:

```
<taglib>
   <taglib-uri>
      /tags/struts-displaytag
   </taglib-uri>
     <taglib-location>
      /WEB-INF/displaytag.tld
   </taglib-location>
</taglib>
```

12.11 Session timeout

The session timeout is defined in the *web.xml* and is the maximun amount of inactivity measured in minutes:

```
<session-config>
   <session-timeout>
      100
   </session-timeout>
</session-config>
```

12.12 Extension mapping

In the *web.xml* the type of file that corresponds to the different extensions, such as css, jsp, etc. Generally a typical web.xml includes mappings similar to these shown here:

```
<mime-mapping>
   <extension>
      .js
   </extension>
   <mime-type>
      text/JavaScript
   </mime-type>
</mime-mapping>
<mime-mapping>
   <extension>
      .css
   </extension>
   <mime-type>
      text/css
   </mime-type>
</mime-mapping>
<mime-mapping>
```

```
   <extension>
      .pdf
   </extension>
   <mime-type>
      application/pdf
   </mime-type>
</mime-mapping>
<mime-mapping>
   <extension>
      xslt
   </extension>
   <mime-type>
      text/xml
   </mime-type>
</mime-mapping>
```

12.13 Welcome page

The welcome page is configured in the *web.xml*. The system by default will search in all public directories, so that if a user types in a URL which doesn't match any specific page JBoss will try to find a page that matches the value entered here.

Here you can specify as many welcome pages as are needed.

```
<welcome-file-list>
   <welcome-file>
      login.html
   </welcome-file>
   <welcome-file>
      index.html
   </welcome-file>
</welcome-file-list>
```

12.14 Datasources

A datasource is a connection pool to the database. JBoss provides an easy way to define them using XML files which are deployed in the *deploy* directory of its instance and where the configuration data is specified: the name of the datasource, the driver to use, the URL to the database, the user and password, etc.

The XML files where the datasources of JBoss are defined always end with the *–ds.xml* suffix.

The SC uses the datasources of JBoss, but applies an important restriction when defining them: the name of the XML file must match the name of the datasource. In this way, if a datasource is going to be named *futuretree*, the datasource definition file must be called *futuretree-ds.xml*.

By default the datasources are not kept in the user's session, they will only be accessible through the servlet context. This is due to the fact that the datasources are tied to the access permissions specified in the User Administration Module, where the mapping between datasources and applications are defined. The user's session only stores the datasources that belong to applications that the user has been given permission to access (refer to the section on *Roles and Applications* from the *Permissions* chapter). Please refer to the documentation of the User Administration Module for more information.

Even though a datasource can be configured in many ways, the more common method used in the SC requires entering the following information:

- *Name*: is indicated with the tags *<jndi-name>…</jndi-name>*. This name must match the name of the XML file.
- *URL*: is defined with the tags *<connection-url>…</connection-url>*. It's a string where all the connection parameters are present separated by a semicolon (:). The first part of this string indicates the type of driver that will be used, which is usually *jdbc:oracle:thin*, whilst the second part of the string, separated by the previous by an at sign (@), indicates the IP, the port, and name of the database. For example:

```
jdbc:oracle:thin:@localhost:1521:HPSA
```

- *Driver*: is indicated between the *<driver-class>…</driver-class>* tags. For an Oracle database the driver is:

```
oracle.jdbc.driver.OracleDriver
```

- *User*: is indicated between the *<user-name>…</user-name>* tags.
- *Password*: is defined with the *<password>…</password>* tags.
- Minimum number of open connections: is defined with the *<min-pool-size>…</min-pool-size>* tags. It shows the minimum number of connections to the database that must be kept always opened.
- Maximum number of open connections: is defined with the *<max-pool-size>…</max-pool-size>* tags. It indicates the maximum number of connections to the database that can be kept open simultaneously.
- Maximum timeout waiting for a free connection: is defined between the *<blocking-timeout-millis>…</blocking-timeout-millis>* tags. The value is specified in milliseconds. After this time an exception is thrown.
- Maximum time an open connection can remain inactive: is indicated with the *<idle-timeout-minutes>…</idle-timeout-minutes>* tags. The value is given in minutes.

According to this, a configuration example of a datasource defined in *futuretree-ds.xml* could be:

```
<?xml version="1.0" encoding="UTF-8"?>
<datasources>
   <local-tx-datasource>
      <jndi-name>
         futuregui
      </jndi-name>
      <connection-url>
         jdbc:oracle:thin:@localhost:1521:HPSA
      </connection-url>
      <driver-class>
         oracle.jdbc.driver.OracleDriver
      </driver-class>
      <user-name>
         user41
      </user-name>
      <password>
         pass4user41
      </password>
      <min-pool-size>
         0
      </min-pool-size>
      <max-pool-size>
         5
      </max-pool-size>
```

```
      <blocking-timeout-millis>
         10000
      </blocking-timeout-millis>
      <idle-timeout-minutes>
         15
      </idle-timeout-minutes>
   </local-tx-datasource>
</datasources>
```

SC provides two datasources, one called *futuregui*, and another called *futuretree*. The second one is not necessary in this version because it has been supplied by the first one, but it has been kept to warranty backwards compatibility.

It's also possible to define datasource alias in the file alias.xml that can be found in the same directory as the proper datasources. This file allows the user to define an alias for a pre-existent datasource. This alias can be used in the same way as any other datasource defined in the system. Only the users with permissions to the original datasource can access to its alias.

The xml file has the next structure:

```
<alias-definition>
  <alias>
      <datasource-name>DatasourceOne</datasource-name>
      <datasource-alias> DatasourceTwo</datasource-alias>
  </alias>
  <alias>
      <datasource-name> DatasourceThree</datasource-name>
      <datasource-alias> DatasourceFour</datasource-alias>
  </alias>
</alias-definition>
```

12.15 Permissions

The permissions are specified in the User Administration Module and are established for each role the user belongs to.

The permissions granted to a user are verified only once: the moment when the user logs on. Therefore, if there is a change in the user's permissions while he is logged on, the user must log in again in order for the changes to take effect.

12.15.1 Users and Teams

Teams (i.e. Groups) are used to define groups of users with the same (or at least very similar) privileges. A group may have from zero to n users, and may be associated to one role (*futuregui*) or more. Each user must be assigned to a group, and there can't be any user associated to roles which are not associated to that group. If this situation happens, the user won't be able to log on the SC.

Teams may have administrators. There is no limitation on the number of administrators a team can have.

Administrators are allowed to create, update and remove users of their own group. They can manage their permissions to access roles, but they are not allowed to create, update or remove roles. This feature is only allowed for super users.

12.15.2 Roles and Teams

The relationships between roles and teams determine the roles which will be accessible for the users of the different teams. A user will have permission to access one or more of the roles belonging to his team, but at least it is necessary for him to have access to the *futuregui* role.

12.15.3 Roles and users

These are the first permissions that must be established. A user can be associated to any number of roles and vice versa. From this moment on, the rest of the permissions are established through the roles, and never through the user.

Since a user must belong to a team (and only to one team), it is not allowed to establish access to roles which are not associated to the user's team. If this situation is given, the user will not be able to log on the SC.

12.15.4 Roles and applications

The permissions between roles and applications determine the applications (and all the elements belonging to the applications, such as menus and datasources) to which the roles will have access.

From these permissions are determined the datasources that the user will keep in the session after logging in: those datasources that are associated to the applications the user has access to.

12.15.5 Roles and menus

The permissions between roles and application menus are established in two ways. One is this, making the relationship directly between the roles and the menus, but as the menus belong to the applications it is also necessary establish the permissions to access the application that corresponds to the menu, as was explained in the previous section.

These permissions only affect the application environment, which is where the application menus are used, but they are irrelevant to the inventory.

12.15.6 Roles and inventory views

The inventory views the user has access to, are defined here. Thus, a normal user will opening the inventory window will only have access to those views associated to one (or more) of his roles.

12.15.7 Roles and inventory view operations

The permissions between roles and the operation types belonging to each inventory view are set here. Thus, only those operations of those operation types associated to one (or more) of the user roles will be accessible for each user.

12.16 GUI

There are some features of the Inventory's interface which can be configured.

12.16.1 Log4j

Log4j is used to print log traces. It allows, for instance, setting the level of printed logs or to change the console where these logs are printed.

There is a XML file where this configuration is set:

```
C:\hp\jboss\server\diagnostic\conf
```

For more configuration information and examples see the Jakarta Log4j website:
http://jakarta.apache.org/log4j

12.16.2 Changing view and status

The *index.jsp* file can receive two optional parameters, which are typically specified along the different mappings in the application *struts-config.xml* file:

- *viewName*: indicates the name of the new view which is going to be loaded. If this menu has any menu attached, they will be preloaded, too. The JSP file associated to this view, if any, is obtained from database.
- *fjsp*: indicates the URL of the initial status JSP file which has to be loaded in the status space, if any. If no *fjsp* parameter is specified, a default JSP file is loaded, called *blank.jsp*, and provided with the SC. This default JSP file has no representation.

12.17 Access to the Inventory UI: cross launch

The Inventory window is opened in a new navigator's window from the SC's applications environment by clicking the *Inventory → Open* menu. This option will not be available for a user if that user is not associated to the role *inventory*. Contact your system administrator to get these rights.

The Inventory UI accessed is the HPSA's using cross launch, so parameters regarding this cross launch must be configured in the *crosslaunch.properties* file:

- *hpsa.ip*: the IP where HPSA is running. Note that HPSA must be started up to access the Inventory.
- *hpsa.port*: the port where HPSA is running, typically 8080.

12.18 Workflow Launcher

The next sections explain every needed configuration for the WFLT. This configuration is set using the *wflt.properties* file, which in a Windows environment is placed below the "hp\jboss\server\diagnostic\deploy\hpovact.sar\activator.war\properties" directory.

12.18.1 SOSA Remote Interface

If any workflow has to be started up with SOSA the next parameters are needed in the *wflt.properties* in order to be able to invoke the SOSA remote interface:

- *wfltmanager.service.host*: The computer's IP where SOSA is running.
- *wfltmanager.service.port*: The port which is being used by SOSA.
- *wfltmanager.service.name*: The RMI service used by SOSA.

Here we can see an example of this configuration where SOSA is running locally:

```
wfltmanager.service.host = 127.0.0.1
wfltmanager.service.port = 1119
wfltmanager.service.name = RmiWFLTService
```

12.18.2 Not interactive step names

In the *wflt.properties* file there can be specified the different step names which shall never be considered as interactive nodes, so any node which name starts by any of this configured names will never be an interactive node.

These parameters must be numbered starting from 0:

```
wflt.not.interaction.step0 = Activate
wflt.not.interaction.step1 = Fix
wflt.not.interaction.step2 = Test
wflt.not.interaction.step3 = Lock
wflt.not.interaction.step4 = Invoke
wflt.not.interaction.step5 = Wait
```

12.18.3 ECP Command tracking configuration

Some parameters are necessary to track the ECP commands. They must be specified in the *wflt.properties* file:

- *wflt.provider.url*: The URL where the ECP JMS Server has been launched
- *wflt.max.commands*: The maximum number of commands which will be stored in each launched activation.
- *wflt.ecp.jms.connection.factory*: The JMS Connection factory, this parameter it's not mandatory. By default it will be "TopicConnectionFactory". This parameter must be the same as the one configured in the ECP.
- *wflt.ecp.jms.destination.id* = The JMS Destination Id, this parameter it's not mandatory. By default it will be "/dynamicTopics/ECP.MainTopic". This parameter must be the same as the one configured in the ECP.

Here we can see an example of the values assigned to these parameters:

```
wflt.provider.url = tcp://16.38.0.136:4001
wflt.max.commands = 20
```

As it happens in the previous section with the not interactive step names, those node names in which the ECP command tracking has to be performed must be specified using the properties file. For that, there are some numbered parameters starting from 0 (as it can be seen in the example below) where the beginning of the node names which must be considered as command tracking nodes are specified:

```
wflt.activation.step0 = ECP
wflt.activation.step1 = Command
wflt.activation.step2 = Activate
```

12.18.4 CCWF for the WFLT

Each CCWF must be noticed by the WFLT to be able to track workflows on the different modules. Thus, for each defined CCWF, there must be a properties file with the name of that CCWF where it's RMI URL will be specified using the next parameters:

- *concurrentworkflow.service.host*: the IP of the MWFM host.

- *concurrentworkflow.service.port*: the MWFM port.
- *concurrentworkflow.service.name*: the name of the CCWF remote service.

Note that these three parameters must be the same as the ones specified in the *remote_url* parameter of the CCWF.

For example, in the example of the previous section the name of the CCWF is *localmwfm*. That means that there must be a *localmwfm.properties* file in the properties directory of the JBoss with these contents:

```
concurrentworkflow.service.host = localhost
concurrentworkflow.service.port = 2000
concurrentworkflow.service.name = concurrent_workflows
```

If no properties file is found for a given MWFM name, then the default URL will be used to invoke the CCWF:

//localhost:2000/concurrent_workflows

12.19 ECP Console

12.19.1 Permissions

There are two kinds of permissions that must be managed in order to use the ECP Console: the command filters, which allow executing the different typed commands, and the command scripts, explained in previous sections.

The SC provides an administration GUI to manage these permissions. Check the sections about the ECP Console in the document *"HPSA Extension Pack – Solution Container - User Reference"* for further information.

12.19.2 Command filters

A command filter is a regular expression which matches every typed command. Only those commands that match a regular expression will be accepted. The other ones will become forbidden and an error message will be displayed for the user.

Command filters are associated to users. Any typed command is matched with every user's command filter and, if it matches one of them then it is accepted and executed.

Check the sections about the ECP Console in the document *"HPSA Extension Pack – Solution Container - User Reference"* for further information.

12.19.3 Scripts

The accessible command scripts must be associated to the user and the host. Other way they will never be displayed in the ECP Console.

Check the sections about the ECP Console in the document *"HPSA Extension Pack – Solution Container - User Reference"* for further information.

13 Start-up

The basic requirements in order to start-up the SC are the *Default* and *Diagnostic* instances of JBoss. Refer to the documentation of the different modules provided with the SC for more information about how to start them up.

The first thing we have to start-up is the default JBoss instance. To do this we have to find the bin directory of JBoss, which in a PC is:

```
C:/hp/jboss/bin
```

Here we have to launch the executable file called run.bat:

```
C:/hp/jboss/bin>run
```

With this command we launch the JBoss where the *HP Service Activator* runs.

Once started, we have to do the same for the Diagnostic instance of JBoss where the SC is run.

```
C:/hp/jboss/bin>run –c diagnostic
```

Among the start-up logs of this instance appear the different *struts-config* that have been mapped or the number of inventory views processed.

14 API Reference

14.1 fg-plugin reference

A maven plugin to define and configure user applications is provided with the SPI installation. This plugin is called fg-plugin.

Before executing any task, the fg-plugin requires the user to set some parameters. These parameters can be set in the build.properties, project.properties or just before the task invocation.

- **oracle.hostname**: the SC oracle host.
- **oracle.port**: the SC oracle port.
- **oracle.sid**: the SC oracle sid.
- **db.user.name**: the SC oracle user.
- **db.user.password**: the SC oracle password.
- **dir.jboss.home**: HPSA jboss directory.
- **dir.thirdparty.lib**: HPSA thirdparty lib directory.

The tasks provided with this plug-in can only be invoked from a maven file and in order to let maven recognize the prefix *futureGUI:* of the different tasks it is mandatory the addition of the next code in the header of every maven file using this plug-in:

```
<project xmlns:futureGUI="futureGUI">
```

Plugin tasks:

- **Task 'futureGUI:createDataSource'**: creates a datasource entry in the database. The data sources will be associated with the different user applications.

NOTE: When the container starts, it loads all the data sources defined in jboss. Every time a new user logs into the container, the container obtains the data sources associated with the applications that the user has access to, and includes a reference to each data source in the user session.

Parameter Name	Mandatory	Type	Description
name	Yes	String	Data source name. It has to be a name of a valid data source defined in jboss.
description	Yes	String	Data source description.

- **Task 'futureGUI:createApplication'**: creates a new application in the Data Base.

Parameter Name	Mandatory	Type	Description
name	Yes	String	Application name.

description	Yes	String	Application description.
dataSource	No	String	Name of the data source associated to the application. A reference to the data source will be included in the user's session when the user accesses the container.
enable	No	boolean	Indicates if the application is enabled. The default value is 'true'.

- **Task 'futureGUI:createMenu'**: creates a new application menu.

Parameter Name	Mandatory	Type	Description
name	Yes	String	Menu name
description	Yes	String	Menu description.
parentMenu	No	String	Name of the parent menu (if exists).
bundle	Yes	String	Path of the properties file for internationalization.
bundleKey	Yes	String	Key property with the menu title.
applicationName	Yes	String	Application name.
action	No	String	Action to execute when the menu is selected. It has to be a path to a struts action. Only final menus can contain actions.
location	No	String	Indicates where the action result will be loaded. Possible values are: • '_self': the action is shown in the window itself. • '_blank': The action is shown in a new pop-up window

			• 'ifr': The action is shown in a specific iframe prepared for it • 'default': The action is shown in default place • 'inv': The action is shown in the inventory window The default value is 'default'.

- **Task 'futureGUI:associateMenuToView'**: associates a menu to a view.

NOTE: all menus have to be associated to one view. The menus on the main bar, are associated with the 'root' view.

Parameter Name	Mandatory	Type	Description
viewName	Yes	String	View name
menuName	Yes	String	Menu name.
menuOrder	Yes	Integer	Menu order. All menus will be sorted based on this value. The order is calculated from left to right and from top to down.

- **Task 'futureGUI:createApplicationView'**: creates a new application view.

NOTE: views are not directly associated with applications, because one view can be associated to many applications.

Parameter Name	Mandatory	Type	Description
name	Yes	String	View name
description	Yes	String	View description.
jsp	Yes	String	Jsp path representing the view.

- **Task 'futureGUI:createStatus':** creates a new status in the application

Parameter Name	Mandatory	Type	Description
name	Yes	String	Status name
description	Yes	String	Status description.
applicationName	Yes	String	Application name.

- **Task 'associateMenuToStatus'**: associates a menu to a status.

Parameter Name	Mandatory	Type	Description
statusName	Yes	String	Status name.
menuName	Yes	String	Menu name.

- **Task 'futureGUI:associateApplicationToRole':** associates an application to a role.

Parameter Name	Mandatory	Type	Description
roleName	Yes	String	role name.
applicationName	Yes	String	Application name.

- **Task 'futureGUI:associateMenuToRole'**: associates a menu to a role.

Parameter Name	Mandatory	Type	Description
roleName	Yes	String	Role name.
menuName	Yes	String	Menu name.

- **Task 'futureGUI:checkApplication':** implements an accurate analysis of the application and shows the application's structure and the errors found. It checks the following modules:
    - Application basic information.
    - Menus of the main bar.

- Application views.
- Status menus associated with each view.
- Application status.
- Roles associated.

Error messages are displayed on screen. There are four types of messages:

- Information messages: messages showing information about application structure.
- Critical Errors: errors that cause the application to fail.
- Errors: errors that cause some module to fail.
- Warning: possible errors in the application structure.

NOTE: This task can be performed during the development process, and help the developer to find out if there are modules with missing configuration and any errors found in the modules already developed. An example of execution can be found later in this chapter.

Parameter Name	Mandatory	Type	Description
name	Yes	String	Application name.
detailed	Yes	boolean	Establishes the detail of the information returned. A value of 'true' shows an accurate structure of the application and the errors found. A value of false only shows the errors found.

- **Task 'futureGUI:removeApplication'**: removes an application (and all the associated information) from the Data Base.

Parameter Name	Mandatory	Type	Description
name	Yes	String	Application name.

Plugin tasks related with user management:

- **Task 'futureGUI:createUser'**: includes a new user in the Data Base.

Parameter Name	Mandatory	Type	Description
name	Yes	String	User name

password	Yes	String	User password.
passwordNeverExpire	No	boolean	True if the password never expires. Otherwise, the user will have to establish the password the first time he accesses the container.
description	Yes	String	User description.
realName	No	String	User real name.
companyName	No	String	User company name.
language	Yes	String	Preferred user language. The application offers two languages with the installation: 'spanish' and 'english'. Other languages can be defined.
superUser	No	boolean	Indicates whether the user is a super user. The default value is 'false'.
team	No	String	The user team. All users have to belong to a single team. If not indicated, the user will be assigned to the 'default' team.
teamAdmin	No	boolean	Indicates whether the user is the team's administrator. The default value is 'false'.

- **Task 'futureGUI:createTeam'**: includes a new team in the Data Base.

Parameter Name	Mandatory	Type	Description
name	Yes	String	Team name

Description	Yes	String	Team description.
sessionsPerUser	No	Integer	Indicates the maximum number of concurrent sessions per user. The default value is 1.

- **Task 'futureGUI:associateUserToTeam'**: associate a user to a team.

Parameter Name	Mandatory	Type	Description
teamName	Yes	String	Team name
username	Yes	String	User name.

- **Task 'futureGUI:createRole':** includes a new role in the Data Base.

Parameter Name	Mandatory	Type	Description
name	Yes	String	Role name
Description	Yes	String	Role description.

- **Task 'futureGUI:associateRoleToTeam':** associate a role to a team.

Parameter Name	Mandatory	Type	Description
teamName	Yes	String	Team name.
roleName	Yes	String	Role name.

- **Task 'associateRoleToUser':** associate a role to a user.

Parameter Name	Mandatory	Type	Description
userName	Yes	String	User name.

roleName	Yes	String	Role name.

The following example shows the tasks needed to configure the example application 'HelloWorld':

```
<?xml version="1.0" encoding="ISO-8859-1"?>

<project xmlns:futureGUI="futureGUI">

…


<core:set var="oracle.hostname" value="localhost"/>
<core:set var="oracle.port" value="1521"/>
<core:set var="oracle.sid" value="HPSA"/>
<core:set var="db.user.name" value="userpp"/>
<core:set var="db.user.password" value="userpp"/>
<core:set var="dir.jboss.home" value="C:\hp\jboss"/>
<core:set var="dir.thirdparty.lib"
          value="C:\hp\OpenView\ServiceActivator\3rd-party\lib"/>

<core:catch var="exception">

  <futureGUI:removeApplication
       name="HelloWorldApplication"/>

  <futureGUI:createApplication
       name="HelloWorldApplication"
       description="Hello World Application"
       enable="true"/>

  <futureGUI:createMenu
       name="HelloWorld"
       description="Hello World"
       bundle="com/hp/spain/example/helloworld/struts/
                   HelloWorldApplicationResources"
       bundleKey="menu.principal"
       applicationName="HelloWorldApplication"/>

  <futureGUI:associateMenuToView
       viewName="root"
       menuName="HelloWorld"
       menuOrder="100"/>

  <futureGUI:createMenu
       name="OpenHelloComponent"
       description="Open Hello Component"
       parentMenu="HelloWorld"
       bundle="com/hp/spain/example/helloworld/struts/
                   HelloWorldApplicationResources"
       bundleKey="menu.open"
       applicationName="HelloWorldApplication"
       action="/activator/OpenHelloWorldComponentAction.do"/>

  <futureGUI:associateMenuToView
       viewName="root"
       menuName="OpenHelloComponent"
       menuOrder="100"/>
```

```
<futureGUI:createApplicationView
     name="HelloComponentView"
     description="Hello Component View"
     jsp="/jsp/helloworld/helloWorldComponentView.jsp"/>

<futureGUI:createMenu
     name="HelloComponentActions"
     description="Hello Component Actions"
     bundle="com/hp/spain/example/helloworld/struts/
                 HelloWorldApplicationResources"
     bundleKey="menu.actions"
     applicationName="HelloWorldApplication"/>

<futureGUI:associateMenuToView
     viewName="HelloComponentView"
     menuName="HelloComponentActions"
     menuOrder="100"/>

<futureGUI:createMenu
     name="SayHello"
     description="Say Hello"
     parentMenu="HelloComponentActions"
     bundle="com/hp/spain/example/helloworld/struts/
                 HelloWorldApplicationResources"
     bundleKey="menu.sayHello"
     applicationName="HelloWorldApplication"
     action="/activator/SayHelloAction.do"/>

<futureGUI:associateMenuToView
     viewName="HelloComponentView"
     menuName="SayHello"
     menuOrder="100"/>

<futureGUI:createStatus
     name="HelloWorldDefaultStatus"
     description="hello world default status"
     applicationName="HelloWorldApplication"/>

<futureGUI:associateMenuToStatus
     menuName="HelloComponentActions"
     statusName="HelloWorldDefaultStatus"/>

<futureGUI:associateMenuToStatus
     menuName="SayHello"
     statusName="HelloWorldDefaultStatus"/>

<futureGUI:associateApplicationToRole
     applicationName="HelloWorldApplication"
     roleName="HelloWorldRole"/>

<futureGUI:associateMenuToRole
     roleName="HelloWorldRole"
     menuName="HelloWorld"/>

<futureGUI:associateMenuToRole
     roleName="HelloWorldRole"
     menuName="OpenHelloComponent"/>
```

```
  <futureGUI:associateMenuToRole
      roleName="HelloWorldRole"
      menuName="HelloComponentActions"/>

  <futureGUI:associateMenuToRole
      roleName="HelloWorldRole"
      menuName="SayHello"/>

  <futureGUI:checkApplication
      name="HelloWorldApplication"
      detailed="true"/>

</core:catch>

<core:if test="${exception != null}">
  <echo>[ERROR]: ${exception.getMessage()}</echo>
      <core:if test="${exception.getCause().getCause().getMessage() !=
                        null}">
            <echo>[ERROR]: Caused by:
                  ${exception.getCause().getCause().getMessage()}</echo>
      </core:if>
  <fail>ERROR</fail>
</core:if>

…

</project>
```

The output will be:

```
    [echo] INFO: Removed application "HelloWorldApplication"
    [echo] INFO: Created application "HelloWorldApplication"
    [echo] INFO: Created menu "HelloWorld"
    [echo] INFO: Associated menu "HelloWorld" to view "root"
    [echo] INFO: Created menu "OpenHelloComponent"
    [echo] INFO: Associated menu "OpenHelloComponent" to view "root"
    [echo] INFO: Created application view "HelloComponentView"
    [echo] INFO: Created menu "HelloComponentActions"
    [echo] INFO: Associated menu "HelloComponentActions" to view
                  "HelloComponentView"
    [echo] INFO: Created menu "SayHello"
    [echo] INFO: Associated menu "SayHello" to view "HelloComponentView"
    [echo] INFO: Created status "HelloWorldDefaultStatus"
    [echo] INFO: Associated menu "HelloComponentActions" to status
                  "HelloWorldDefaultStatus"
    [echo] INFO: Associated menu "SayHello" to status
                  "HelloWorldDefaultStatus"
    [echo] INFO: Associated application "HelloWorldApplication" to role
                  "HelloWorldRole"
    [echo] INFO: Associated menu "HelloWorld" to role "HelloWorldRole"
    [echo] INFO: Associated menu "OpenHelloComponent" to role
                  "HelloWorldRole"
    [echo] INFO: Associated menu "HelloComponentActions" to role
                  "HelloWorldRole"
    [echo] INFO: Associated menu "SayHello" to role "HelloWorldRole"
    [echo] Checking Application "HelloWorldApplication"

Module: Application 'HelloWorldApplication'
 Params:
  number of sub-modules: 13
```

```
Status: OK

 Module: Application basic information
  Params:
   name: HelloWorldApplication
   description: Hello World Application
   enable: true
  Status: OK

 Module: Main menu bar structure
  Params:
   number of sub-modules: 2
  Status: OK

   Module: Root menu 'HelloWorld'
    Params:
     name: HelloWorld
     description: Hello World
     bundle: com/hp/spain/example/helloworld/struts/
                 HelloWorldApplicationResources
     bundleKey: menu.principal
     action: null
    Status: OK

     Module: Child menu 'OpenHelloComponent'
      Params:
       name: OpenHelloComponent
       parent menu: HelloWorld
       description: Open Hello Component
       bundle: com/hp/spain/example/helloworld/struts/
                   HelloWorldApplicationResources
       bundleKey: menu.open
       action: /activator/OpenHelloWorldComponentAction.do
      Status: OK

 Module: Views structure
  Params:
   number of sub-modules: 4
  Status: OK

   Module: View 'HelloComponentView'
    Params:
     name: HelloComponentView
     description: Hello Component View
     jsp: /jsp/helloworld/helloWorldComponentView.jsp
    Status: OK

     Module: Menu structure of view 'HelloComponentView'
      Params:
       number of sub-modules: 2
      Status: OK

       Module: Root menu 'HelloComponentActions'
        Params:
         name: HelloComponentActions
         description: Hello Component Actions
         bundle: com/hp/spain/example/helloworld/struts/
                 HelloWorldApplicationResources
         bundleKey: menu.actions
```

```
         action: null
        Status: OK

         Module: Child menu 'SayHello'
          Params:
           name: SayHello
           parent menu: HelloComponentActions
           description: Say Hello
           bundle: com/hp/spain/example/helloworld/struts/
                       HelloWorldApplicationResources
           bundleKey: menu.sayHello
           action: /activator/SayHelloAction.do
          Status: OK

  Module: Application status structure
   Params:
    number of sub-modules: 1
   Status: OK

    Module: Status 'HelloWorldDefaultStatus'
     Params:
      name: HelloWorldDefaultStatus
      description: hello world default status
      associated menu #0: HelloComponentActions
      associated menu #1: SayHello
     Status: OK

  Module: Roles associated with the application
   Params:
    number of sub-modules: 1
   Status: OK

    Module: Role HelloWorldRole
     Params:
      associated menu #0: HelloComponentActions
      associated menu #1: SayHello
      associated menu #2: HelloWorld
      associated menu #3: OpenHelloComponent
     Status: OK

    [echo] INFO: Checked application "HelloWorldApplication"
```

14.2 General information request views

This kind of views allows the user to compose his searches, selecting some available attributes and operations and specifying the wanted value.

There are some JavaScript objects developed for the SC which provides an easy way to generate these views. The JavaScript file where this objects are coded is imported in the *index.jsp* file, so there is no need to import again the JavaScript file in the JSP of the view.

There are four objects involved in this view: *DateFormat*, *Operation*, *Field* and *Search*.

The API of these objects is:

c. DateFormat object

This static object sets the date format which will be used if the calendar is needed. There are four possible formats:

- DDMMYYYY (default)
- DDMMMYYYY
- MMDDYYYY
- MMMDDYYYY

It is also possible to show the hour or not. The hour can be shown in "12" or "24" (default) format.

Methods:

- *showTime(boolean)*: indicates if the time must be shown with date field attributes. By default, time is not included.
- *setFormat(format)*: indicates which of the four possible formats will be used. Possible values for the parameter are *DateFormat.DDMMYYY*, *DateFormat.DDMMMYYYY*, *DateFormat.MMDDYYYY* and *DateFormat.MMMDDYYYY*.
- *setHourFormat(hourFormat)*: sets the hour format that will be used with all date field attributes. Possible values are *DateFormat.HOURS_24* (default) and *DateFormat.HOURS_12*.

d. Operation object

This object gathers possible values associated to different types of attributes. It is used to simplify the specification of the operators for a given attribute. If an attribute has no operations explicitly attached, the Operation object provides a role of default operations for it, using the attribute's type to gather them.

Defined operations are:

- Operation.LESS_THAN = "<";
- Operation.LESS_EQUAL_THAN = "<=";
- Operation.GREATER_THAN = ">";
- Operation.GREATER_EQUAL_THAN = ">=";
- Operation.EQUAL = "=";
- Operation.NOT_EQUAL = "!=";
- Operation.LIKE = "LIKE";
- Operation.P_LIKE = "%LIKE";
- Operation.LIKE_P = "LIKE%";
- Operation.P_LIKE_P = "%LIKE%";

But an attribute can have any other operation even though it is not defined here. Note that for the view an operation is only a String, it has any sense to it because this javascript code uses this operations to show them to the user, not just to perform the operation.

e. *Field* object

The Field object wraps each possible attribute the Search can manage.

To define each Field, the next parameters are needed:

- *name*: the text that will be shown

- *attName*: the name of the attribute expected by the action which is going to perform the Search.
- *type*: the type of the attribute. The possible values for this parameter are:
    - Field.SELECT: values for this Field are selected from a combo.
    - Field.STRING: value for this Field is a text.
    - Field.BOOLEAN: value for this Field is a boolean.
    - Field.NUMBER: value for this Field is a number.
    - Field.DATE: value for this Field is a date. If this is the case, the JSP must import the datetimekeeper.js file.
    - Field.IP: value for this Field is an IP.

The public methods for this object are:

- *addOperation(type)*: Adds an operation to this Field. Operations are automatically added to a Field according to it's type when no operation is attached explicitly. For instance, if a Field belongs to the Field.BOOLEAN type and no operation is attached to it using neither the addOperation(op) nor the addOperations(aOps) methods, the Field.BOOLEAN type's operations are attached automatically. The parameter *op* is the operation to add. Any String is valid because it is not checked.
- *setValidationType (type)*: Adds a possible value for this Field. This method is only allowed for Fields belonging to the Field.SELECT type. Otherwise, an error is shown. The parameter *value* is the possible value for this Field.
- *addValue(value)*: Sets the validation type of this Field. This is used to validate the format entered for the values of a Field. For instance, it allows to validate a String as a Number, or checks if a number entered by the user is really a number. The parameter *vType* the validation type for this Field. The possible values for this parameter are the same as the types of a Field.

***Search* object**

The Search object stores and shows the view.

The next parameters are needed to define a Search object:

- *title*: the title of the Search.
- *action*: the action that will be invoked to perform the Search.

The public methods for this object are:

- setAddButtonText(text): Sets the Add button's text. This allows to internationalize texts. The parameter text is the text of the Add button.
- setSearchButtonText(text): Sets the Search button's text. This allows to internationalize texts. The parameter text is the text of the Search button.
- setFieldsText(text): Sets the text for the Fields combo. This allows to internationalize texts. The parameter text is the text for the Fields combo.
- setOperatorsText(text): Sets the text for the Operations combo. This allows to internationalize texts. The parameter *text* is the text for the Operations combo.
- setValuesText(text): Sets the text for the Values input. This allows to internationalize texts. The parameter text is the text for the Values input.
- addField(field): Adds a possible Field to the Search. The parameter field is the Field to be added.

Example

The next code generates a view like the one in the figure below.

```
var a = new Search("Bean search", "/activator/mySearch.do");
var f = new Field("NAME", "name", Field.STRING);
f.addOperation(Operation.EQUAL);
f.addOperation(Operation.LIKE);
a.addField(f);
f = new Field("LOCATION", "location", Field.SELECT);
f.addOperation("%");
f.addOperation("BETWEEN");
f.addValue("UNO");
f.addValue("DOS");
a.addField(f);
f = new Field("PUBLIC", "public", Field.BOOLEAN);
f.addOperation(Operation.LESS_EQUAL_THAN);
f.addOperation(Operation.LESS_THAN);
a.addField(f);
f = new Field("DATE", "date", Field.DATE);
a.addField(f);
f = new Field("IP", "ip", Field.IP);
a.addField(f);
a.write();
DateFormat.setFormat(DateFormat.MMDDYYYY);
DateFormat.showTime(true);
DateFormat.setHourFormat(DateFormat.HOURS_12);
```

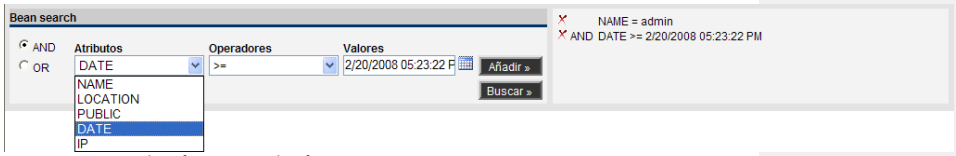


Figure 1: Example of a general information's request view

14.3 Information request views: Block Taglib

These kinds of views, typical of element searches, consist of a form with several fields where the user must enter the information to interact with the system.

To avoid the need for the programmers to be concerned about following the style and appearance of the SC the Block taglib has been developed, which allows the creation of centred search fields, in columns of one or two fields, and with a maximum of 5 fields (more than 5 can also be shown, but the user's screen only has 1024 pixel width resolution some of the columns will be lost).

The Block Taglib is made out of the following tags:

***Space* Tag**

This tag indicates the beginning and end of the block space. It does not have any values; its usefulness is limited to marking the border of the taglib. Every use of the Block taglib must begin and end with this tag.

```
<block:space>
   ...
</block:space>
```

It accepts the following attributes:

- *align*: indicates the default alignment of the text. It can take the values *left* (default value) *center* and *right*.
- *title*: indicates the title of this view. The title is showed on an upper bar over the blocks of the view.
- *key*: indicates the key of the internationalization file where the title is found. This attribute has no sense if the *bundle* attribute is not specified.
- *bundle*: indicates the name of the internationalization file where the title is found. This attribute has no sense if the *key* attribute is not specified.

Wall **Tag**

The blocks must be placed in columns or walls, of one or two blocks. This tag also has no values; it is used to delimit the roles, but is necessary both when the role has one block or two.

```
<block:wall>
   ...
</block:wall>
```

It can have the following attributes:

- *width*: it shows the width of the column. If no value is assigned a default one is taken, but it's important to take into account that it must match the corresponding width attribute from the Block tag.

Block **Tag**

This is the tag that establishes the block itself. If must always appear inside a *wall* tag.

It can have the following attributes:

- *title*: the block title. It is the text that is shown just above the search field.
- *key*: it indicates the entry of a property file that contains the internationalized title for this block. If this attribute is present, then the *bundle* tag must also have a value.
- *bundle*: it indicates the package where the property file from which the *key* value is obtained. Therefore the *key* attribute must have a value.
- *verticalAlign*: the vertical position of the block. It can take three possible values: top, center or bottom. It is only useful when there is only one block inside the column. If there are two blocks this attribute is irrelevant.
- *width*: indicates the block width. If it is not indicated a default value is assigned, but if it does have a value then it's important that it corresponds to the similar attribute from the *wall* tag.

Example

The following example generates a view with two columns, two blocks in the first column and one in the second:

Figure 2: Example of the Block Taglib

```
<block:space>
   <block:wall>
```

```
      <block:block title="Nombre">
         <input type=text value="">
      </block:block>
      <block:block title="Tipo de equipo">
         <select style="width:145">
            <option value="1">Riverstone</option>
            <option value="2">Alcatel</option>
            <option value="3">Otro</option>
         <select>
      </block:block>
   </block:wall>
   <block:wall>
      <block:block title="Localización" verticalAlign="center">
         <select style="width:145">
            <option value="1">Madrid</option>
            <option value="2">Valencia</option>
            <option value="3">Chimbamba</option>
         <select>
      </block:block>
   </block:wall>
</block:space>
```

14.4 Buttons: Button taglib

The application environment follows the idea that you can only use buttons in the views, but never in the status. To do any operation from a status JSP we have the status menu.

To generate buttons that blend with the SC interface the Button Taglib has been developed composed of just one tag:

***Button* tag**

It is the only tag of the taglib. It generates a button that matches the look & feel of the SC. It accepts the following attributes:

- *value*: the text that must be shown with the button. It automatically receives the » prefix (unless the string value that is given with this attribute already has the symbol). If no specific text is given for the button then the default value is the double bigger-than symbol.
- *key*: It indicates the entry for a property file that contains the internationalized text for this button. When this value is defined it is mandatory to also have a value for the *bundle* attribute.
- *bundle*: indicates whereabouts of the package where the property file from which the value set for *key* is obtained. Therefore, it's necessary to indicate a value for the *key* attribute.
- *onclick*: string with the invocation that must be produced when this event is detected on the button. If this attribute contains quote symbols (") (not apostrophes, these aren't a problem) are substituted by apostrophes.
- *width*: the button width. If none is indicated, then the button's size is resized depending on the text.
- *noRaquo*: boolean that indicates whether the prefix » must appear in front of the button's text. The default value is false, which indicates that this value must be shown.
- *type*: string that indicates the button type. It can take the values: "button", "submit" and "reset". The appearance of both is similar, but the first creates a traditional button (*<input type=button>*)

and the second a submit button for the associated form (<input type=submit>). If no value is given for this attribute, then the default value is "button".

Examples

Basic button with no text

Generates a button similar to that in figure 13.

Figure 3: basic button with no text

The code necessary to generate this button is:

```
<btn:button onclick="alert('Hello, world!!!');"/>
```

Button with text

Generates a button similar to that in figure 14.

Figure 4: Button with text

The code necessary to generate this button is:

```
<btn:button value="Say Hello" width="100" onclick="alert('Hello,
world!!!');"/>
```

Button with internationalized text

We can generate a button such as the one in Figure 2 that shows the text in the language associated with the user.

Let's suppose that in the struts-config.xml file of the application we are developing we have mapped the property file with the name ApplicationResourcesEJ. The button's internationalization would be:

```
<btn:button key="button.salutation" bundle="ApplicationResourcesEJ"
width="100" onclick="alert(Hello, world!!!');"/>
```

14.5 Information Presentation Views

The information presentation views regularly show a great amount of data that due to the confinement of the space should be condensed as much as possible.

To aid with the development of these kind of views, whose design complication is quite high, an API exists (*menuInfo.js)* based on JavaScript objects that are in charge of showing the data correctly. This file is part of the *index.jsp* page and because all the views correspond to JSPs that are embedded inside *index.jsp* the access to the API objects contained in *menuInfo.js* is direct from the view JSP.

An Information Presentation View looks similar to figure 15.

Figure 5: Elements of the automatic view generation

As can be seen, this representation of the information is divided in three big main blocks:

- The main information is the one that will grab the user's attention initially and is shown at the beginning when the view is loaded.
- The secondary information can be composed of at most of two elements, and refer first of all to the information associated with the main information. By default the first of these is always shown first, but you can see one or the other by clicking on the column titles (in the image Titulo1 and Titulo2) of the main information. The secondary information does not have to be present necessarily, and when none is specified the main information is extended automatically to occupy the whole width of the screen.
- The extended information contains information that does not fit in any of the other or that for whatever reason is better shown in this way. It can be associated to only one attribute and not to a main or secondary element. This information is hidden when the view loads and in order to show it it is necessary to click the button for showing/hiding this particular extended information.

The figure 16 shows the view elements that interact with the user:

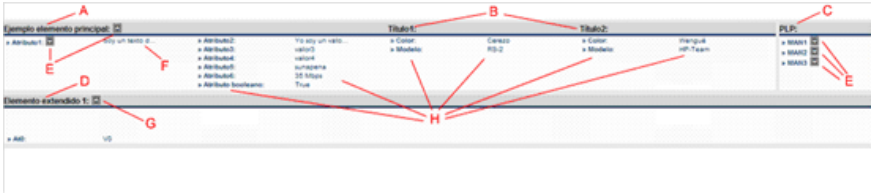


Figure 6: Interaction elements

where:

- A: Main element title.
- B: Column titles, that show one or the other secondary information
- C: Title for the secondary element that is being shown
- D: Title for the extended element that is being shown.
- E: Buttons for the showing/hiding of the extended information.
- F: Truncated text, which can be seen completely by putting the cursor over it.
- G: Button for the hiding of the extended information that is being shown.
- H: Attributes, composed of name/value pairs.

The API for the Information Presentation View is composed of four JavaScript objects:

- *MainMenuInfo*: generates the main element.
- *SecondaryMenuInfo*: generates the secondary elements.
- *ExtMenuInfo*: generates the extended information.
- *MenuInfoWriter*: is in charge of showing everything on screen.

MainMenuInfo object

The *MainMenuInfo* object constitutes the core of the information presentation views. It is the only object, apart from *MenuInfoWriter*, that must appear necessarily. The *SecondaryMenuInfo* and *ExtMenuInfo* instances, however, can exist or not depending no the needs of the data to be shown.

This object provides a matrix representation of the name-value pairs that form the view information. Once all the matrix cells have been filled in the data will be shown on the web page as a table.

A simple example of use of the *MainMenuInfo* object is shown below. In it the object constructor is invoked, a title is assigned and several name-value attributes are established.

```
// Constructor
var mmi = new MainMenuInfo();
// Título
mmi.addTitle("My object title", null);
// Atributos
mmi.addAttribute("First name att", "First value", 0, 0, null);
mmi.addAttribute("Another name", "Another value", 2, 0, null);
...
mmi.addAttribute("Last name att", "Last value, allocated at the right side",
6, 1, null);
```

Constructors

- *MainMenuInfo()*

Methods

- *public void addTitle(String title, ExtMenuInfo extensibleObj)* – Sets the main *title* for the object.

  Parameters:

  - *title* - the object's title.
  - *extensibleObj* - the *ExtMenuInfo* object associated. If null, this object won't have any extended information associated with it. If it is not null then a button appears to the right of the object's title which will allow hiding or showing the associated extended information.
- *public void addColumnTitle(String title, String/int columnNumber)* – Sets the titles for the fourth or sixth columns of the object. The presence of these titles allows showing one of the two possible secondary information available (see SecondaryMenuInfo).

  Parameters:

  - title – the title for the fourth or sixth columns of this object. If null, the default title shown is "Column title not found".
  - columnNumber – the number of the column the title corresponds to. It cannot be null. In fact, it can only acquire two possible values: 4 or 6, as only these two columns can have titles.
- *public void addAttribute(String title, String value, String/int nameX, String/int nameY, ExtMenuInfo extensibleObj)* – Adds a name-value pair to the object. The name of the attribute is set in the matrix cell corresponding to the position indicated by the parameters *(nameX, nameY)*, while the value is situated in the cell *(nameX + 1, nameY)*. Each name-value pair occupies two consecutive cells.

  If the parameter (*title parameter*) or the value (*value parameter*) where null they would be replaced for the text "Name not found" or "Value not found", but the process does not stop, it simply shows a warning message to inform the programmer of the situation.

  If the coordinates *nameX* or *nameY* where null then the process stops, any future invocation to any other method of the object is ignored and a message is shown to warn about the problem.

  The same thing happens if the coordinates exceed the limits allowed. The coordinate established by *nameX* can take values from 0 to 7, both included, and *nameY* between 0 and 5, both

included. This means that the matrix representations of this object have at most 8 columns and 6 rows.

As each name-value pair occupies two cells, the *nameX* coordinate must necessarily be an even number, starting the count with 0. For example, the coordinates (0,0), (0,1) or (2,4) are valid, but the coordinate (1,2) is not valid. If this is not followed, a future invocation of this method might result in an overwriting of the name or value established here. If the following JavaScript piece of code is examined:

```
myMainMenuInfoObj.addAttribute("nameAtt0", "valueAtt0", 0, 0, null);
myMainMenuInfoObj.addAttribute("nameAtt1", "valueAtt1", 1, 0, null);
```

the result would be incorrect, as the *valueAtt0* value of the first line has been located in the (1,0) coordinate, the same coordinate that the second line sets with the name *nameAtt1*. The correct way to do it is:

```
myMainMenuInfoObj.addAttribute("nameAtt0", "valueAtt0", 0, 0, null);
myMainMenuInfoObj.addAttribute("nameAtt1", "valueAtt1", 2, 0, null);
```

The matrix that is filled with name-value pairs is similar to:

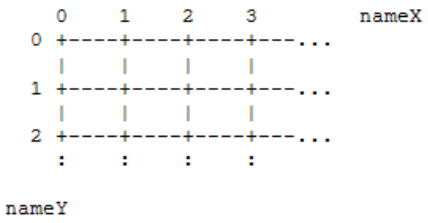


Figure 7: *MainMenuInfo*attributes

Parameters:

- *name* - the attribute name.
- *value* - the value associated with the name of the attribute.
- *nameX* - the row where the name must be situated.
- *nameY* - the column where the name must be situated.
- *extensibleObj* – the object with the extended information associated with this attribute. If the attribute does not have extended information it will be *null*. If not, to the right of the button a button will appear to the right of the attribute name that will allow the hiding/showing of the extended information.

- *public void addScrollableCell(String title, int initRow, int initColumn, int width, int height, String fromTextareaId)* – Shows a multiple line field (a non editable textarea) situated in the cells whose coordinates are given by initRow and initColumn and whose width and height are, respectively, width y height. Any name-value pair specified in the cells that this element overshadows will be hidden by it.

  This element is used when the type of information to be shown consists of a very long text and that might include any mix of characters such as colons or line feed.

  To avoid having to escape the potentially problematic characters as the ones cited before, a final parameter has been included in this method that corresponds to the identifier of the hidden *textarea* where the information we want to show here should have been stored previously.

  Let's put an example. We need to show an attribute "Observations" that contains the following:

```
This text
"contains" dangerous characters
```

```
and line feeds.
```

What we will do is to write this in a *textarea* hidden from our view. Like this:

```
<textarea id="myObservations"
style="visibility:hidden"> This text
"contains" dangerous characters
and line feeds.
</textarea>
```

This, obviously, must be outside any *<script>...</script>* tags.

Later, when we specify our *MainMenuInfo* object and we invoke the *addScrollableCell* method, we pass as *fromTextareaId* parameter the value "myObservations". Like this:

```
mmi.addScrollableCell("Observations", ...,
"myObservations");
```

Parameters:

- *title* - the multi-line attribute title. This string is shown over the multi-line text. If the textbox is situated in row number 0 the title is not shown.
- *initRow* - the first row where the multi-line attribute will be shown.
- *initColumn* - the first column where we want to show the multi-line attribute.
- *width* - the number of columns (width) of the multi-line attribute.
- *initRow* – the number of rows (height) of the multi-line attribute.
- *fromTextareaId* – the hidden *textarea* identifier from with the text of this multi-line attribute will be copied.

***SecondaryMenuInfo* object**

This object makes reference to the secondary information that can be shown optionally in the right panel of the information representation view. Due to the fact that it is optional, when no object of this type is specified for the view in the main information contained in MainMenuInfo it expands to occupy the whole view's width.

The secondary information is shown vertically, like a one column table.

As can be seen from the MainMenuInfo specification it is possible to establish two different instances of this object with completely separate secondary information. At each moment only one of them will be visible. The MenuInfoWriter object establishes which of them will be visible when the page loads and which will remain hidden at the beginning at the start.

A basic example of secondary information specification is:

```
<script>
// Constructor
var smi = new SecondaryMenuInfo();
// Title
smi.addTitle("Networks");
// Atributos
smi.addAttribute("Network 1", null, 0, null, null);
smi.addAttribute("Network 2", null, 1, null, null);
smi.addAttribute("Network 3", null, 2, null, null);
...
smi.addAttribute("Network N", null, N, null, null);
</script>
```

Constructors

- *SecondaryMenuInfo()*

Methods

- *public void addTitle(String title)* – Sets the main title of the secondary information.

Parameters:

- *title* – the secondary information title.

- *public void addAttibute(String name, ExtMenuInfo extensibleObj, int position, String action, String target)* - Adds an element to the secondary information.

  Parameters:

  - *name* - the name of the element.
  - *extensibleObj* - the object with the extended information associated with this element, if any is given. When none is specified the value for this parameter is *null*. The existence of extended information associated to an element results in the presence of a button to show/hide this information.
  - *position* – the element's position inside the element column that constitutes the extended information. It can be *null*, in which case the element is added to the end of the existing ones.
  - *action* – indicates the URL or JavaScript function that must be invoked when the user clicks on the element. It can be *null*, in which case clicking on the element will have no effect.
  - *target* – indicates the physical place where the URL must be shown when clicking on the element. It can be null, in which case the default value is "_self", that is, the same page we are in, which would be result in a change of view. The possible values for this attribute are:
    - "_self": the URL will appear in the same window we are in, which will result in a change of view.
    - "_blank": the URL will appear in a popup window.
    - "fjsp": the URL will appear in the space reserved for status. "fjsp" is the iframe name dedicated for this use. This results in a status change.
    - "_js": the URL corresponds to a JavaScript function that will be invoked when the user clicks on the element.

***ExtMenuInfo* object**

This object allows the representation of extended information of other objects or of other object's elements.

It is not shown from the start, but is spread below the main information when it is needed.

The way to represent the information is through a matrix, in the same way as happened with the main information (see MainMenuInfo), and is also composed of name-value pairs.

A simple example for this object is:

```
var emi = new ExtMenuInfo();
emi.addTitle("System components ");
emi.addAttribute("Port 1", "Gigabyte", 0, 0);
emi.addAttribute("Port 2", "Gigabyte", 0, 1);
emi.addAttribute("Network card", "Ethernet", 0, 2);
```

Constructors

- *ExtMenuInfo()*

Methods

- *public void addTitle(String title)* – Sets the main title for the secondary information.

  Parameters:

  - *title* - the title for the secondary information.
- *public void addAttribute(String name, String value, int nameX, int nameY)* - Adds a new name-value pair to this extended information which will be put on the cell whose coordinates are *(nameX, nameY)*.

  Parameters:

  - *name* - the name of the attribute. If null, the default value is "Name not found".
  - *value* - the attribute's value. If null, the default value is "Value not found".
  - *nameX* – the *X* coordinate where the name of the attribute will be set. As the value will be set in the next cell to the right, the *X* coordinate implicit for the value will be *nameX + 1*. It cannot be null. The possible values go from 0 to 7 both included.
  - *nameY* – the *Y* coordinate is the attribute's name. As the value will be shown in the next cell, the *Y* coordinate is implicit for the attribute's value and will have the same value *nameY*. It cannot be null, the possible values go from 0 to 3, both included.
- *public void addScrollableCell(String title, int initRow, int initColumn, int width, int height, String fromTextareaId)* - Shows a multi-line field (a non editable *textarea*) situated in the cell whose coordinates are given by *initRow* and *initColumn* and whose width and height are *width* and *height*. Any name-value specified that this element will overshadow will remain hidden.

  This element is used when the information type we need to show can have a very long text that can include any kind of characters, such as line feed or double quotes.

  With the goal to escape the potentially problematic characters such as the ones mentioned before, this method includes a parameter that corresponds to the hidden *textarea* where the text to be shown here will have been previously set.

  Lets show an example. We need to show the "Observations" attribute that contains the following:

  ```
  This text
  Contains "dangerous" characters
  and line feeds.
  ```

  What we will do is write this in a textarea hidden from our view. Like this:

  ```
  <textarea id="myObservations"
  style="visibility:hidden"> This text
  Contains "dangerous" characters
  and line feeds.
  </textarea>
  ```

  This, obviously, must appear outside any *<script>...</script>* tags.

  Later, when we are specifying our ExtMenuInfo object and we invoke the *addScrollableCell* method, such as the *fromTextareaId* parameter we will send "myObservations". Like this:

```
emi.addScrollableCell("Observations", ...,
"myObservations");
```

  Parameters:

  - *title* - the multi-line attribute title. This string is shown over the multi-line text. If the textbox is situated in row number 0 the title is not shown.
  - *initRow* - the first row where the multi-line attribute will be shown.
  - *initColumn* - the first column where we want to show the multi-line attribute.

- *width* - the number of columns (width) of the multi-line attribute.
- *initRow* – the number of rows (height) of the multi-line attribute.
- *fromTextareaId* – the hidden *textarea* identifier from with the text of this multi-line attribute will be copied.

***MenuInfoWriter* object**

This object doesn't have its own visual representation; it is in charge of showing the different objects defined.

It only has one write method that takes care of invoking in the right way the different similar names that form the View Representation.

Supposing a MainMenuInfo object has been defined, stored in mmi, and two SecondaryMenuInfo objects, stored in smi and dmi respectively, the way to use this method is:

```
new MenuInfoWriter(mmi, smi, dmi).write();
```

Constructors

- *MenuInfoWriter(MainMenuInfo mainMenuInfo, SecondaryMenuInfo secObj1, SecondaryMenuInfo secObj2)*

  Parameters:

  - *mainMenuInfo* – the *MainMenuInfo* object's view representation information.
  - *secObj1* - the *SecondaryMenuInfo* object's view representation information that must be shown initially.
  - *secObj2* - the *SecondaryMenuInfo* object's view representation information that must be hidden initially.

Methods

- *public void write()* – Shows the view's representation on screen.

Examples

Only with main information

For this example we are going to create a view's information representation made up of only main information.

Let's suppose that we simply have to show a user's data: username, description, real name, company, whether he is a restricted user or not and his preferred language.

Let's remember we are developing a view's JSP and therefore, that it must not constitute a whole web page, as it will be embedded inside the *<body>...</body>* tags of *index.jsp*. If we include these tags inside the view's JSP the final result will be an error, so it is important to assume that we are developing the body or the *index.jsp* already.

Let's remember also that *index.jsp* already includes in its header the invocation for the JavaScript file (*menuInfo.js*) that contains the necessary objects to generate the information representation views, so we don't need to include them again in our view's JPS.

Therefore, the only thing we must do in this case is to invoke the main information element's constructor (MainMenuInfo), and to establish a title for the information we want to show and to add the necessary attributes in the preferred positions.

```
<script>
// Constructor invocation
var mmi = new MainMenuInfo();
// Setting the title
mmi.addTitle("User data", null);
```

```
// We add the attributes starting from the leftmost
mmi.addAttribute("Nombre", "operador", 0, 0, null);
mmi.addAttribute("Nombre real", "John Smith", 0, 1, null);
mmi.addAttribute("Compañía", "HP", 0, 2, null);
mmi.addAttribute("Descripción", "Operador de sistemas", 0, 3, null);
mmi.addAttribute("Restringido", "No", 0, 4, null);
// We put the language in the first cell of the second column
mmi.addAttribute("Lenguaje", "Castellano", 2, 0, null);
// We invoke the object that composes and writes or view.
new MenuInfoWriter(mmi, null, null).write();
</script>
```

With this code, the final result is shown in Figure 18.

Figure 8: View representation formed only by main information

Figure 18's menus have not been generated with the previous code, only the view.

Main information with the extended view

In this case we are going to complicate the view's representation a little by establishing two possible pieces of extended information.

In the previous example we were showing user's information: username, real name, etc., but now we also want to show the information that doesn't have to appear all the time but which can be consulted when needed, so we use extended information. Therefore, we can establish as extended information the user's measurements, his height, size and weight.

But we also want to be able to consult the extended information about the company he works for, so for this attribute we will associate more extended information where we will be able to consult the antiquity, achievements and things like this.

The first thing we have to do is to define both pieces of extended information. For this we make use of the ExtMenuInfo object.

```
<script>
// We define the extended information with the user's measurements
// We invoke the constructor
var emi0 = new ExtMenuInfo();
// We establish the title for this extended information
emi0.addTitle("User's measurements");
// We establish the height and weight in the first cells of the first //
column

emi0.addAttribute("Height", "185 cm", 0, 0);
emi0.addAttribute("Weight", "80 kg", 0, 1);
// We define the extended information with all the company data
// Invoke the constructor
var emi1 = new ExtMenuInfo();
// Set the title for this extended information
emi1.addTitle("Company data");
// We set the information we need for the company
emi1.addAttribute("From", "1902", 0, 0);
emi1.addAttribute("Country", "EEUU", 2, 0);
emi1.addAttribute("State", "California", 2, 1);
```

```
emi1.addAttribute("Profession", "Informática", 2, 2);
emi1.addAttribute("Activation", "Madrid", 4, 0);
emi1.addAttribute("City", "Las Rozas", 4, 1);
emi1.addAttribute("Address ", " Vicente Aleixandre", 4, 2);
emi1.addAttribute("Department", "Telco", 4, 3);
</script>
```

Now we will define the main information in a similar way we did for the first example, but associating the extended information we just defined.

```
<script>
// Constructor invocation
var mmi = new MainMenuInfo();
// We establish the title and we associate the extended user
// information
mmi.addTitle("User data", emi0);
// We add the attributes starting with the leftmost column
mmi.addAttribute("Username", "operador", 0, 0, null);
mmi.addAttribute("Real name", " John Smith ", 0, 1, null);
// We associate to this attribute the extended information
mmi.addAttribute("Company", "HP", 0, 2, emi1);
mmi.addAttribute("Description", "Operador de sistemas", 0, 3, null);
mmi.addAttribute("Restricted", "No", 0, 4, null);
// We set the language in the first cell of the second column
mmi.addAttribute("Language", "Castellano", 2, 0, null);
// We invoke the object that composes and shows our view.
new MenuInfoWriter(mmi, null, null).write();
</script>
```

With the previous code we create a View with the initial appearance as that of figure 16.

Figure 9: Initial appearance of a view with extended information

If the user clicks on the arrow situated to the right of the title the user's extended attributes are shown, as can be seen in figure 20.

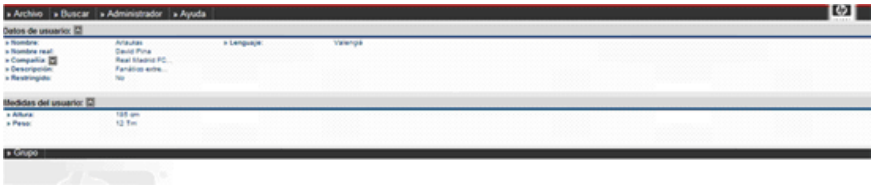


Figure 10: Appearance of a view with visible extended information

And if we finally click on the arrow situated to the right of the "Company" attribute the extended data about the user's company is shown.

Initial information and secondary information

We are going to complicate a little the example that we are in charge with now, and apart from seeing the user's data, we are going to show as extended information the roles he belongs to.

As the definition order of the main and secondary information is unimportant, we can define any of them first.

The first thing we are going to do is to define the secondary information making use of the SecondaryMenuInfo object. Let's suppose the user belongs to three roles: Operator, Administrator and Demo. Also, when we click over the Administrator and Operator roles we want to access the URL *getRoleData.do*, whose result will be shown in the page we are in, that is, we would jump to a completely different view, and when the user clicks on the Demo role, we want to invoke the JavaScript function called *jumpToStatus()* which will show us the user singing his companies hymn to his heart's content.

We first define the jumpToStatus() function:

```
<script>
function jumpToStatus() {
   // Code necessary to view the user singing the hymn...
   ...
}
</script>
```

Later we define the secondary information:

```
<script>
// Constructor invocation
var smi = new SecondaryMenuInfo();
// We establish the title for the secondary information
smi.addTitle("Associated Roles ");
// Setting the roles the user belongs to
smi.addAttribute("Operator", null, 0, "getRoleData.do", "_self");
smi.addAttribute("Administrator", null, 1, "getRoleData.do", "_self");
smi.addAttribute("Demo", null, 2, "jumpToStatus()", "_js");
</script>
```

Now we define the main information exactly the same as we did in the first or second examples, depending on whether we want the extended information to appear or no.

When we invoke the *MenuInfoWriter* Object we will have to indicate the presence of both the main and the secondary information.

```
<script>
// Constructor invoked
var mmi = new MainMenuInfo();
// Title establishedEstablecemos el título
mmi.addTitle("User's Data", null);
// We add the attributes starting from the leftmost column
mmi.addAttribute("Name", "operador", 0, 0, null);
mmi.addAttribute("Real name", "John Smith", 0, 1, null);
mmi.addAttribute("Company", "HP", 0, 2, null);
mmi.addAttribute("Description", "Operador de sistemas", 0, 3, null);
mmi.addAttribute("Restricted", "No", 0, 4, null);
// We set the language in the first cell of the second column
mmi.addAttribute("Language", "Castellano", 2, 0, null);
// We invoke the object that composes and shows the view.
new MenuInfoWriter(mmi, smi, null).write();
</script>
```

This code's result is shown in figure 21.

Figure 11: Appearance of a view with main and secondary information

Main and secondary information with extended

We are going to complicate things further and now we are going to let the roles that are part of the secondary information to have extended information.

The first thing to do in this case is to define de extended information of the Operator, Administrator and Demo roles.

```
<script>
// We define the extended information for the Operator role
// Constructor invocation
var emi0 = new ExtMenuInfo();
// Set the title for this secondary info
emi0.addTitle("Operator Role ");
// Set the data for the Operator Role
emi0.addAttribute("Users", "2", 0, 0);
emi0.addAttribute("Performances", "5", 0, 1);
// We define the extended info for the Administration role
// Constructor invocation
var emi1 = new ExtMenuInfo();
// We set the title for this extended info
emi1.addTitle("Administrator Role");
// We set the data for the Administrator role
emi1.addAttribute("Users", "1", 0, 0);
emi1.addAttribute("Performances", "21", 0, 1);
// We set the extended information for the Demo role
// Constructor invocation
var emi2 = new ExtMenuInfo();
// We set the title for this extended information
emi2.addTitle("Demo role ");
// We set the information we need to know about this role
emi2.addAttribute("Users", "1", 0, 0);
emi2.addAttribute("Performances", "5", 2, 0);
</script>
```

Once defined we proceed like in the example number 3, but taking into account that now the roles possess extended information and we need to indicate it the code.

We first define the jumpToStatus() function:

```
<script>
function jumpToStatus() {
   // Code necessary to view the user singing the hymn...
   ...
}
</script>
```

Then we define the secondary information, associating the extended information for each role:

```
<script>
// Constructor invocation
var smi = new SecondaryMenuInfo();
// Set the title for the secondary information
smi.addTitle("Associated roles");
// Set the roles the user belongs to
smi.addAttribute("Operator", emi0, 0, "getRoleData.do", "_self");
smi.addAttribute("Administrator", emi1, 1, "getRoleData.do", "_self");
smi.addAttribute("Demo", emi2, 2, "jumpToStatus()", "_js");
</script>
```

Now we define the main information exactly the same as we did in the first or second examples, depending on whether we want the extended information to appear or no.

When we invoke the *MenuInfoWriter* Object we will have to indicate the presence of both the main and the secondary information.

```
<script>
// Construction invoked
var mmi = new MainMenuInfo();
// Setting the title
mmi.addTitle("Datos de usuario", null);
// We add the attributes starting with the leftmost column
mmi.addAttribute("Nombre", "operador", 0, 0, null);
mmi.addAttribute("Nombre real", "John Smith", 0, 1, null);
mmi.addAttribute("Compañía", "HP", 0, 2, null);
mmi.addAttribute("Descripción", "Operador de sistemas", 0, 3, null);
mmi.addAttribute("Restringido", "No", 0, 4, null);
// We put the language on the first cell of the second column
mmi.addAttribute("Lenguaje", "Castellano", 2, 0, null);
// We invoke the object that forms and composes our view.
new MenuInfoWriter(mmi, smi, null).write();
</script>
```

This code's result is shown in figure 22, where you can see that the entries for the secondary information possess a button to spread the extended information associated to them.

Figure 12: Appearance of the view with secondary and extended info

Main information and two secondary info

This example is an extension of the third example, very similar to it but with the existence of two secondary info instead of one.

The major difference in this case, is that apart from having to define the two secondary information, we have to establish column titles in the main information depending on the current secondary information selected. The usual in this case is that column 4 (and 5) show main information related to the associated secondary and that columns 6 (and 7) do the same for their info.

The secondary information of the roles will be identical to the one we have already seen.

First we define *jumpToStatus()*:

```
<script>
function jumpToStatus() {
   // Necessary code for the user singing the hymn...
   ...
}
</script>
```

Then secondary info is defined:

```
<script>
// Constructor invocation
var smi = new SecondaryMenuInfo();
// Title is set for the secondary info
smi.addTitle("Associated roles");
// Roles the user belong to
smi.addAttribute("Operator", null, 0, "getRoleData.do", "_self");
smi.addAttribute("Administrator", null, 1, "getRoleData.do", "_self");
```

```
smi.addAttribute("Demo", null, 2, "jumpToStatus()", "_js");
</script>
```

Now we proceed to define the secondary information. Let's say in this case we want to show the names of the applications the user has access to.

```
<script>
// Constructor invocation
var smi1 = new SecondaryMenuInfo();
// Set the title for the secondary info
smi1.addTitle("Aplications");
// We set the application the user has access to
smi1.addAttribute("GdC", null, 0, null, null);
smi1.addAttribute("Diagnostic", null, 1, null, null);
</script>
```

Now we define the main information exactly the same as we did for the first and second examples, depending on whether we want to show the secondary information.

When the object *MenuInfoWriter* is invoked we will have to indicate the presence of both the main and secondary info.

```
<script>
// Constructor invocation
var mmi = new MainMenuInfo();
// We set the title and we associate the user's extended info
mmi.addTitle("User's data", null);
// We set the title for the fourth column
mmi.addColumnTitle("Roles", 4);
// We set the title for the sixth column
mmi.addColumnTitle("Applications", 6);
// We add the attributes starting from the leftmost

mmi.addAttribute("Username", "Arlaukas", 0, 0, null);
mmi.addAttribute("Real name ", "David Phine", 0, 1, null);
// For the company attribute we associate the extended information
mmi.addAttribute("Company", "RMFC", 0, 2, null);
mmi.addAttribute("Description", "Company Description ", 0, 3, null);
mmi.addAttribute("Restricted", "No", 0, 4, null);
// We set the language in the first cell of the second column
mmi.addAttribute("Language", "Catalan", 2, 0, null);
// We invoke the object that forms and shows the view, but this time we
indicate the presence of the secondary information.
new MenuInfoWriter(mmi, smi0, smi1).write();
</script>
```

The initial result for this code is shown in figure 23.

Figure 13: Appearance of a view with two pieces of secondary info (1)

If we now click on the "Applications" title the secondary information will be shown, the one about the applications.

Figure 14: Appearance of a view with two pieces of secondary information (2)

14.6 Table Taglib

This taglib, designed specially for the SC, allows the generation of simple tables, that don't require ordering by columns or result pagination.

In order to use this taglib it is necessary to have defined it before in the *web.xml* (see section 4.8.3.2 for more information).

The taglibs are used assigning them a prefix such that the JSP's interpreter can recognize them each time they are found. In the case of the Table Taglib the prefix is "table", so each time the JSP's interpreter finds "<table:...>" it will know it must interpret it according to the taglib's definition. To know what it must do it is mandatory to indicate the following line at the beginning of the JSP that is going to use the taglib:

```
<%@ taglib uri="/WEB-INF/table-taglib.tld" prefix="table" %>
```

Also, the tables that are generated with the Table Taglib use the SC's style, so it is also necessary to include the "subestilosX.css" stylesheet inside the JSP (please note that the X must be substituted for the random colour of the SC).

The SC's tables possess a certain format that can have small changes, but whose final appearance is always the same. This makes all tables used in the SC to be declared initially in a way similar to this:

```
<table border="0" cellSpacing="2" cellPadding="2" width="90%">
```

As this heading is the same every single time, the best idea is to use a taglib that generates it automatically by just changing the previous line for:

```
<table:table>
```

The Table Taglib is very simple and is made up of only five tags: *table*, *header*, *row*, *cell* and *separator*. Let's see each of them together with all the possible attributes they can have and also see a few examples, which will become useful.

14.6.1 TableTag

This generates the initial code for a table. It possesses some attributes that can modify to a certain degree the basic table format of the SC. They are:

- *width*: determines the table width. Its default value is "90%". It can acquire all the values of the traditional HTML tables, allowing both percentages and pixel or point measurements. You must take into account that the tables can be deformed and if the cell width is bigger than this then the table will expand as much as necessary.
- *height*: indicates the table's height. Its default value is null and usually has no sense, because the HTML tables resize depending on the space occupied by the cells. If a value X is assigned and the content for the table needs more space then the table will expand as much as necessary even if it had been predefined to height X.
- *border*: indicates the number of pixels that the table border occupies. Its default value is 0 and is also the only value allowed for SC's tables, because in this environment the tables have no border. However, to debug the JSPs the border attribute has been allowed, so that it is possible to

check whether everything is being shown as it should, but its important to make sure the final JSP has border size 0.

- *id*: the table's identifier. By default, a table never has an id assigned so its value is "null".
- *rowsMayBeSelected*: tells whether the different rows of a table can be selected or not. Its default value is "true" and it can take the values "true" or "false". The "true" true value indicates that the rows can be selected. In this case the automatic ilumination effect of the row the mouse is over is created together with the tables. Also the row remains illuminated unless another is clicked on. If the value for this attribute is "true" all the rows must have a unique id associated to each one.
- *headerAsBody*: indicates whether the header must have the same number of columns as the rest of rows in the table. The default value is "true" and the possible values are "true" and "false". The true value indicates that the number of rows must indeed be the same.

14.6.2 Header Tag

This tag is used to declare the table header. This header can be global for the whole table or it can be local a column, so every table's column can have a different header. In the first case the number of header cells doesn't have to be the same as the number or rows in the table, whilst in the second it must necessarily be the same (see the *headerAsBody* attribute of the "table" tag).

This tag is devoid of attributes.

14.6.3 Row Tag

This tag is used to declare the begging of the new row in the table.

It possesses the following attributes:

- *width*: indicates the table width. The default value is "null", because logic indicates that a row has the same length as the table. This attribute is hardly useful.
- *height*: indicates the vertical length of the row. The default value is "null", as this value is usually resized automatically to the space needed for the table content.
- *id*: it is the row's identifier. It is necessary when the table's rows can be selected (see the attribute *rowsMayBeSelected* for the "table" tag), as it's the only way to distinguish during execution a row from another. Obviously, each row's identifier must be unique for the whole JSP.
- *onclick*: this is the action which must be invoked when an onclick event is detected on the row. Let's suppose that when a row is clicked on whose identifier is "myRow" we want to invoke a JavaScript function called "myFunction", which we have previously coded. What we will do then to declare this row is:

```
<table:row id="myRow" onclick="myFunction()">
```

Or also, supposing that when we click on the row we want to jump immediately to a certain URL, be it a JSP, a Struts Action or any other. Then the previous declaration must be:

```
<table:row id="myRow" onclick="window.location.href='URL'">
```

- *selected*: indicates whether the row must be selected from the moment the JSP is loaded for the first time. The default value is "false", which means that the row isn't selected. It can have the values "true" or "false".

14.6.4 Separator Tag

This tag introduces a row in the middle of the table that can give a new meaning to the table's rows below. The appearance of a separating row is the same one as the header's header. The effect is the same as if we had several consecutive tables, but the difference is that in this way everything forms part of the same table and we make sure that all the columns have the same width. It is a question of symmetry.

This tag has no attributes.

14.6.5 Cell Tag

This tag creates a new cell inside the table's header, inside a row or inside a separator.

The attributes this tag can have are:

- *width*: shows the cell's width. Its default value is "null", as the horizontal length for the table is usually set automatically by the browser depending on the table's needs.
- *height*: indicates the cell's vertical length. Its default value is "null".
- *id*: the cell's identifier. The cells have no default identifier, so its value is "null".
- *align*: indicates the alignment for the text inside the cell. The default value is "left".
- *colspan*: indicates the number of consecutive cells starting from this one that must be combined into one cell.
- *nobg*: indicates whether or not the background colour for this cell should be transparent. The default value is "false", in which case the cell possesses the traditional colour for the SC's cells. It can take the values "true" o "false". This attribute is hardly ever used.
- *onclick*: assigns an *onclick* event to the cell. This event doesn't usually have any meaning in cells that aren't part of the header, although it can also be used for them. Usually this event is used for the table header's cells that can be ordered by columns using struts' pagination feature.

14.6.6 Examples

Simple table with general use title

The example that follows generates a table of 500 pixel width and un-selectable rows. Also, the table will have a general use title; it won't specify the meaning of every column.

```
<table:table width="500" headerAsBody="false"
rowsMayBeSelected="false">
   <table:header>
     <table:cell>General use title</table:cell>
   </table:header>
   <table:row>
     <table:cell>a0</table:cell>
     <table:cell>a1</table:cell>
     <table:cell>a2</table:cell>
   </table:row>
   <table:row>
     <table:cell>b0</table:cell>
     <table:cell>b1</table:cell>
     <table:cell>b2</table:cell>
   </table:row>
   <table:row>
     <table:cell>c0</table:cell>
```

```
      <table:cell>c1</table:cell>
      <table:cell>c2</table:cell>
    </table:row>
    <table:row>
      <table:cell>d0</table:cell>
      <table:cell>d1</table:cell>
      <table:cell>d2</table:cell>
    </table:row>
  </table:table>
```

Table with selectable rows

This second example generates a table which will occupy 100% of the available width for the web page and where a title is set for each column. Also, the rows can be selected and when a row is selected it will remain marked with blue colour and the JavaScript *myFunction* function will be invoked, which will receive as parameter the rows identifier.

```
<script>
function myFunction(clickedRow) {
   alert(clickedRow);
}
</script>

<table:table width="100%" headerAsBody="true"
rowsMayBeSelected="true">
   <table:header>
     <table:cell>título0</table:cell>
     <table:cell>título1</table:cell>
     <table:cell>título2</table:cell>
   </table:header>
   <table:row id="row0" onclick=" myFunction(this.id)">
     <table:cell>a0</table:cell>
     <table:cell>a1</table:cell>
     <table:cell>a2</table:cell>
   </table:row>
   <table:row id="row1" onclick=" myFunction(this.id)">
     <table:cell>b0</table:cell>
     <table:cell>b1</table:cell>
     <table:cell>b2</table:cell>
   </table:row>
   <table:row id="row2" onclick=" myFunction(this.id)">
     <table:cell>c0</table:cell>
     <table:cell>c1</table:cell>
     <table:cell>c2</table:cell>
   </table:row>
   <table:row id="row3" onclick=" myFunction(this.id)">
     <table:cell>d0</table:cell>
     <table:cell>d1</table:cell>
     <table:cell>d2</table:cell>
   </table:row>
  </table:table>
```

14.7 Combotext

This taglib is a combination between a text field and a combo box. With it, any text may be typed into the text field, but there are some suggested options by default, as it happens with a combo box, which are displayed as they match the already typed text.

As with any taglib, all JSP's that use it must include the following header:

```
<%@ taglib uri = "/WEB-INF/combotext-taglib.tld " prefix = "cmbtxt" %>
```

This makes possible to use the combotext tags with the prefix *cmbtxt*.

This taglib is composed by the two tags explained in the sections below.

14.7.1 Combotext tag

Generates a combotext object.

The attributes accepted by this tag are:

- *name*: the object's name. It is a mandatory parameter. It must be a unique name inside the web page. The meaning of this attribute is the same as the *name* attribute of a common text field.
- *id*: the object's id, if any.
- *value*: the initial value for this field, if any. By default, the combotext is left empty if no initial value is specified.
- *width*: the object's width, in pixels. The default value is 140 pixels.
- *position*: the object's position. It may take only two values: *relative* and *absolute*, as it happens with any HTML element.
- *top*: the object's top position, in pixels. The default value is 0.
- *left*: the object's left position, in pixels. The default value is 0.
- *maxheight*: the maximum value for the options height, that is, the height of the displayed options shown anytime a character is typed into the combotext. The default value is 200 pixels.
- *onchange*: The javascript function to be invoked when the combotext's value is modified. Examples:

```
  onchange = "myFunction()";
  onchange = "myfunction('myFinalString')";
  onchange = "myfunction(myVar)"; -- In this case the variable myVar must exist.
```

Formatted: Font: Not Italic

Formatted: Style Computer + Box: (Single solid line Auto 05 pt Line width), No bullets or numbering

14.7.2 Option tag

This tag adds an option to the combotext. Options will be displayed below the text field of this combotext anytime a character is typed, and there will only be displayed those matching with the entered text.

The attributes accepted by this tag are:

- *value*: the value and text of this option. It will be the text displayed if it matches the typed text. It is a mandatory parameter.

14.7.3 Example

The next example will create a combotext with five options.

```
<cmbtxt:combotext name="element">
  <cmbtxt:option value="users"/>
  <cmbtxt:option value="roles"/>
  <cmbtxt:option value="applications"/>
  <cmbtxt:option value="treeviews"/>
  <cmbtxt:option value="branches"/>
</cmbtxt:combotext>
```

14.8 Displaytag

This taglib generates more elaborate tables than the ones generated with the Table Taglib. It's used for tables where there is the need to paginate the results and to order them in columns. It can also be used to export the data to other formats, such as PDF, Excel, CSV or XML.

As with any taglib, all JSP's that use it must include the following header:

```
<%@ taglib uri = "http://displaytag.sf.net" prefix = "display" %>
```

It is an Open Source taglib property of *Sourceforge*, so it has not been tailor made for the SC. However, it allows us to use *decorator* classes, whose role is to provide the table the proper look for the SC, and for this the following decorators have been developed:

- *FutureGUITableDecorator*: selects a row each time and invokes a JavaScript function when the user clicks on it.
- *MultiSelectTableDecorator*: can select several rows at the same time.
- *InventoryBuilderTableDecorator*: is the decorator used in the JSPs generated by the InventoryBuilder. It should not be used for the development of applications.

The JSP used in this taglib, and the associated actions, are the only authorized to break one of the stricter rules of the SC, which is the one that forbids inserting objects in the user's session. This taglib's functioning requires the presence in the session of a collection of bean objects (it accepts several formats, such as Array, Collection, Iterator and other) from which the table's information is obtained. To avoid the clutting up of the user's session with these kinds of collections it has been decided to impose the following rule: the array or object collection must be stored in the session under the name *tmp*. This way in any session there will only be one object collection at any moment.

It will be understood that in order to get to this type of JSP a previous Struts action will have stored in the user's session the object collection under the key *tmp* with all the *beans* that the *displaytag* must display. Also, in a String *array* called *colnames* (names or titles for the columns in the table) will be indicated the names for the different *bean* attributes that we want to show, which means that the *displaytag* will invoke the *getters* for each attribute to obtain the value that will be inserted in each cell.

As this taglib's information can be consulted online (http://displaytag.sourceforge.net/11/), in this section we are going to focus on the more useful functionality for the application environment JSPs. The most important tags are therefore *table* and *column*.

14.8.1 Table Tag

This is the main taglib's tag, which can take the following attributes:

- *id*: can assign an identifier to the table.
- *style*: can set a style for the table. As the style must be the same as the one for the SC, this attribute can have value modifiers such as the table's width.
- *name*: indicates the place and name (separated with a dot. Like this: place.name) with which to find the bean collection. The place can be *sessionScope*, *requestScope* (or by default), *pageScope* and *applicationScope*. As the bean collection must be stored in the session, the value must be *sessionScope*. The name has to be *tmp*. The result will be *sessionScope.tmp*.
- *pagesize*: indicates the number of results that will be shown for each page.
- *export*: indicates whether the options for exporting the results to Excel, PDF, XML or CSV should be shown below the table. It can take the values "true" or "false".

- *sort*: indicates whether the table can be ordered by columns. It can take the values "true" or "false".
- *requestURI*: indicates whether the URL that should be loaded every time a new page is called, the table is ordered by one of the columns or if an exporting option is selected. Usually the value is set to return to the same JSP we are in, but this doesn't have to necessarily be so.
- *decorator*: indicates the class to be used to give the table the correct look for the SC.

14.8.2 Column tag

It is necessary to indicate a tag of this kind for every table's column, that is, for each bean attribute we want to show.

The possible attributes are:

- *property*: indicates the bean attribute's name whose *getter* must be invoked to get the cell's value.
- *sortable*: indicates whether the table can be ordered depending on the values for this row.
- *titleKey*: sets the column's title, that is, the text that must be shown in the column's header. To internationalize it we can use the following syntax: internationalization file name followed by a dot and the key that contains the internationalized text. For example: *ApplicationResourcesUMMA.username*.
- *headerClass*: indicates the name of the style sheet class that must be assigned to this header's cell. This class is called *tableTitle*.
- *class*: indicates the name for the stylesheet class that must be applied to this column's cell. This class is called *tableCell*.

14.8.3 Examples

In the next example (let's say the JSP that this code belongs to is called ejemplo.jsp and its path is precisely the one set in the attribute *requestURI* attribute) we assume the presence in the user's session of a collection of beans stored under the key tmp. For each bean three attributes will appear: *id, name* and *description*.

```
<display:table
      id="userlist"
      style="width:98%"
      name="sessionScope.tmp"
      pagesize="20"
      export="true"
      sort="list"
      requestURI="/jsp/ej/ejemplo.jsp"
      decorator="com.hp.spain.hputils.taglib.displaytag.decorator.
FutureGUITableDecorator">
     <display:column
      property="id"
      sortable="true"
        titleKey="ApplicationResourcesUMMA:user.id"
      headerClass="tableTitle"
      class="tableCell"/>
   <display:column
      property="name"
      sortable="true"
        titleKey="ApplicationResourcesUMMA:user.name"
```

```
      headerClass="tableTitle"
      class="tableCell"/>
   <display:column
      property="description"
      sortable="true"
        titleKey="ApplicationResourcesUMMA:user.description"
      headerClass="tableTitle"
      class="tableCell"/>
</display:table>
```

14.9 FutureAlert

To invoke the *FutureAlert* from a JSP it is necessary to import the JavaScript document where the object is kept. This is done inserting it between the *<head> ... </head>* tags of the JSP the following code:

```
<script src="/activator/JavaScript/hputils/alerts.js"></script>
```

After this, the next thing we have to do is to invoke the FutureAlert's constructor. We can create initially an empty instance and establish later the title and the warning message or we can indicate them in the constructor.

The following example generates an empty instance:

```
<script>
   var fa = new FutureAlert();
</script>
```

That we can use to set the title and the message like in this example:

```
<script>
   fa.setTitle("Warning message");
   fa.setMessage("Hello, world!!!");
</script>
```

This other example creates an instance where the constructor is called specifying the title and the message:

```
<script>
 var fa = new FutureAlert("Warning for users ", "Hello, world!!!");
</script>
```

which generates an equivalent *FutureAlert* to the previous.

Let's not forget that both the title and the message can be changed at any moment by invoking as many times as is needed the *setTitle()* and *setMessage()* methods.

To show the *FutureAlert* on screen we have to invoke the *show()* method. Like this:

```
<script>
   fa.show();
</script>
```

The easiest and shortest way to set and show a *FutureAlert* with the default values is as follows:

```
<script>
   new FutureAlert("Warning for users", "Hello, world!!!").show();
</script>
```

The result for any of the previous examples is the same, as is shown in figure 25.

Figure 15: FutureAlert example

As can be observed, the *FutureAlert* possesses several default characteristics, and some of them can be configured.

It will automatically be shown centred in the browser's window. This property cannot be configured

The default width is of 300 pixels and the height is of 150 pixels. These dimensions can be changed at any moment by invoking the method *setBounds()*.

```
<script>
   fa.setBounds(500, 200);
</script>
```

FutureAlert is a blocking application, which means that while visible it will be impossible to click or to interact over any other element of the page. This characteristic can be changed by calling the *setBlockingAlert()* method.

```
<script>
   fa.setBlockingAlert(true);  // FutureAlert blocks
</script>
<script>
   fa.setBlockingAlert(false); // FutureAlert does not block
</script>
```

The text that appears in the *FutureAlert* button is by default "Aceptar". To establish a different text the method *setButtonText()* must be called.

```
<script>
   fa.setButtonText("OK");
</script>
```

Once visible, the *FutureAlert* will only disappear when the user clicks on the button. However, there is a *hide()* method to hide the *FutureAlert* from the code if it becomes necessary at any moment.

```
<script>
   fa.hide();
</script>
```

The *FutureAlert*'s alert versatility is superior to the JavaScript alert. Also, if in a page it is necessary to show several different *FutureAlerts* you don't have to create an instance for each of them, the same one can be used, changing the title and message as seems fit. For example, let's suppose we have shown a *FutureAlert* like the one shown below:

```
<script>
   var fa = new FutureAlert("Message for users", "Hello, world!!!");
   fa.show();
</script>
```

The user sees it and clicks on the "Accept" button, hiding the *FutureAlert*. (It is very important to take into account that the user must have already hidden the FutureAlert before changing the title or the message. If not, we take the risk of the user not having seen the initial FutureAlert.) Everything carries on as normal until the time comes to show another FutureAlert to the user. As we already had the first, instead of creating a new one we do this:

```
<script>
   fa.setTitle("Second Warning");
   fa.setMessage("Second Message!!!");
   fa.show();
</script>
```

In general, the *FutureAlert's* API is as follows:

Constructors:

- *FutureAlert()*: creates an instance with no title or message.
- *FutureAlert(String title, String message)*: creates an instance with a title and a message depending on the similar named parameters.

Methods:

- *setTitle(String title)*: sets a new title for the *FutureAlert*.
- *setMessage(String message)*: establishes a new message for the *FutureAlert*.
- *setBounds(int width, int height)*: sets a width of "width" pixels and a height of "height" pixels.
- *setBlockingAlert(boolean isBlocking)*: tells whether the *FutureAlert* will block the underlying page or not.
- *setButtonText(String buttonText)*: sets a new text to be shown inside the button that hides the FutureAlert.
- *setButtonFunction(String jsFunction)*: indicates that when the *FutureAlert's* button is clicked on the JavaScript function *jsFunction* should be called. This is a way of using the *FutureAlert* to block code execution, as the *jsFunction* won't be executed until the user clicks on the button.
- *takeUp(int numPixels)*: shows the *FutureAlert* higher up (if *numPixels* is a positive number) or further below (if negative). The vertical distance the *FutureAlert* moves depends on the *numPixels* value.
- *show()*: shows the *FutureAlert* in the centre of the browser.
- *hide()*: hides the *FutureAlert*.

14.10 FutureConfirm

To invoke the *FutureConfirm* from a jsp it is necessary to import the JavaScript document where the object is kept. This is done by inserting between the *<head> ... </head>* tags the following code:

```
<script src="/activator/JavaScript/hputils/alerts.js"></script>
```

After this, the next step is to call *FutureConfirm*'s constructor. We can create an empty instance initially and set later the title and warning message or we can indicate them in the constructor call.

The next example generates an empty instance:

```
<script>
   var fc = new FutureConfirm();
</script>
```

in which we can set the title and message in the following way:

```
<script>
   fc.setTitle("User confirmation required ");
   fc.setMessage("Do you want to say Hello, World?");
</script>
```

This other example creates an instance in which the title and message are specified in the constructor itself:

```
<script>
   var fc = new FutureConfirm("User confirmation required ", "Do you want to
say Hello, World?");
</script>
```

which generates a similar *FutureConfirm* to the previous one.

We have to note that both the message and the title can be changed at any given moment by calling as many times as needed the *setTitle()* and *setMessage()* methods.

It is also necessary to indicate the JavaScript functions that will be called when the user clicks on one of the buttons of the *FutureConfirm*. If not, the only effect will be to hide the *FutureConfirm*. These methods can be set in the constructor itself:

```
<script>
   var fc = new FutureConfirm("User confirmation required ", "Do you want to
say Hello, World?", "sayHello(true)", "sayHello(false)");
</script>
```

or the function can also be set by using the mehods *setAcceptButtonFunction() and setCancelButtonFunction()*:

```
<script>
   fc.setAcceptButtonFunction("sayHello(true)");
   fc.setCancelButtonFunction("sayHello(false)");
</script>
```

It looks obvious, but different functions can be called for each case:

```
<script>
   fc.setAcceptButtonFunction("sayHello()");
   fc.setCancelButtonFunction("sayGoodbye()");
</script>
```

and strings can also be set as parameters for the functions called:

```
<script>
   fc.setAcceptButtonFunction("say(\"Hello!!\")");
   fc.setCancelButtonFunction("say(\"Goodbye!!\")");
</script>
```

In order to show the *FutureConfirm* on screen we call the method called *show()*. Like this:

```
<script>
   fc.show();
</script>
```

The shortest way to set and show a *FutureConfirm* with default parameters is like this:

```
<script>
   new FutureConfirm("User confirmation required", "Do you want to say
Hello, World?").show();
</script>
```

The result of any of the previous examples is the same, as is shown in figure 26.

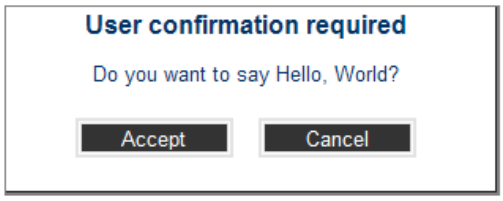


Figure 16: FutureConfirm example

As can be seen, the *FutureConfirm* possesses certain properties by default, some of them being configurable.

By default it will always be shown centred in the browser's window. This property is not configurable.

The default width is of 300 pixels and the height is of 150 pixels. These dimensions can be changed at any given moment by calling the *setBounds()* method.

```
<script>
   fc.setBounds(500, 200);
</script>
```

The *FutureConfirm* is blocking, which means that while visible it will be impossible to click or interact with the underlying window. This characteristic can be changed by calling the method called *setBlockingConfirm()*.

```
<script>
   fc.setBlockingConfirm(true);  // The FutureConfirm is blocking
</script>
<script>
   fc.setBlockingConfirm(false); // The FutureConfirm is not blocking
</script>
```

The text that appears inside the *FutureConfirm's* buttons is by default "Aceptar" and "Cancelar". To set a different text it is necessary to invoke the methods *setAcceptButtonText()* and *setCancelButtonText()*.

```
<script>
   fc.setAcceptButtonText("Yes");
   fc.setCancelButtonText("No");
</script>
```

Once it appears, the *FutureConfirm* will only disappear when the user clicks on the button. However, there exists a method called *hide()* that can hide the *FutureConfirm* from the code if it becomes necessary.

```
<script>
   fc.hide();
</script>
```

The *FutureConfirm's* versatility is superior to JavaScript's confirm. Also, if in a page it is necessary to show several different *FutureConfirms* we don't have to create a new one for each, we can use the same one and change the title and message depending as we see fit.

For example, let's suppose we have shown a *FutureConfirm* like the one below:

```
<script>
   var fc = new FutureConfirm("User confirmation required ", "Do you want to
say Hello, World?");
   fc.setAcceptButtonFunction("sayHello()");
   fc.setCancelButtonFunction("sayGoodbye()");
   fc.show();
</script>
```

The user sees it and clicks on the "Aceptar" button, hiding the *FutureConfirm*. (It is important to note that the user must have hidden the *FutureConfirm* before changing the title or message. If not, we take the risk that the user doesn't notice the initial *FutureConfirm*.) Everything carries on as normal until the time comes to show the user the second *FutureConfirm*. As we already had the first, instead of creating a new one we do the following:

```
<script>
   fc.setTitle("Second confirm");
   fc.setMessage("Second confirm message");
   fc.setAcceptButtonFunction("say(\"Hello!!\")");
   fc.setCancelButtonFunction("say(\"Goodbye!!\")");
   fc.show();
</script>
```

In general, the *FutureConfirm's* API is as follows:

Constructors:

- *FutureConfirm()*: creates an instance with no title and no message.
- *FutureConfirm(String title, String message)*: creates an instance with title and message depending on the similar named parameters.
- *FutureConfirm(String title, String message, String acceptFunctionName, String cancelFunctionName)*: creates an instance with title and message, and the JavaScript functions "acceptFunctionName" and "cancelFunctionName" will be called when the user clicks on the respective buttons.

Methods:

- *setTitle(String title)*: sets the new title for the *FutureConfirm*.
- *setMessage(String message)*: sets the new message for the *FutureConfirm*.
- *setBounds(int width, int height)*: sets the width and height in pixels.
- *setBlockingConfirm(boolean isBlocking)*: indicates whether or not the *FutureConfirm* will block the underlying page.
- *setAcceptButtonText(String buttonText)*: sets the new text that will be shown inside the first button to hide *FutureConfirm*.
- *setCancelButtonText(String buttonText)*: new text that will be shown inside the second button to hide *FutureConfirm*.
- *setAcceptButtonFunction(String fnc)*: indicates that the JavaScript function called "fnc" should be called when *FutureConfirm*'s first button is clicked on.
- *setCancelButtonFunction(String fnc)*: indicates that the JavaScript function called "fnc" should be called when *FutureConfirm*'s second button is clicked on.
- *takeUp(int numPixels)*: makes the *FutureConfirm* appear higher up (if numPixels is a positive number) or further down (if negative). The vertical distance that the FutureConfirm will move coinsides with the value for numPixels.
- *show()*: makes the *FutureConfirm* appear centred on the browser.
- *hide()*: hides the *FutureConfirm*.

14.11 SC's Context and Application Context

The SC provides a static singleton class called Context where any application can store key-value pairs and *Application Context* instances. The figure below shows the UML representation of the classes involved.

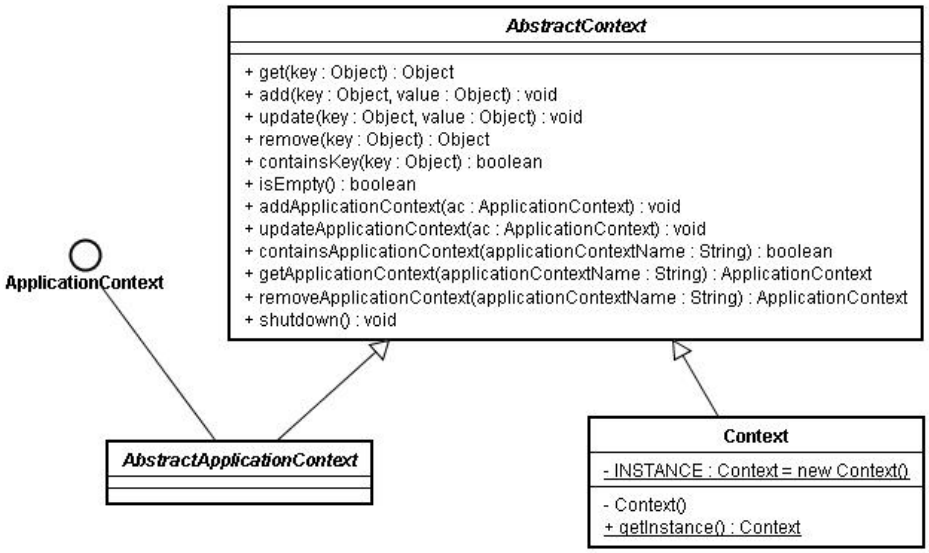


Figure 17: Context's UML diagram

14.11.1 Context class

This is a static singleton class, what means that it can be never instantiated by any other class but itself. The only one existing instance is pointed by the INSTANCE static constant, and can be obtained to operate over it using the getInstance() method.

This class implements the abstract class *AbstractContext*.

14.11.2 AbstractContext class

This abstract class manages the key-value pairs and the *ApplicationContext* instances. Provides methods to get, add, remove and update any key-value pair or any *ApplicationContext*.

14.11.3 ApplicationContext interface

This interface defines a getName() method used to identify the ApplicationContext instance.

14.11.4 AbstractApplicationContext class

This abstract class implements the *ApplicationContext* interface and defines an abstract method called *getName* as it is specified in the interface. It also extends the abstract class *AbstractContext* to inherit the methods defined there.

Any application which needs an Application Context has to define a new class which must extend this one. Once the Application Context is instantiated, it can be stored into the *Context* using the *addApplicationContext()* method.

14.12 Properties files

Some applications running under SC may need to be configured before the HPSA is started up. This can be done using properties files that must be located at this directory:

```
C:\hp\jboss\server\diagnostic\deploy\hpovact.sar\activator.war\properties
```

Along the stating up process all these properties files under the specified directory are read and stored into the SC's Context object as a key-value pair, where the key is a String with the name of the properties file (without the *.properties* extension) and the value is a *java.util.Properties* object representing the contents of the file.

This way, any application can get any configured parameter looking for the *java.util.Properties* object at the SC's Context and getting the parameter from it.

For instance, let's suppose that an application deploys a *xxx.properties* file into the specified directory. The contents of this file are:

```
equipment.ip = 11.22.33.44
equipment.port = 8080
```

When the SC starts up, a new entry is added to the Context under the key *xxx*.

Afterwards, any Struts' action of the application can get the two parameters configured into the file easily. The next code shows how:

```
java.util.Properties p =
   (java.util.Properties) Context.getInstance().get("xxx");
String ip = p.get("equipment.ip");
String port = p.get("equipment.port");
```

See the API of the Context class for further information.

14.13 Action Audit

The URL of the RMI service with the methods for action audition is stored in the SC's Context (see section 14.1 for further information). The key needed to obtain the URL from the Context is a constant defined in the com.hp.spain.futuregui.login.LoginConstants interface.

There is an example about this in the section 9 dedicated to *Action Audit*.

The parameters of the *auditAction* method provided with the RMI service are:

- *messageType*: indicates what kind of message is being audited (error, warning, info, etc.)
- *username*: the name of the user who generates the log.
- *workId*: the identifier of the task which audited this action.
- *sourceComponent*: the component where this actions was being performed.
- *actionPerformed*: the name of the action that was being performed.
- *description*: a brief description of the audit message.

14.14 WFLT

14.14.1 WFLTAction.do

This is the action which should be invoked to launch and track a workflow. The way the workflow will be launched and how it will be tracked can be specified through some configuration parameters which are described in this section. The information necessary for the launching of a workflow will be searched in the request attributes and in the parameters. There is only one restriction, it is that all this elements must be Strings, or adaptable to Strings. All the elements will be searched in lower case too.

14.14.1.1 General parameters

These are the fundamental parameters used to launch a workflow:

- __wfname: Workflow name. Is a mandatory parameter. If it's not present an error will be thrown.
- __wfmwfmname: The name of the Mwfm in which the workflow will be launched or in which the workflow will be searched. If it's not present the default Mwfm will be used.

It's also possible to track a workflow that has been already launched. In order to use this functionality we need to specify a new parameter:

- __wfJobId: The id of the workflow which we are going to track.

14.14.1.2 Concurrent Workflows

To enable the tracking of workflows with children using the Concurrent Workflow Module the next parameter has to be used.

- __wfConcurrentCheck: Has a boolean value. This parameter is not mandatory. If its value is true the workflows will be tracked by the Concurrent Workflows application.

14.14.1.3 Database tracking

It's also possible to track workflows with children using the database. To use this functionality is necessary to use the next three parameters:

- __wfServiceName: It is the workflow's service name. Its value should be the bean package referencing the database table (Ex: com.hp.spain.inventory.Service).
- __wfServicePk: It is the workflow's service primary key. That's the primary key which will be associated with the workflow in the database.
- __wfDatasource: It is the data source name to access the database where we will store the workflow jobId.

14.14.1.4 ECP Command tracking

The activations launched by workflows can also be tracked. When this option is enabled the commands sent to the ECP will be shown in the screen. Some parameters are necessary to access to this functionality:

- __wf_command_audit_active: This parameter will enable the ECP command tracking if its value is "true". It's not mandatory and by default this option is not enabled.
- __wf_command_id. This id must be unique and will be used to filter the received messages and show only the ones related to a specific activation. At the same time, this identifier must be

provided to the ECP under the same key. If no id is provided the jobId value will be taken by default.

14.14.1.5 SOSA

The workflow launcher tracker can launch SOSA 3 service orders and track them. In order to use the SOSA integration some parameters are needed.

- __wfsosatype: It corresponds to the field "service_order_name" from the table "catalog_service_order".
- __wfsosaservice: It corresponds to the field "service_name" from the table "catalog_service_order".
- __wfsosaaction: It corresponds to the field "service_operation" from the table "catalog_service_order".
- __wfsosacheck: This parameter must be true to indicate that SOSA is being used.

There are also specific SOSA parameters that are needed in the workflow's case packet. More details about them and about how to launch workflows in SOSA can be found in the document "OVSA SPI for Service Providers - SOSA - Developer Reference.doc".

14.14.1.6 Miscellaneous parameters

- next_url: It's the URL which will be invoked when the workflow finish its execution. The URL can be absolute (http://...) or relative to the base activator path (Ex. /activator/jsp/future-gui/blanck.jsp).

14.14.1.7 User parameters

The user parameters are the attributes and parameters retrieved from the request that start with the prefix "wfvar__". The next parameter:

```
wfvar__equipmentname=NT300
```

In the workflow's case packet it will be translated into this:

```
Name: equipmentname
Value: NT300
```

It is possible to make groups of attributes or parameters using String arrays. Example: if we need to launch a workflow that waits for a String array with three values whose name is "equipmentnames" we will need to use the next four parameters:

```
wfvar__arrayiterator0=wfvar__equipmentnames
wfvar__equipmentnames5=NT300
wfvar__equipmentnames22=NT400
wfvar__equipmentnames17=NT6000
```

The first one is the group's name while the others, formed using the name of the array followed by any group of numbers or chars, will contain the names which will constitute the array.

This will make the next line in the workflow's initial case packet:

```
Name: equipmentnames
Value: {NT300, NT400, NT6000}
```

If the workflow needs more arrays it will need to repeat the process adding to the first parameter's integer value (wfvar__arrayiterator0, wfvar__arrayiterator1, wfvar__arrayiterator2…). The enumeration must be consecutive.

Example:

This example is going to launch a workflow from the inventory, called EQUIPMENT_CONFIGURATION, which will receive three String arrays: the first one containing the equipments' names, the next one containing their IPs and the third containing their operating systems. Also, it will need the user name to access them. We'll assume that the user name is the same for the three of them.

```
/activator/WFLTAction.do?
__wfname=EQUIPMENT_CONFIGURATION&
__wfDatasource=confDS&
__wfservicename=confservice&
__wfservicepk=25&
__wfmwfmname=localmwfm&
wfvar__username=admin&
wfvar__arrayiterator0=equipmentnames&
wfvar__equipmentnamesA=NT300&
wfvar__equipmentnamesB5=NT400&
wfvar__equipmentnames20=NT6000&
wfvar__equipmentnamesAB=NT50&
wfvar__arrayiterator1=equipmentips&
wfvar__equipmentipsA=10.10.10.1&
wfvar__equipmentipsB=10.10.20.2&
wfvar__equipmentipsC=10.10.30.3&
wfvar__equipmentipsD=10.10.40.4&
wfvar__arrayiterator2=equipmentsos&
wfvar__equipmentsosA=HPUX&
wfvar__equipmentsosB5=HPUX&
wfvar__equipmentsos20=Windows&
wfvar__equipmentsosAB=Solaris
```

Glossary

Datasource: a factory for connections to the physical data source.

EJB (Enterprise JavaBeans): a server-side component that encapsulates the business logic of an application. The EJB specification intends to provide a standard way to implement the back-end 'business' code typically found in enterprise applications.

JSP (Java Server Page): a technology which provides a simplified, fast way to create dynamic web content. JSP technology enables rapid development of web-based applications that are server- and platform-independent.

MWFM (Micro Workflow Manager): the workflows engine provided with the HPSA.

MWFM Módule: a class which extends those provided by the MWFM to perform a certain functionality for the HPSA. Every module is started up by the MWFM and runs in the same Java virtual machine.

Servlet: a technology which provides web developers with a simple, consistent mechanism for extending the functionality of a web server and for accessing existing business systems. A servlet can almost be thought of as an applet that runs on the server side--without a face.

Taglib: a librarie which allows you to create custom actions and encapsulate functionality. Custom tags can clearly separate the presentation layer from the business logic. They are easy to maintain reusable components that have acces