LIMS – SQUIT Spec Mapper 1.0 Component Specification

1. Design

The Laboratory Information Management System (LIMS) is an inventory tracking system. The system is a JEE web application that relies on the application server logging to track execution issues.

SQUIT is a system which receives supplier information from customers and exports it to SAP systems.

The SpecMappingAction class provides the functionality to manage the spec mappings.

1.1 Industry Standards

None.

1.2 Design Patterns

DAO Pattern
The LimsSpecDBO class uses the DAO pattern to manage the SpecMap entity in the persistence. (Note that the LimsSpecDBO is out of scope.)

1.3 Required Algorithms

1.3.1 Logging

The exceptions should be logged with ERROR level in the SpecMappingAction.
Both exception message and stack trace should be logged.

The validation errors should be logged with ERROR level in the SpecMappingAction.

Log4J will be used to perform the logging.

1.3.2 SpecMappingAction Configuration

The SpecMappingAction should be configured in the struts-config.xml as below:

```xml
<struts-config>
    <action-mappings>
        <action
            path="/specMapping.do"
            type="com.ibm.lims.actions.transformer.SpecMappingAction"
            parameter="method"
            scope="request">

            <forward name="searchLimsSpecs" path="/limsSpecPopup.jsp"/>
            <forward name="searchSquitSpecs" path="/squitSpecPopup.jsp"/>
            <forward name="searchSpecMappings" path="/specList.jsp"/>
            <forward name="openSpecMapping" path="/specEdit.jsp"/>
            <forward name="viewSpecMappings"
                path="/specMapping.do?method=searchSpecMappings"
                redirect="true"/>
        </action>
    </action-mappings>
</struts-config>
```

1.3.3 JSP Pages

Developers are responsible for implementing the JSP pages listed below.

1.3.3.1 The specList.jsp Page

The specList.jsp page is converted from the docs/specList.html page.

This page is rendered as the result of the SpecMappingAction.searchSpecMappings method.

The text inputs on the "SQUIT" column should be named with "squitSpecCode", "squitSpecName", and "squitElement".
The text inputs on the "LIMS" column should be named with "limsSpecCode", "limsSpecName", and "limsElement".

When the "Clear" button is clicked, all the text inputs should be cleared.
When the "Search" button is clicked, the form is posted to /specMapping.do?method=searchSpecMappings.

The SQUIT and LIMS spec mapping table on the page is populated with data retrieved from the request attribute under the "specMaps", "totalCount" and "pageNo" keys. (Refer to the SpecMappingAction.searchSpecMappings method).

Apart from the rows in the spec mapping table, a pager should be rendered with "Prev" and "Next" page links. The page size is 20 records; the pageNo represents the current page number; and the totalCount represents the total number of records, it will be used calculate the total number of pages. User can click "Prev" or "Next" page links to move to the previous page or next page. The "Prev" page link will only be available if there is a previous page, and the "Next" page link will only be available if there is a next page.

When user clicks any row in the spec mapping table, user should be redirected to /specMapping.do?method=openSpecMappingForEdit&action=update&specMapId=${id} to update the clicked row. Where the ${id} represents the specMapId of the SpecMap entity corresponding to the currently clicked row.

When user clicks the "Delete" button, a message dialog is displayed to let user confirm. If user confirms, all the rows with checkbox checked will be deleted. Each checkbox should be named with "specMapId", and its value should be the specMapId of the corresponding SpecMap entity. The request will be posted to the /specMapping.do?method=deleteSpecMappings for processing.

When user clicks the "Add" button, user should be redirected to the /specMapping.do?method=openSpecMappingForEdit&action=add to add a new spec mapping.

1.3.3.2   The specEdit.jsp Page
The specEdit.jsp page is converted from the docs/specEdit.html page.

The given docs/specEdit.html page has a mistake. The "Spec code", "Spec name", "Element" values for the LIMS should be labels, they can only be selected through the "Browse" button.

This page is rendered as the result of the SpecMappingAction.openSpecMappingForEdit method.

The "action" request attribute will be rendered as a hidden input, and the "specMap" request attribute will be rendered on the SQUIT and LIMS columns if the "action" value is "update". The fields of the "specMap" request attribute value will also be rendered as hidden inputs, so that they can be submitted as form data.

The "Unit" dropdown list will contain the following values:
PARTICLE

#/CM2
#/GALLON
#/Sq. Cm
#/Sq. In
#sq.m./g
%
ABSORBANCE
ANGSTROMS
APHA
BALANCE
CENTIPOISE
CENTISTOKE
CM
DEGREES C
DYNES/CM2
E-5 1/DEGC
E+12OHM-CM
E+14OHM-CM
g/ml
G/L
GM/L
GM/ML
GRAMS
HOURS
ID
INCHES
KG/MM2
L/G-CM
mm
M2/GRAM
MEQ/GM
MG / SEC
MG/FT3
MG/GM
MG/KG
MG/L
MICRON
MILLIGRAMS
MJ/CM2
ML/L
MM/DD/YY
MOLAR
MPA
nm
NAME
NORMAL
OHM-CM
OHMS
PART/L
PART/ML
PARTICL/ML
PASS TEST
PB
POISE
PPB
PPM

PPT
PSI
RATIO
RPM
RUN/RECORD
SECONDS
uC/CM2
um
uOHMS/CM
UEQ/GM
wt%
WHITE LIQU
YES/NO

The "Operation" dropdown list contains the following values:
None
Multiply
Divide

When user clicks "Cancel" button, user is redirected to the
/specMapping.do?method=searchSpecMappings.

When user clicks "Save" button, the form is submitted to the
/specMapping.do?method=editSpecMapping to add a new spec mapping or update the
spec mapping.

When user clicks the "Browse" button on the "SQUIT" column, a popup window will be
opened. This popup window will open /specMapping.do?method=searchSquitSpecs URI
to display all the SQUIT specs.

When user clicks the "Browse" button on the "LIMS" column, a popup window will be
opened. This popup window will open /specMapping.do?method=searchLimsSpecs URI
to display all the LIMS specs.

1.3.3.3 The squitSpecPopup.jsp Page
The squitSpecPopup.jsp page is converted from the docs/squitSpecPopup.html page.

This page is rendered as the result of the SpecMappingAction.searchSquitSpecs method.

The table on the page is populated with data retrieved from the request attribute under
the "specs", "totalCount" and "pageNo" keys.

Apart from the rows in the table, a pager should be rendered with "Prev" and "Next" page
links. The page size is 20 records; the pageNo represents the current page number; and
the totalCount represents the total number of records, it will be used calculate the total
number of pages. User can click "Prev" or "Next" page links to move to the previous page
or next page. The "Prev" page link will only be available if there is a previous page, and
the "Next" page link will only be available if there is a next page.

The "spec" attribute value is a list of TestDetailsVO objects. And the TestDetailsVO is
linked to the GUI fields as follows:
TestDetailsVO.type = Spec code
TestDetailsVO.SampleID = Spec name
TestDetailsVO.Element = Element
TestDetailsVO.Units = Unit

The text inputs on the page are named with "specCode", "specName" and "element" respectively, and they will be used to filter the SQUIT specs. When the "Search" button is clicked, the form is posted to the /specMapping.do?method=searchSquitSpecs URI.

When "Cancel" button is clicked, the page is simply closed.
When user clicks any row in the table, the "specCode", "specName", "element" and "unit" values of the clicked row will be retrieved and assigned to the corresponding fields on the SQUIT column in the parent page (specEdit.jsp page), and then this popup window is closed. Note the hidden input fields on the parent page should also be updated with the selected spec. Java Script will be used to achieve this.

1.3.3.4　　The limsSpecPopup.jsp Page

This page is converted from the docs/limsSpecPopup.html page.

This page is rendered as the result of the SpecMappingAction.searchLimsSpecs method.

It will be rendered in the same way as the squitSpecPopup.jsp page as in chapter 1.3.3.3. Except the "Search" button will post the request to /specMapping.do?method=searchLimsSpecs URI; and when user clicks any row in the table, values will be assigned to the corresponding fields on the LIMS column in the parent page (specEdit.jsp page).

1.4　　Component Class Overview

1.4.1　Package com.ibm.lims.actions.transformer

SpecMappingAction
This class extends the DispatchAction and it provides methods to search the LIMS specs, search the SQUIT specs, search Spec Mappings, edit spec mapping, update (add or edit) spec mapping and delete spec mappings.

1.4.2　Package com.ibm.lims.valueobject

SpecFilter
This class represents the filter used to search the LIMS and SQUIT spec.

SpecMapFilter
This class represents the filter used to search the SpecMap.

SpecMap
This class represents the spec mapping between LIMS and SQUIT.

SpecSearchResult
This class represents the spec list search result.

SpecMapSearchResult
This class represents the spec map list search result.

Operation
This enumeration class represents the operation.

TestDetailsVO [Out of Scope]

1.5　　Component Exception Definitions

Custom Exceptions
SpecMappingActionException
This exception extends the Exception class and it's thrown from the SpecMappingAction

class if any error occurs when processing the request.

System Exceptions
IllegalArgumentException – it's thrown when the passed-in argument is invalid.

Note that the "empty string" mentioned in UML documentation means the string with zero length after trimming.

1.6   Thread Safety

This component can be used thread-safely.

The SpecFilter, SpecMapFilter, SpecMap, SpecSearchResult and SpecSearchResult entities are mutable and not thread-safe. But they will be used as method arguments or returned values only or stored into the request scope, so they won't affect the thread-safety of the classes using them.

The SquitSpecDBO and LimsSpecDBO classes will be thread-safe as confirmed in the forum.

The struts action will be used to process multiple requests simultaneously, so its request processing methods must be thread-safe.

The SpecMappingAction class is immutable and thread-safe.

2. Environment Requirements

2.1   Environment
- Java 1.5
- DB2 v8.1
- WebSphere v6.1

2.2   TopCoder Software Components
None.

2.3   Third Party Components
Log4J 1.2 (http://logging.apache.org/log4j/1.2/index.html)
It's used to log exceptions.

Struts 1.1
This component is built upon the struts framework.

3. Installation and Configuration

3.1   Package Name

com.ibm.lims.actions.transformer
com.ibm.lims.valueobject (the TestDetailsVO is out of scope)
com.ibm.lims.databaseobject (out of scope)

3.2   Configuration Parameters
None.

3.3   Dependencies Configuration
The Log4J should be configured properly in order to be used in this component.

4. Usage Notes

4.1   Required steps to test the component

- Extract the component distribution.

- Follow Dependencies Configuration.
- Execute 'ant test' within the directory that the distribution was extracted to.

4.2   Required steps to use the component

See demo.

4.3   Demo

4.3.1   User Interactions

Assume the component is properly deployed with the JSP pages described in chapter 1.3.3 above, and it's deployed on local machine at port 80 as "mapper" web application.

User opens http://localhost/mapper/specMapping.do?method=searchSpecMappings in the browser. The following spec mappings will be displayed to user if the database contains example records as displayed.

Mapping List

	SQUIT			LIMS		
Spec code				Spec code		
Spec name				Spec name		
Element				Element		

[Search] [Clear]

	SQUIT			LIMS		
	Spec code	Spec name	Element	Spec code	Spec name	Element
☐	01L8758C--4436732	TGGY	LA	01L8758C	TUNGGY	LA- LANTHANUM
☐	01L8758C--4436732	TGGY	MG	01L8758C	TUNGGY	MG- MAGNESIUM
☐	01L8758C--4436732	TGGY	IR	01L8758C	TUNGGY	IR- IRIDIUM
☐	01L8758C--4436732	TGGY	K	01L8758C	TUNGGY	K- POTASSIUM
☐	01L9171--4425674	COPPER	CO	01L9171	COPPER ANODE	CO
☐	01L9171--4425674	COPPER	CS	01L9171	COPPER ANODE	CS
☐	01L9171--4425674	COPPER	CE	01L9171	COPPER ANODE	CE

[Add] [Delete]

User can enter search filters and click the "Search" button to further filter the spec mappings.
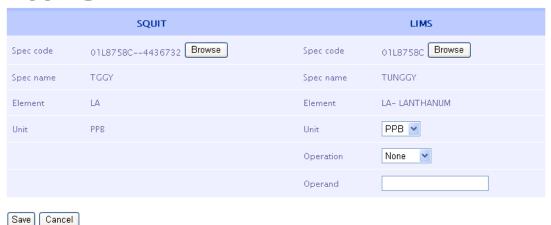
User can click the "Add" button to add a new spec mapping. A new page will be displayed

for user to add the spec mapping, this page works in the same way as the "edit spec mapping" page below.

User can check checkboxes and then click "Delete" button to remove the checked spec mappings. A confirmation dialog will be displayed, and the mappings will only be removed if user confirms.

User can click any row in the displayed table to edit the spec mapping. The following page is displayed if the first row in the displayed table is clicked.

Mapping Edit

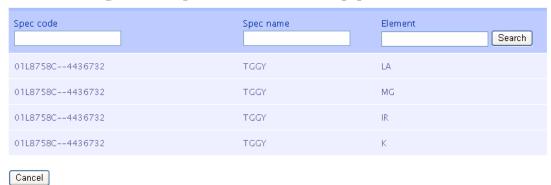| SQUIT		LIMS	
Spec code	01L8758C--4436732 [Browse]	Spec code	01L8758C [Browse]
Spec name	TGGY	Spec name	TUNGGY
Element	LA	Element	LA- LANTHANUM
Unit	PPB	Unit	PPB ▼
		Operation	None ▼
		Operand	

[Save] [Cancel]

User can click the "Browse" button on SQUIT column to select a SQUIT spec. And user can click the "Browse" button on the LIMS column to select a LIMS spec. User can also edit the "Unit", "Operation", "Operand" field values. Then user can click "Save" button to save the spec mapping and be brought back to the spec mappings page.

User can give up the change by clicking the "Cancel" button and go back to the spec mappings page.

When the "Browse" button on the SQUIT column of the "spec mapping edit" page is clicked, a popup window is displayed to show the following content:

Select SQUIT Spec to be mapped

Spec code	Spec name	Element	
			[Search]
01L8758C--4436732	TGGY	LA	
01L8758C--4436732	TGGY	MG	
01L8758C--4436732	TGGY	IR	
01L8758C--4436732	TGGY	K	

[Cancel]

User can click the row in the displayed table to select the SQUIT spec, the selected SQUIT spec will be assigned to the corresponding fields in the parent page. User can also enter the "spec code", "spec name" and "element" values to filter the SQUIT specs.

The "Browse" button on the "LIMS" column of the "spec mapping edit" page works in the similar way as the "Browser" button described above. Except it's used to select the LIMS spec.

5. **Future Enhancements**

None.