

# The SearchPanel component (replacement for LookupForm)

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## Using the SearchPanel

When data is stored in a database we want to be able to search for records. Searching is so common that DomUI has a special component that helps with creating database search screens: the SearchPanel. The Search Panel works on database *objects*, i.e. entity classes that are defined in Hibernate or JPA, or even with plain JDBC accessed objects (using DomUI's generic database layer). This means that working with the panel you stay inside the Java world.

Let's start with an example:

```
@Override public void createContent() throws Exception {
    ContentPanel cp = new ContentPanel();
    add(cp);

    SearchPanel<Invoice> lf = new SearchPanel<>(Invoice.class);
    cp.add(lf);
    lf.setClicked(a -> search(lf));

    lf.add().property("customer").control();           // Start with lookup by customer
    lf.add().property("total").control();             // Allow searching for a total
    lf.add().property("invoiceDate").control();       // And the date.
}
```

This example creates a search panel which searches for Invoice instances using the customer, total (amount) and invoiceDate properties. The actual searching and showing of the data is done by base class which will be shown at the end of this document.

This fragment creates the following UI (LIVE - click inside to play with it):

As can be seen, each property is presented on the form, in order. And for each property we have a special "control" which allows for input related to the type of the property. We see, in order:

- The customer property uses a LookupInput2, because it is actually a @ManyToOne relation (parent) of the Invoice class. [This control lets you search for a Customer using a special UI.](#)
- The "total" field is a numeric field. It uses a special *Lookup Control* called *NumberLookupControl* which allows searching for a number as follows:
  - Enter "> 1000" to find all records with an amount > 1000. Likewise you can use <, <=, >=.
  - Entering a single amount searches for an exact match
  - Entering 10% does a "like" query with all amounts that start by 10.
- The invoiceDate field creates another *Lookup Control* called *DateLookupControl*. This control shows two dates, and allows searched starting from, ending at or between the two dates.

The SearchPanel uses metadata to get the default label for properties, and it uses a registry of factories (LookupControlRegistry2) to find the best lookup control for a property, by type. The registry can be easily extended with your own lookup control factories.

You can control how data is shown using the builder pattern exhibited above. In that way you can change:

- The label by using label(String) or label(NodeContainer)
- The lookup hint (what is shown when hovering over the control) which also defaults to metadata
- The default value to use. This value will be used as the initial value of the control, and will also be used when the "reset" button is pressed on the panel.
- Whether a text search ignores case or not (defaults to true)
- The minimal input length for a control before the search is issued. This can be used to prevent large searches by specifying that at least 3 characters should be used for instance.
- Options specific for the control being created.

## Using metadata with the panel

In the above example we specified what to search on by hand. This is often handy because it allows full control. But the form can also be populated automatically by using the metadata associated with the entity we look for. Take for example the following definition for Invoice's metadata:

```
@Entity
@Table(name = "Invoice")
@SequenceGenerator(name = "sq", sequenceName = "invoice_sq")
@MetaObject(defaultColumns = { // 20180203 Must have metadata for SearchPanel/LookupForm tests.
    @MetaDisplayProperty(name = "customer.lastName", displayLength = 20)
    , @MetaDisplayProperty(name = "customer.firstName", displayLength = 10)
    , @MetaDisplayProperty(name = "invoiceDate")
    , @MetaDisplayProperty(name = "billingAddress", displayLength = 20)
    , @MetaDisplayProperty(name = "billingCity", displayLength = 10)
    , @MetaDisplayProperty(name = "total", displayLength = 10)
}
, searchProperties = {
    @MetaSearchItem(name = "invoiceDate")
    , @MetaSearchItem(name = "billingCity")
    , @MetaSearchItem(name = "customer")
}
})
```

The searchProperties above are the "default" properties to use inside the SearchPanel, and they take effect when no manual configuration of the SearchPanel is done, like this:

```
@Override public void createContent() throws Exception {
    ContentPanel cp = new ContentPanel();
    add(cp);

    SearchPanel<Invoice> lf = new SearchPanel<>(Invoice.class);
    cp.add(lf);
    lf.setClicked(a -> search(lf.getCriteria()));
}
```

In this case the metadata takes effect, resulting in:

Mixing metadata and user configuration

By default the SearchPanel does not use metadata when the panel is configured manually. To combine metadata with manually added controls call the following:

```
<div class="code panel pdl" style="border-width: 1px;"><div class="codeContent panelContent pdl"> <pre class="syntaxhighlighter-pre" data-syntaxhighlighter-params="brush: java; gutter: false; theme: Confluence" data-theme="Confluence">lf.addDefault();</pre> </div></div>
```

This adds the metadata to the definition as follows:

- When this call is done the metadata defined search items are added *after* what is already configured
- When a user defined item is added for a given property then metadata for that same property is not used. This acts a bit special:
  - If the user defined item has been added *before* the call to addDefault() then the metadata items are added behind all defined items, and the metadata item with the existing property is just skipped
  - If the user defined item is added *after* the metadata items have been added (so after the call to addDefault()) then the user defined item *replaces* the metadata defined item. The net result is that the user defined item will be at the same position that the metadata item would have been.

One word of warning though: it is dangerous to assume a lot about how the metadata for an object looks. So manipulating the result of the metadata a lot inside a form is madness: any time the metadata changes the form becomes unstable. If you need to make large changes to how a form would look when it only uses metadata consider configuring the thing completely - that makes you independent of metadata.

Customizing the SearchPanel

Using default values

To have default values for controls we use the builder. To define a default value we need to know the *data type* of the control that is being used for searching. This data type is often **not** the same as the data type of the field we search on! This can be seen in the examples above: The lookup control for the "total amount" field behaves as a String, because you can input things like "1200". The actual value type for this control is NumberLookupValue, which contains:
 

- Number from: the "from" amount or the first number entered in the string (always present)
- QOperation from Operation: an enum representing the possible operations to issue on that "from", like "=&quot; or "&lt;&gt;"

 We also have Number to and QOperation to which are used when there are two conditions in the field, like "1000 &lt;&gt; 10000".
 

- The invoiceDate property uses a DateLookupControl which consists of two dates. Consequently it returns a datatype "DatePeriod" which consists of two Date fields (from and to) representing the values in both DateInput controls.

 To set a default value you must use the data types that are actually used by the control or things will fail.
 

An example of using default values is this:

```
<div class="code panel pdl" style="border-width: 1px;"><div class="codeContent panelContent pdl"> <pre class="syntaxhighlighter-pre" data-syntaxhighlighter-params="brush: java; gutter: false; theme: Confluence" data-theme="Confluence">@Override public void createContent() throws Exception { ContentPanel cp = new ContentPanel(); add(cp); SearchPanel<Invoice> lf = new SearchPanel<>(Invoice.class); cp.add(lf); lf.setClicked(a -> search(lf.getCriteria()));
//-- Find customer by ID Customer defaultCustomer = getSharedContext().get(Customer.class, Long.valueOf(10)); lf.add().property("&quot;customer&quot;").defaultValue(defaultCustomer).control(); // Default customer
//-- Default the search total to 5.0 NumberLookupValue nlv = new NumberLookupValue(QOperation.GE, BigDecimal.valueOf(5.0)); lf.add().property("&quot;total&quot;").defaultValue(nlv).control(); // Allow searching for a total
//-- Default the date to before 2010. DatePeriod period = new DatePeriod(null, DateUtil.dateFor(2010, 0, 1)); lf.add().property("&quot;invoiceDate&quot;").defaultValue(period).control(); // And the date.
}</pre> </div></div>
```

We use the appropriate data type for the controls being used and define the value for the control from there. The net result is that the form shows with default search values loaded:

<https://etc.to/demo/to.etc.domuidemo.pages>



(replacementforLookupForm)-Example: creating your own component and builder">Example: creating your own component and builder</h2><p>In this example we are going to make a screen to search inside the Tracks table.</p><p>We will use the EnumSetInput control to select zero to one Genre's from the database, then limit the search to those genres selected. The completed thing looks like this:</p><p><iframe src="https://etc.to/demo/to.etc.domuidemo.pages.searchpanel.SearchPanelCustomControl4.ui" width="1024" height="400" /></p><p>We will start with the page's code:</p><div class="code panel pdl" style="border-width: 1px;"><div class="codeContent panelContent pdl"><pre class="syntaxhighlighter-pre" data-syntaxhighlighter-params="brush: java; gutter: false; theme: Confluence" data-theme="Confluence">@Override public void createContent() throws Exception { ContentPanel cp = new ContentPanel(); add(cp); SearchPanel&lt;&T;Track&gt; If = new SearchPanel&lt;&T;Track.class); cp.add(If); If.setClicked(a -&gt; search(If.getCriteria()); //-- For Genre we will use a new control EnumSetInput&lt;&T;Genre&gt; genreC = new EnumSetInput&lt;&T;Genre.class); List&lt;&T;Genre&gt; genreList = getSharedContext().query(QCriteria.create(Genre.class)); genreC.setData(genreList); Set&lt;&T;Genre&gt; def = new HashSet&lt;&T;Genre&gt;(); def.add(genreList.get(0)); def.add(genreList.get(1)); If.add().property(&quot;name&quot;).control(If); If.add().property(&quot;album&quot;).control(If); // Allow searching for a total }</pre></div></div><p>We add the usual panel, then we prepare the EnumSetInput:</p><ul><li>We read all Genre records from the database in genreList</li><li>We prepare a default (just for show) of the 1st two genres returned</li><li>Then we add the control for the Genre to the SearchPanel.</li></ul><p>The EnumSetInput returns a Set&lt;&T;Genre&gt; for all of the selected items. This set of course is not understood by any of the existing query builders, so we made one ourself: the EnumSetQueryBuilder:</p><div class="code panel pdl" style="border-width: 1px;"><div class="codeContent panelContent pdl"><pre class="syntaxhighlighter-pre" data-syntaxhighlighter-params="brush: java; gutter: false; theme: Confluence" data-theme="Confluence">public class EnumSetQueryBuilder&lt;&T;V&gt; implements ILookupQueryBuilder&lt;&T;Set&lt;&T;V&gt;&gt; { private final String m\_propertyName; public EnumSetQueryBuilder(String propertyName) { m\_propertyName = propertyName; } @Nonnull @Override public &lt;&T;T&gt; LookupQueryBuilderResult appendCriteria(@Nonnull QCriteria&lt;&T;T&gt; criteria, @Nullable Set&lt;&T;V&gt; lookupValue) { if(lookupValue == null || lookupValue.isEmpty()) return LookupQueryBuilderResult.EMPTY; QRestrictor&lt;&T;T&gt; or = criteria.or(); lookupValue.forEach(value -&gt; or.eq(m\_propertyName, value)); return LookupQueryBuilderResult.VALID; }</pre></div></div><p>An instance of this class gets connected to the search item. It works as follows:</p><ul><li>The class gets instantiated with the property name to search for, which in this case will be &quot;genre&quot; inside the Track entity.</li><li>When it is time to create the query the appendCriteria call gets called. It:</li><li>Checks whether the data was actually there. If not it returns the EMPTY indicator. This indicator is used when searching is only allowed with at least one clause filled in.</li><li>For complex data you would also check the input here and throw a ValidationException if the data was wrong.</li><li>We can now create the query: we add an or of all values in the set.</li></ul></div><div id="TheSearchPanelComponent(replacementforLookupForm)-Generatingtheform">Generating the form</div><p>The search panel generates a form containing the labels and controls that are added. By default it generates a simple vertical form where each label/control pair are on a single line. How can we influence the form's layout? For that we need to know how the form gets generated.</p><p>The SearchPanel uses an ISearchFormBuilder implementation as the thing that actually builds the form:</p><div class="code panel pdl" style="border-width: 1px;"><div class="codeContent panelContent pdl"><pre class="syntaxhighlighter-pre" data-syntaxhighlighter-params="brush: java; gutter: false; theme: Confluence" data-theme="Confluence">public interface ISearchFormBuilder { /\*\* Defines the target node for the form to be built. \*/ void setTarget(NodeContainer target) throws Exception; void append(SearchControlLine&lt;&T;?&gt; it) throws Exception; void finish() throws Exception; }</pre></div></div><p>All actions that create the form based UI are delegated to this interface. If you do nothing then SearchPanel uses the default implementation of this thing: DefaultSearchFormBuilder. This implementation is very basic:</p><div class="code panel pdl" style="border-width: 1px;"><div class="codeContent panelContent pdl"><pre class="syntaxhighlighter-pre" data-syntaxhighlighter-params="brush: java; gutter: false; theme: Confluence" data-theme="Confluence">public class DefaultSearchFormBuilder implements ISearchFormBuilder { @Nullable private FormBuilder m\_builder; private Div m\_target; @Override public void setTarget(NodeContainer target) throws Exception { Div root = m\_target = new Div(&quot;ui-dfs-panel&quot;); target.add(root); Div d = new Div(&quot;ui-dfs-part&quot;); root.add(d); m\_builder = new FormBuilder(d); } @Override public void append(SearchControlLine&lt;&T;?&gt; it) throws Exception { NodeContainer label = it.getLabel(); if(null != label) fb().label(label); IControl&lt;&T;?&gt; control = it.getControl(); fb().control(control); } public void addBreak() { NodeContainer target = requireNonNull(m\_target); Div d = new Div(&quot;ui-dfs-part&quot;); target.add(d); m\_builder = new FormBuilder(d); } @Override public void finish() throws Exception { m\_builder = null; } @Nonnull public FormBuilder fb() { return requireNonNull(m\_builder); }</pre></div></div><p>It just uses a normal FormBuilder to create the form, and it has an extra &quot;method&quot; to allow the form to be split into multiple columns: the &quot;addBreak&quot; method.</p><p>Controlling how the form looks can be done by creating your own implementation of ISearchFormBuilder. You can even make it the default layout by calling:</p><div class="code panel pdl" style="border-width: 1px;"><div class="codeContent panelContent pdl"><pre class="syntaxhighlighter-pre" data-syntaxhighlighter-params="brush: java; gutter: false; theme: Confluence" data-theme="Confluence">SearchPanel.setDefaultSearchFormBuilder(Supplier&lt;&T;ISearchFormBuilder&gt; factory)</pre></div></div><p>so that the supplier returns your factory.</p><p>To interact with your factory you can add special &quot;actions&quot; to the SearchForm's definition. For example, to use that &quot;addBreak&quot; method we would code the following:</p><div class="code panel pdl" style="border-width: 1px;"><div class="codeContent panelContent pdl"><pre class="syntaxhighlighter-pre" data-syntaxhighlighter-params="brush: java; gutter: false; theme: Confluence" data-theme="Confluence">SearchPanel sp = new SearchPanel(Invoice.class); DefaultSearchFormBuilder bld = new DefaultSearchFormBuilder(); sp.setFormBuilder(bld); // Ensure that the DefaultFormBuilder is used //-- add first two props If.add().property(&quot;type&quot;).control(typeC, new EnumSetQueryBuilder&lt;&T;Definition.pTYPE); If.add().property(&quot;type&quot;).control(If); If.add().action(() -&gt; bld.addBreak()); If.add().property(&quot;stage&quot;).control(If);</pre></div></div><p>The action will be executed in the order of adding the controls.</p><div class="confluence-information-macro confluence-information-macro-warning"><span class="aui-icon aui-icon-small aui-iconfont-error confluence-information-macro-icon"></span><div class="confluence-information-macro-body"><p>You could of course also cast If.getFormBuilder() to DefaultSearchFormBuilder instead of creating an instance yourself. This however will cause your code to break if the default ever changes.</p></div></div><p></p></div></div></body></html>