Oracle® Endeca Information Discovery

Studio Developer's Guide

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ORACLE

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Preface

Oracle® Endeca Information Discovery is an enterprise data discovery platform for advanced, yet intuitive, exploration and analysis of complex and varied data.

Information is loaded from disparate source systems and stored in a faceted data model that dynamically supports changing data. This integrated and enriched data is made available for search, discovery, and analysis via interactive and configurable applications.

Oracle Endeca Information Discovery enables an iterative “model-as-you-go” approach that simultaneously frees IT from the burdens of traditional data modeling and supports the broad exploration and analysis needs of business users.

About this guide

This guide provides information on extending the Studio portal of Oracle Endeca Information Discovery.

Who should use this guide

This guide is intended for developers who want to extend Studio.

Conventions used in this guide

This guide uses the following typographical conventions:

Code examples, inline references to code elements, file names, and user input are set in `monospace` font. In the case of long lines of code, or when inline monospace text occurs at the end of a line, the following symbol is used to show that the content continues on to the next line: ¬

When copying and pasting such examples, ensure that any occurrences of the symbol and the corresponding line break are deleted and any remaining space is closed up.

Contacting Oracle Customer Support

Oracle Customer Support provides registered users with important information regarding Oracle software, implementation questions, product and solution help, as well as overall news and updates from Oracle.

You can contact Oracle Customer Support through Oracle's Support portal, My Oracle Support at *https://support.oracle.com*.

Chapter 1

About Extending Studio

Out of the box, Studio includes numerous components that you can use to quickly develop an enterprise-quality search application. In addition, Studio provides a number of extension points for managing query and portlet operations, along with default implementations of the various interfaces that you can modify.

Developer tasks in Studio

Developer tasks include both data source development and component customization.

Data source development tasks include:

- Modifying data sources.
- Adjusting security.
- Customizing how data sources interact with each other.

Component customization tasks include:

- Adding or modifying portlet components based on the `EndecaPortlet` class, using the Studio Component SDK.
- Localizing components.

This guide covers all of these developer tasks.

Note: Before modifying data sources, make sure to read the data sources chapter of the *Oracle Endeca Information Discovery Studio User's Guide*. This chapter describes the default interaction model between related data sources.

Licensing requirement for component development

Studio component development may require the purchase of a third party license.

Studio uses *Ext JS* in its components and in the default components created by its SDK.

The Oracle Endeca Information Discovery license does not bundle licensing for ExtJS.

Therefore, customers developing components with ExtJS must either purchase their own development licenses from ExtJS, or remove ExtJS and develop components without using that Javascript framework.

Other resources for additional information

In addition to this guide, there are other resources that can help with these development tasks.

Liferay documentation

Because Studio is built upon the Liferay Portal, you can access Liferay's documentation for more information about how to perform administrative and developer tasks.

Specifically, the *Liferay Portal Administrator's Guide* provides extensive information about installing, configuring, and maintaining a portal.

Liferay developer resources

This guide only covers Information Discovery extensions to the Liferay Portal. For additional developer support, Liferay provides blogs, wikis, and forums. To access this, go to *http://www.liferay.com* and navigate to Community.

Additional Information Discovery documentation

The complete Oracle Endeca Information Discovery documentation set is available from the Oracle documentation library.

Chapter 2

Security Extensions to Studio

You may require more than the default data source role-based security discussed in the *Oracle Information Discovery Studio User's Guide*. If so, you can customize the automated filtering of data from the Oracle Endeca Server (based on user profile details such as the user's role or group association) by creating a custom Security Manager.

Security Manager class summary

A Security Manager is a concrete class that implements `com.endeca.portal.data.security.MDEXSecurityManager`.

Abstract base class	`com.endeca.portal.data.security.MDEXSecurityManager`
Default implementation class	`com.endeca.portal.data.DefaultMDEXSecurityManager`
Description	Handles pre-execution query modification based on the user, role, or group-based security configuration of filters.

Default implementation behavior	The default Security Manager implementation uses the following properties: • `securityEnabled`. If the value is not present, then `securityEnabled` defaults to `false`. • `securityFilters`. Record filters are the only supported type of `securityFilter`. • `rolePermissions` • `inheritSecurity`. If the data source has a parent, then `inheritSecurity` defaults to `true`. Otherwise, the value defaults to `false`. • `parentDataSource` These properties are defined in data source configurations in order to apply role-based security filters to queries issued to the Endeca Server backing a given data source. Users are assigned to Liferay roles in the **Control Panel**. The related associations are made available to every component throughout the user's session. Users who have not yet logged in are automatically assigned the Guest user role. Any role-based restrictions for the Guest role are also applied to these users. For each data source, the Security Manager maintains an internal map of security filters to always apply to queries issued during that user's session.

Creating a new Security Manager

The Studio Component SDK includes Windows and Linux batch scripts for creating a new Security Manager.

To create a new Security Manager project:

1. In a terminal, change your directory to `endeca-extensions` within the Component SDK's root directory (normally called `components`).
2. Run one of the following commands:
   - On Windows: `.\create-mdexsecuritymanager.bat <your-security-manager-name>`
   - On Linux: `./create-mdexsecuritymanager.sh <your-security-manager-name>`

   This command creates a `your-security-manager-name` directory under `endeca-extensions`. This directory is an Eclipse project that you can import directly into Eclipse, if you use Eclipse as your IDE.

   This directory also contains a sample implementation that you can use to help understand how the Security Manager can be used. The sample implementation is essentially identical to the default implementation of the Security Manager used by Studio.

Implementing a new Security Manager

Your Security Manager must implement the `applySecurity` method.

There are two versions of the `applySecurity` method, one of which your Security Manager must implement:

```
public void applySecurity(PortletRequest request, MDEXState mdexState, Query query) throws
MDEXSecurityException;
```

The Query class in this signature is `com.endeca.portal.data.Query`. This class provides a simple wrapper around an `ENEQuery`.

Using the Security Manager

In order to use your Security Manager, you must specify a new class for Studio to pick up and use in place of the default Security Manager implementation.

The `your-security-manager-name` directory you created contains an ant build file. The `ant deploy` task places a .jar file containing your Security Manager into the `portal/tomcat-<version>/lib/ext` directory.

To configure Studio to use your new class:

1. Point the cursor at the Dock in the upper-right corner of the page.
2. In the drop-down menu, choose **Control Panel**.
3. In the **Information Discovery** section of the **Control Panel** navigation panel, select **Framework Settings**.
4. Change the value of the `df.mdexSecurityManager` property to the full name of your class, similar to following example:
   ```
   df.mdexSecurityManager = com.endeca.portal.extensions.YourSecurityManagerClass
   ```
5. Click **Update Settings**.
6. Restart Studio so the change can take effect. You may also need to clear any cached user sessions.

Chapter 3

Managing Data Source State in Studio

Studio allows you to define your own interaction model for data sources by creating a custom State Manager. For information on the default interaction model between related data sources, see the *Oracle Endeca Information Discovery Studio User's Guide*.

About the State Manager interface

The State Manager controls how data sources interact during updates and query construction.

Interface (required)	`com.endeca.portal.data.MDEXStateManager`
Abstract base class (optional)	`com.endeca.portal.data.AbstractMDEXStateManager`
Default implementation class	`com.endeca.portal.data.DefaultMDEXStateManager`
Description	Handles: • Updating a data source with a new query state (called from `DataSource.setQueryState(QueryState newState)`) • Retrieving the current query state from a data source (called from `DataSource.getQueryState()`) • Resetting a data source's query state to its initial state (called from `DataSource.resetQueryState()`) • Retrieving a copy of the data source's initial state without resetting the data source (called from `DataSource.getInitialQueryState()`)

Default implementation behavior	The default State Manager implementation uses the `ParentDataSource` property from the data source configuration to propagate state changes throughout the hierarchy of data source relationships. When a component changes the query state of its data source, that modification is applied to: • The parent data source • All of the children of the parent data source This is recursive, applying all the way up and back down an ancestor tree. Configuring a hierarchy of data source relationships allows application developers to create more advanced interfaces, such as a tabbed result set where a single **Guided Navigation** component controls the query state for **Results Table** components on different tabs.

Creating a new State Manager

The `endeca-extensions` directory of the Component SDK includes scripts for creating a State Manager project on either Windows or Linux.

To create a new State Manager project:

1. In a terminal, change to the `endeca-extensions` directory within the Component SDK's root directory (normally called `components`).
2. Run one of the following commands:
   - On Windows: `.\create-mdexstatemanager.bat` <*`your-state-manager-name`*>
   - On Linux: `./create-mdexstatemanager.sh` <*`your-state-manager-name`*>

   This command creates a <*`your-state-manager-name`*> directory under `endeca-extensions`. This directory is an Eclipse project. If you use Eclipse as your IDE, you can import the project directly into Eclipse.

   The directory also contains a sample implementation, which is essentially identical to the default implementation of the State Manager used by Studio. You can use this sample implementation to help understand how to use the State Manager.

Implementing a State Manager

Custom State Managers implement the `MDEXStateManager` interface. There are methods for updating, retrieving, and resetting the data source query state.

Recommendations for implementing

To create a custom State Manager, you must at minimum implement the `com.endeca.portal.data.MDEXStateManager` interface. The recommended approach is to extend `com.endeca.portal.data.AbstractMDEXStateManager`, which in turn implements `MDEXStateManager`.

You also should extend `com.endeca.portal.data.AbstractMDEXStateManager`, which in turn implements `MDEXStateManager`. The `AbstractMDEXStateManager` abstract class contains the useful utility method `addEventTrigger(PortletRequest, MDEXState)`.

The default state manager implementation is `com.endeca.portal.data.DefaultMDEXStateManager`. The Studio Component SDK creates state managers that extend `DefaultMDEXStateManager`, because they will work without any modification. If you want your custom state manager to inherit some of the default functionality, you can extend `DefaultMDEXStateManager` instead of `AbstractMDEXStateManager`.

Required methods

Your State Manager must implement the following methods:

```
public void handleStateUpdate(PortletRequest request, MDEXState mdexState, QueryState newQueryState)
throws QueryStateException;

public QueryState handleStateMerge(PortletRequest request, MDEXState mdexState) throws
QueryStateException;

public void handleStateReset(PortletRequest request, MDEXState mdexState) throws QueryStateException;

public QueryState handleStateInitial(PortletRequest request, MDEXState mdexState) throws
QueryStateException;
```

`handleStateUpdate()`	Called when a component calls `DataSource.setQueryState(qs)`. This method should eventually call `mdexState.setQueryState()`. However, it is not required to make this call if it determines that the `MDEXState's QueryState` should not change. If the data source state is changed by `handleStateUpdate()`, you must mark the affected data sources. To mark the data sources, you call the `addEventTrigger(PortletRequest request, MDEXState ds)` method, passing in the request object and any `MDEXState` objects that are changed.
`handleStateMerge()`	Called when a component calls `DataSource.getQueryState()`. You are expected to return the `QueryState` that the component should get access to for the data source represented by the `mdexState`, taking into account any data source relationships or other aspects of your `State Manager` that might affect the query state.

`handleStateReset()`	Called when a component calls `DataSource.resetQueryState()`. This method returns the data source to the "initial state" defined by your state manager. The default implementation (`DefaultMDEXStateManager`) clears all query functions from the data source except those defined in the `baseFunctions` key of the data source's .json file, and similarly updates all parent and child data sources. If the data source state changes while it is being reset, you must mark the affected data sources. To mark the data sources, you call the `addEventTrigger(PortletRequest request, MDEXState ds)` method, passing in the request object and any `MDEXState` objects that are changed.
`handleStateInitial()`	Called when a component calls `DataSource.getInitialQueryState()`. This method returns a copy of the data source's initial state as defined by your state manager. The default implementation (`DefaultMDEXStateManager`) returns a `QueryState` with query functions made up of the union of the `baseFunctions` from: • The current data source • All of the current data source's parents

Using the State Manager

In order to use your State Manager, you must specify a new class for Studio to pick up and use in place of the default State Manager implementation.

The *<your-state-manager-name>* directory you created contains an ant build file. The `ant deploy` task places a `.jar` file containing your State Manager into the `portal/tomcat-<version>/lib/ext` directory.

To configure Studio to use your State Manager:

1. Point the cursor at the Dock in the upper-right corner of the page.
2. In the drop-down menu, choose **Control Panel**.
3. In the **Information Discovery** section of the **Control Panel** navigation panel, select **Framework Settings**.
4. Change the value of `df.mdexStateManager` property to the full name of your class, similar to following example:
   ```
   df.mdexStateManager = com.endeca.portal.extensions.YourStateManagerClass
   ```
5. Click **Update Settings**.
6. Restart Studio so the change can take effect. You may also need to clear any cached user sessions.

Chapter 4

Installing and Using the Component SDK

You can customize Studio even further by creating your own components.

The Studio Component SDK is a packaged development environment that you can use to add or modify components, themes, and layout templates. It is a modified version of the Liferay Plugins SDK, and includes enhancements such as the `EndecaPortlet` core class.

Note: The Studio Component SDK is designed to work with the Studio Tomcat bundle. It will not work out-of-the-box on other platforms.

Downloading and configuring the Component SDK

The Studio Component SDK is available with the Studio installer.

Before installing the Component SDK, download and unzip `EID_<version>_portal.zip`, as described in the Studio portion of the *Oracle Endeca Information Discovery Installation Guide*. This is the base Studio code, upon which the Component SDK depends. You do not have to start Studio.

Note: Do not install the Component SDK in a directory path that contains spaces.

Note: On Windows, for steps b and d below, backslashes in paths must be escaped. That is, use a path similar to the following:

```
portal.base.dir=C:\\my_folder\\EID-portal
```

instead of:

```
portal.base.dir=C:\my_folder\EID-portal
```

To install the Component SDK:

1. Download and unzip `EID_<version>_components_sdk.zip` to a separate directory.

   This is the Component SDK itself.

2. Perform the following steps within the Component SDK:
   (a) Create a file `components/build.<user>.properties`

   where `<user>` is the user name with which you logged on to this machine.

(b) Within that `properties` file, add a single property `portal.base.dir=<absolute_path_to_portal>`

where `<absolute_path_to_portal>` is the path to the unzipped `EID_<version>_portal.zip`.

(c) Create a `shared.properties` file in the `shared/` directory.

(d) Edit `shared/shared.properties` and set the single property `portal.base.dir=<absolute_path_to_portal>`

where `<absolute_path_to_portal>` is the path to the unzipped `EID_<version>_portal.zip`.

Configuring Eclipse for component development

Before using the Component SDK to develop Studio components in Eclipse, you need to create two Eclipse classpath variables.

Note: Depending on your version of Eclipse, the steps below may vary slightly.

To configure the Eclipse classpath variables for Studio component development:

1. In Eclipse, go to **Window>Preferences>Java>Build Path>Classpath Variables**.
2. Create two new variables:

Name	Path
`DF_GLOBAL_LIB`	Path to the application server global library. Example: `C:/endeca-portal/tomcat-<version>/lib`
`DF_PORTAL_LIB`	Path to the Liferay ROOT Web application library. Example: `C:/endeca-portal/tomcat-<version>/webapps/ROOT/WEB-INF/lib`

Once these variables have been created, the components generated by the Component SDK can be imported into Eclipse.

Developing a new component

Here is a high-level overview of the component development process.

To develop a new Studio component:

1. Create the component.
2. Import the project in Eclipse.

3. Build and test the new component.

Creating a new component

New Studio components are extensions of the `EndecaPortlet` class.

To create a new component:

1. At a command prompt, navigate to the Component SDK directory, and from there to `components/portlets`.
2. Run the command:

   ```
   create.bat <component-name-no-spaces> "<ComponentDisplayName>"
   ```

   For example:

   ```
   create.bat johns-test "John's Test Component"
   ```

   In the command, the first argument is the component name. The component name:

   - Cannot have spaces.
   - Cannot include the string `-ext`, because it causes confusion with the ext plugin extension. For example, `my-component-extension` would not be a valid name.
   - Has the `-portlet` automatically appended to the name. For example, if you set the name to `johns-test`, the name will actually be `johns-test-portlet`.

   The second argument is intended to be a more human-friendly display name. The display name can have spaces, but if it does, it must be enclosed in quotation marks.

Importing the project in Eclipse

Before beginning component development, you have to import the component project you just created into Eclipse.

To import the Studio Component SDK project you just created into Eclipse:

1. Within Eclipse, choose **File>Import>General>Existing Projects into Workspace**.
2. As the root directory from which to import, select the directory where you installed the Component SDK.

   You should see multiple projects to import.
3. Import the components you need to work with.

   If your components depend on shared library projects located within the `/shared` directory, import those as well.

   Note: It takes some time for projects to build after they are imported.

Building and testing your new component

Next, you can build your new component in Eclipse and ensure that it is available in Studio.

To build your new component in Eclipse:

1. In your new project, open the `build.xml` file at the top level.
2. In the outline view, right-click the deploy task and select **Run as...>Ant Build**.

   Note: This step is only necessary if you do not have **Build Automatically** checked in the Eclipse **Project** menu.

3. If Studio is not already running, start Studio and log in.
4. Look at the Studio logs to confirm that the component was picked up successfully.
5. To test your new component within Studio:
   (a) In the Dock menu, click **Add Component**.
   (b) In the **Add Component** dialog, expand the **Sample** category.

   Your component should be listed in that category.

   (c) To add the new component to the Studio page, drag and drop it from the **Add Component** dialog.

Adding and removing components from the WebLogic .ear file

If you have installed Studio on Oracle WebLogic Server, then you can also add the component to the deployed .ear file, so that it will be deployed automatically the next time you deploy the file, for example when installing a production instance after you have completed testing on a development instance.

To add components to and remove components from the WebLogic .ear file:

1. To add a custom component to the .ear file:
   (a) Copy your component to the `<LIFERAY_HOME>/deploy` directory.
   (b) After the component has been processed and moved to the `<LIFERAY_HOME>/weblogic-deploy` directory, undeploy the .ear file.
   (c) Add the processed component .war file to the root of the zipped .ear file.
   (d) In the .ear file, add an entry for the new component to `META-INF/application.xml`.
2. To remove a component from the .ear file:
   (a) Remove the component .war file from the root of the .ear file.
   (b) In the .ear file, remove the component entry from `META-INF/application.xml`.

Modifying the enhancements to the Component SDK

The `build.xml` file in the root directory of each component created by the Component SDK contains properties that control whether to include the build enhancements.

By default, these properties are:

```
<property name="shared.libs" value="endeca-common-resources,endeca-discovery-taglib" />
<property name="endeca-common-resources.includes" value="**/*" />
```

```
<property name="endeca-common-resources.excludes" value="" />
```

The properties control the following behavior:

`shared.libs`	Controls which projects in the `shared/` directory to include in your component. These shared projects are compiled and included as `.jar` files where appropriate.
`endeca-common-resources.includes`	Controls which files in the `shared/endeca-common-resources` project are copied into your component. The default value is `"**/*"`, indicating that all of the files are included, These files provide: • AJAX enhancements (`preRender.jspf` and `postRender.jspf`) • The ability to select a different data source for the component (`dataSourceSelector.jspf`)
`endeca-common-resources.excludes`	Controls which files from the `shared/endeca-common-resources` project are excluded from your component. By default, the value is `""`, indicating that no files are excluded. If your component needs to override any of these files, you must use this build property to exclude them. If you do not exclude them, your code will be overwritten.

The `includes` and `excludes` properties can be specified for any shared library, for example:

```
    <property name="endeca-discovery-taglib.includes" value="**/*" />
    <property name="endeca-discovery-taglib.excludes" value="" />
```

Chapter 5

Working with QueryFunction Classes

Studio provides a set of `QueryFunction` classes to allow you to filter and query data. You can also create and implement your own `QueryFunction` classes.

Provided QueryFunction filter classes

Studio provides the following filter classes. Filters are used to change the current query state. They can be used in the definition of a Studio data source, or called by a custom component.

The available filter classes are:

- `DataSourceFilter`
- `RecordFilter`
- `RefinementFilter`
- `NegativeRefinementFilter`
- `RangeFilter`
- `SearchFilter`

Note that the examples below use the syntax for calling the filters from a component. For details on configuring filters in a data source definition, see the *Oracle Endeca Information Discovery Studio User's Guide*.

DataSourceFilter

Uses an EQL snippet to provide the filtering.

When used in a data source definition, a `DataSourceFilter` is a permanent filter designed to be used for security purposes.

The available properties are:

`filterString`	The EQL snippet containing the filter information. For a `DataSourceFilter`, this would be the content of a `WHERE` clause for an EQL statement. For details on the EQL syntax, see the *Oracle Endeca Server Query Language Reference*.

For example, to filter data to only show records from the Napa Valley region with a price lower than 40 dollars:

```
ExpressionBase expression = dataSource.parseLQLExpression("Region='Napa Valley' and P_Price<40");
DataSourceFilter dataSourceFilter = new DataSourceFilter(expression);
```

RecordFilter

A `RecordFilter` can be configured to include multiple filters with Boolean logic.

When used in a data source definition, a `RecordFilter` provides permanent filtering of the data.

The properties for a `RecordFilter` are:

`recordFilter`	String The filter content. For details on the `RecordFilter` syntax, see the *Oracle Endeca Server Developer's Guide*.

In the following example, the data is filtered to only include records that have a value of Midwest for the Region attribute.

```
RecordFilter recordFilter = new RecordFilter("Region:Midwest");
```

RefinementFilter

Used to filter data to include only those records that have the provided attribute values. End users can remove `RefinementFilter` refinements.

The properties for a `RefinementFilter` are:

`attributeValue`	String The attribute value to use for the refinement. For a managed attribute, this is the value ID.
`attributeKey`	String The attribute key. Identifies the attribute to use for the refinement.

`multiSelect`	`AND |OR | NONE` For multi-select attributes, how to do the refinement if the filters include multiple values for the same attribute. If set to `AND`, then matching records must contain all of the provided values. If set to `OR`, then matching records must contain at least one of the provided values. If set to `NONE`, then multi-select is not supported. Only the first value is used for the refinement.

In the following example, the data is refined to only include records that have a value of 1999 for the Year attribute.

```
RefinementFilter refinementFilter = new RefinementFilter("1999", "Year");
```

NegativeRefinementFilter

Used to filter data to exclude records that have the provided attribute value. End users can remove `NegativeRefinementFilter` refinements.

The properties for a `NegativeRefinementFilter` are:

`attributeValue`	String The attribute value to use for the refinement.
`attributeKey`	String The attribute key. Identifies the attribute to use for the refinement.

For example, to refine the data to only include records that do NOT have a value of 2003 for the Year attribute:

```
NegativeRefinementFilter negativeRefinementFilter = new NegativeRefinementFilter("Year", "2003");
```

RangeFilter

Used to filter data to include only those records that have attribute values within the specified range. End users can remove `RangeFilter` refinements.

The properties for a `RangeFilter` are:

`attributeKey`	String The attribute key. Identifies the attribute to use for the filter.

rangeOperator	LT | LTEQ |GT |GTEQ| BTWN |GCLT |GCGT | GCBTWN The type of comparison to use. • LT - Less than • LTEQ - Less than or equal to • GT - Greater than • GTEQ - Greater than or equal to • BTWN - Between. Inclusive of the specified range values. • GCLT - Geocode less than • GCGT - Geocode greater than • GCBTWN - Geocode between
rangeType	NUMERIC | CURRENCY | DATE | GEOCODE The type of value that is being compared.
value1	Numeric The value to use for the comparison. For BTWN, this is the low value for the range. For the geocode range operators, the origin point for the comparison.
value2	Numeric For a BTWN, this is the high value for the range. For GCLT and GCGT, this is the value to use for the comparison. For GCBTWN, this is the low value for the range.
value3	Numeric Only used for the GCBTWN operator. The high value for the range.

In the following example, the data is refined to only include records where the value of P_Score is a number between 80 and 100:

```
RangeFilter rangeFilter
= new RangeFilter("P_Score", RangeType.NUMERIC, RangeOperator.BTWN, "80", "100");
```

SearchFilter

Used to filter the data to include records that have the provided search terms. End users can remove SearchFilter refinements.

The properties for a `SearchFilter` are:

`searchInterface`	String Either the name of the search interface to use, or the name of an attribute that is enabled for text search.
`terms`	String The search terms.
`matchMode`	`ALL` | `PARTIAL` | `ANY` | `ALLANY` | `ALLPARTIAL` | `PARTIALMAX` | `BOOLEAN` The match mode to use for the search.
`enableSnippeting`	boolean Whether to enable snippeting. Optional. If not provided, the default is `false`.
`snippetLength`	int The number of characters to include in the snippet. Required if `enableSnippeting` is `true`. To enable snippeting, set `enableSnippeting` to `true`, and provide a value for `snippetLength`.

In the following example, the filter uses the "default" search interface to search for the terms "California" and "red". The matching records must include all of the search terms. Snippeting is supported, with a 100-character snippet being displayed.

```
SearchFilter.Builder builder = new SearchFilter.Builder("default", "California red");
builder.matchMode(MatchMode.ALL);
builder.enableSnippeting(true);
builder.snippetLength(100);
SearchFilter searchFilter = builder.build();
```

Provided QueryConfig functions

Studio provides the following `QueryConfig` functions, used to manage the results returned by a query. These are more advanced functions for component development.

Each `QueryConfig` function generally has a corresponding function in `DiscoveryServiceUtils` to get the results.

`QueryConfig` functions are specific to a component. Because of this, `QueryConfig` functions should never be persisted to a data source using `setQueryState()`, as this would affect all of the components bound to that data source. Instead, `QueryConfig` functions should only be added to a component's local copy of the `QueryState` object.

The available `QueryConfig` functions are:

- `AttributeValueSearchConfig`

- `BreadcrumbsConfig`
- `ExposeRefinement`
- `LQLQueryConfig`
- `NavConfig`
- `RecordDetailsConfig`
- `ResultsConfig`
- `ResultsSummaryConfig`
- `SearchAdjustmentsConfig`
- `SearchKeysConfig`
- `SortConfig`

AttributeValueSearchConfig

Used for typeahead in search boxes. For example, used in Guided Navigation to narrow down the list of available values for an attribute.

`AttributeValueSearchConfig` has the following properties:

`searchTerm`	String The term to search for in the attribute values.
`maxValuesToReturn`	int (optional) The maximum number of matching values to return. If you do not provide a value, then the default is 10.
`attribute`	String (optional) The attribute key for the attribute in which to search. Use the `attribute` property to search against a single attribute. To search against multiple attributes, use `searchWithin`.
`searchWithin`	List<String> (optional) A list of attributes in which to search for matching values.
`matchMode`	`ALL`|`PARTIAL`|`ANY`|`ALLANY`|`ALLPARTIAL`|`PARTIALMAX`|`BOOLEAN` (optional) The match mode to use for the search.
`relevanceRankingStrategy`	String (optional) The name of the relevance ranking strategy to use during the search.

The following example searches for the term "red" in the WineType attribute values:

```
AttributeValueSearchConfig attributeValueSearchConfig
= new AttributeValueSearchConfig("red", "WineType");
```

BreadcrumbsConfig

Used to return the breadcrumbs associated with the query. Allows you to specify whether to display the full path for hierarchical attribute values.

`BreadcrumbsConfig` has the following property:

`returnFullPath`	boolean (optional) For a hierarchical managed attribute, whether to return the full path to the selected value. The default is `true`, indicating to return the full path. To not return the full path, set this to `false`.

This example returns the breadcrumbs, but does not return the full path for hierarchical managed attributes:

```
BreadcrumbsConfig breadcrumbsConfig = new BreadcrumbsConfig(false);
```

ExposeRefinement

Affects results from a `NavConfig` function. Used to implement Guided Navigation. Controls whether to display available attributes within groups, and whether to display available refinements for attributes.

`ExposeRefinement` has the following properties:

`dimValId`	String The ID of the selected attribute value. You would provide an attribute value ID if you were displaying the next level of available values in a managed attribute hierarchy.
`dimensionId`	String The name of the attribute. You must provide at least one `dimValId` or `dimensionId`.
`ownerId`	String (optional) The ID of the associated `NavConfig` instance. If not provided, then uses the first `NavConfig` instance.
`dimExposed`	boolean (optional) Whether to display the available values for the attribute, to the number specified in `maxRefinements`. The default is `true`.

`exposeAll`	boolean (optional) Whether to display the complete list of available values. For example, on the **Guided Navigation** component, would indicate whether the "More..." link is selected. The default is `false`.
`maxRefinements`	int (optional) The maximum number of available values to display. The default is `1000`.
`groupKey`	String (required) The name of a group.
`groupExposed`	boolean (optional) Whether to display all of the attributes in the specified group. The default is `true`.

The following example shows the available attributes for the Flavors attribute within the Characteristics group.

```
ExposeRefinement exposeRefinement = new ExposeRefinement("/", "Flavors", "Characteristics");
```

LQLQueryConfig

Executes an EQL query on top of the current filter state.

`LQLQuery` has the following property:

`LQLQuery`	AST The EQL query to add. To retrieve the AST from the query string, call `DataSource.parseLQLQuery`.

The following example retrieves the average of the P_Price attribute grouped by Region:

```
Query query
= dataSource.parseLQLQuery("return mystatement as select avg(P_Price) as avgPrice group by Region",
true);
LQLQueryConfig lqlQueryConfig = new LQLQueryConfig(query);
```

NavConfig

Used to retrieve a navigation menu, such as in the Guided Navigation component.

`NavConfig` has the following properties:

`exposeAllRefinements`	boolean Whether to display all of the available values for the attributes. Determines the initial state of the menu. The associated `ExposeRefinement` function is then applied. The default is false.
`List<RefinementGroupConfigs>`	List of groups for which to return the available attributes. If no `RefinementGroupConfigs` are specified, no attribute groups or attributes are returned.

The following examples returns attributes in the Source and Characteristics groups:

```
List<RefinementGroupConfig> refinementGroups = new ArrayList<RefinementGroupConfig>();
RefinementGroupConfig source = new RefinementGroupConfig();
source.setName("Source");
source.setExpose(true);
refinementGroups.add(source);
RefinementGroupConfig characteristics = new RefinementGroupConfig();
characteristics.setName("Characteristics");
characteristics.setExpose(true);
refinementGroups.add(characteristics);
NavConfig navConfig = new NavConfig();
navConfig.setRefinementGroupConfig(refinementGroups);
```

RecordDetailsConfig

Sends an attribute key-value pair to assemble the details for a selected record. The complete set of attribute-value pairs must uniquely identify the record.

`RecordDetailsConfig` has the following property:

`recordSpecs`	List<RecordSpec> Each new `RecordDetailsConfig` is appended to the previous `RecordDetailsConfig`.

The following example sends the value of the P_WineID attribute:

```
List<RecordSpec> recordSpecs = new ArrayList<RecordSpec>();
recordSpecs.add(new RecordSpec("P_WineID", "37509"));
RecordDetailsConfig recordDetailsConfig = new RecordDetailsConfig(recordSpecs);
```

ResultsConfig

Used to manage the returned records. Allows for paging of the records.

`ResultsConfig` has the following properties:

`recordsPerPage`	long The number of records to return at a time.
`offset`	long (optional) The position in the list at which to start. The very first record is at position 0. For example, if `recordsPerPage` is 10, then to get the second page of results, the offset would be 10.
`columns`	String[] (optional) The columns to include in the results. If not specified, then the results include all of the columns.
`numBulkRecords`	int (optional) The number of records to return. Overrides the value of `recordsPerPage`.

The following example returns a selected set of columns for the third page of records, where each page contains 50 records:

```
ResultsConfig resultsConfig = new ResultsConfig();
resultsConfig.setOffset(100);
resultsConfig.setRecordsPerPage(50);
String[] columns = {"Wine_ID", "Name", "Description", "WineType", "Winery", "Vintage"};
resultsConfig.setColumns(columns);
```

ResultsSummaryConfig

Gets the number of records returned from a query.

```
ResultsSummaryConfig resultsSummaryConfig = new ResultsSummaryConfig();
```

SearchAdjustmentsConfig

Returns "Did you mean" and auto-correction items for a search.

```
SearchAdjustmentsConfig searchAdjustmentsConfig = new SearchAdjustmentsConfig();
```

SearchKeysConfig

Returns the list of available search interfaces.

```
SearchKeysConfig searchKeysConfig = new SearchKeysConfig();
```

SortConfig

Used to sort the results of a query. Used in conjunction with `ResultsConfig`.

`SortConfig` has the following properties:

`ownerId`	String (optional) The ID of the `ResultsConfig` that this `SortConfig` applies to. If not provided, uses the default `ResultsConfig` ID. If you configure a different ID, then you must provide a value for `ownerId`.
`property`	String The attribute to use for the sort.
`ascending`	boolean Whether to sort in ascending order. If set to `false`, then the results are sorted in descending order.

For example, with the following `SortConfig`, the results are sorted by the P_Score attribute in descending order:

```
SortConfig sortConfig = new SortConfig("P_Score", false);
```

Creating a custom QueryFunction class

The Component SDK directory includes scripts for creating new `QueryFunction` classes.

Note: Before you can create `QueryFunction` classes, you must install the Component SDK, which is a separate download. See *Downloading and configuring the Component SDK on page 10*.

To create a new `QueryFilter` or `QueryConfig` class:

1. In a terminal window, change to the `endeca-extensions` subdirectory of the Component SDK's root directory (normally called `components`).
2. Run the appropriate command to create the `QueryFilter` or `QueryConfig` class.

   To create a `QueryFilter` class:

On Windows:	`.\create-queryfilter.bat` <*`your-query-filter-name`*>
On Linux:	`./create-queryfilter.sh` <*`your-query-filter-name`*>

   To create a `QueryConfig` class:

On Windows:	`.\create-queryconfig.bat` <*`your-query-config-name`*>
On Linux:	`./create-queryconfig.sh` <*`your-query-config-name`*>

The command creates in the endeca-extensions directory a new directory for the QueryFilter or QueryConfig class:

- For a QueryFilter, the directory is <*your-query-filter-name*>-filter.
- For a QueryConfig, the directory is <*your-query-config-name*>-config.

This directory is an Eclipse project that you can import directly into Eclipse, if you use Eclipse as your IDE.

It contains an empty sample implementation of a QueryFilter or QueryConfig. This has no effect on QueryState in its original form.

The skeleton implementation creates source files that:

- Extend either QueryFilter or QueryConfig.
- Create stubs for the applyToDiscoveryServiceQuery, toString, and beforeQueryStateAdd methods.

  applyToDiscoveryServiceQuery and toString are required methods that you must implement.

  beforeQueryStateAdd is an optional method to verify the query state before the function is added. This method is used to prevent invalid query states such as duplicate refinements.
- Create a no-argument, protected, empty constructor. The protected access modifier is optional, but recommended.
- Create a private member variable for logging.

Implementing a custom QueryFunction class

After you create your new QueryFunction class, you then implement it.

To implement your new QueryFunction, you must:

- Add private filter or configuration properties.
- Create getters and setters for any filter properties you add.
- Define a no-argument constructor (protected access modifier optional, but recommended).
- Optionally, implement the beforeQueryStateAdd(QueryState state) method to check the current query state before the function is added.

Deploying a custom QueryFunction class

Before you can use your new QueryFunction, you must deploy it to Studio.

The directory that you created for the new QueryFilter or QueryConfig contains an ant build file.

The ant deploy task places a .jar file containing the custom QueryFunction into the endeca-portal/tomcat-<version>/lib/ext directory.

Note: If you are not using the default portal bundle, put the new QueryFunction.jar into the container's global classpath.

To deploy the new QueryFunction:

1. Run the ant build.

2. Restart Studio.

   The portal picks up the new class.

After you deploy your custom `QueryFunction`, you can use it in any component.

Adding the custom QueryFunction .jar file to your Eclipse build path

If you are using Eclipse as your IDE, you need to add the new `.jar` file to the build path of your custom component.

To add the new `.jar` file to your Eclipse build path:

1. Right-click the project, then select **Build Path>Configure Build Path**.
2. Click the **Libraries** tab.
3. Click **Add Variable**.
4. Select **DF_GLOBAL_LIB**.

   You should have added this variable when you set up the SDK.
5. Click **Extend**.
6. Open the `ext/` directory.
7. Select the `.jar` file containing your custom `QueryFunction`.
8. Click **OK**.

After adding the `.jar` file to the build path, you can import the class, and use your custom `QueryFilter` or `QueryConfig` to modify your `QueryState`.

Obtaining query results

The `Results` class is used to represent results of queries.

You must add the relevant `QueryConfigs` to a component in order to specify the types of results it needs.

```
QueryState query = getDataSource(request).getQueryState();
query.addFunction(new NavConfig());
QueryResults results = getDataSource(request).execute(query);
```

You can then get the underlying API results and do whatever manipulation is required by your component.

```
Results discoveryResults = results.getDiscoveryServiceResults();
```

Before executing, you can also make other local modifications to your query state by adding filters or configurations to your query:

```
QueryState query = getDataSource(request).getQueryState();
query.addFunction(new ResultsConfig());
query.addFunction(new RecordFilter("Region:Midwest"));
QueryResults results = getDataSource(request).execute(query);
```

When you need to update a data source's state to update all of the associated components, you must use `QueryState` instances.

```
DataSource ds = getDataSource(request);
QueryState query = ds.getQueryState();
query.addOperation(new RecordFilter("Region:Midwest"));
ds.setQueryState(query);
```

Chapter 6

Localizing Studio

Studio is an internationalized application that can be adapted for use in different locales.

Configuring localization for a component

To localize a component, you must specify the supported languages in `portlet.xml`, and then create the resource files for each language.

To set up a component for localization:

1. Update the `portlet.xml` file to specify the locales this component will support.

   The following example enables English and German:

   ```
   <supported-locale>en</supported-locale>
   <supported-locale>de</supported-locale>
   ```

2. Update `portlet.xml` to specify the location of the component's resource bundle. (The resource bundle is the mechanism the Liferay Portal uses to add localized content to a component.)

   For example, to create custom English and German resource files for the Sample Endeca Portlet component, we would include `Resource_en.properties` and `Resource_de.properties` in the component's `com/endeca/portlet/sample/` directory:

   ```
   <resource-bundle>com.endeca.portlet.sample.Resource</resource-bundle>
   ```

3. Create resource bundles for your supported languages in `WEB-INF/src/`*`[path/to/resource/bundle]`*`_[locale].properties`.

   For example, the bundle for English for the Sample Endeca Portlet component would be `WEB-INF/src/com/endeca/portlet/sample/Resource_en.properties`.

For the most part, this is a simple `properties` file with key/value pairs for message IDs and their locale-specific messages.

Note: You may have noticed that the `resource-bundle` attribute is different from the file path you edit messages in. This is because the component build process combines common message strings from shared libraries with your component-specific messages to create the final `com/endeca/Resource_[locale].properties` file in the compiled portlet WAR. For more information, see *How the build process works with resource files on page 32*.

4. Update your component's implementation to use the `LanguageUtils` class to retrieve messages from the resource bundle, instead of hard-coding message strings.

   This should be done for all messages displayed to the user, including form labels, component titles (and other metadata), warning and error messages, edit views, help text, and so on.

   For information on using the `LanguageUtils` class, see *Retrieving all resource bundle messages in one call on page 34*.

Adding strings to your resource files

Your component resource files can include both common and component-specific text.

Including common shared messages

All Studio components tend to include common messages, like those associated with selecting the data source, saving changes, and working with attributes. Your compiled component automatically includes the default localizations for these messages.

These resource files containing these common messages are in the `components\shared\endeca-common-resources` directory.

To change or override these values, include the same keys in your `PluginResource_[locale].properties` file.

If the messages are not included in a component's resource bundle, then Studio uses the hard-coded English defaults from the original files. It does not display an error.

Including the component name, category, and keywords

Resource bundles need to include a handful of component-specific messages to localize a component's name, description, keywords, and category.

To localize the component's metadata, include the following messages:

```
javax.portlet.title=Sample Endeca Portlet
javax.portlet.short-title=Sample Endeca Portlet
javax.portlet.keywords=Sample, Endeca, Portlet
```

Additionally, if your component is displayed in the **Add Component** menu as part of a custom category (or sub-category), you may need to localize the name of the category. For example:

```
<display>
  <category name="my.new.category">
    <category name="my.new.sub-category">
```

```
      <portlet id="portlet_A" />
    </category>
  </category>
</display>
```

To localize the category names, have your component's resource bundle include the following messages:

```
my.new.category=My Category
my.new.sub-category=My Sub-Category
```

All components that declare the same categories should include these messages, since the component container uses the localized messages from the first component that specifies them.

Using tokens in message strings

Message strings can include tokens that are substituted at runtime.

For example, a search breadcrumb may need to display a spelling correction message such as *"No matches found for 'bearign'; showing results for 'bearing'"*. In a `.properties` file, this message would appear with tokens for the two terms, as in the following example:

```
autocorrect-msg=No matches found for \'{0}\'; showing results for \'{1}\'
```

When using the`LanguageUtils` utility to include this message in your component, you pass in a list of parameters to substitute for these tokens. This substitution uses the class `java.text.MessageFormat`. To see the available token substitution options, refer to the javadoc for that class.

Tokens may also do advanced substitution, such as date substitution formatted appropriately for the locale.

Guidelines for working with non-Unicode characters

Because Studio is Java-based, it can only read Unicode or Latin-1 characters. In the case of other characters, you can work around this limitation by converting the native file to ASCII, using a converter such as `native2ascii`, which is freely available as part of the JDK.

Keep in mind the following guidelines:

1. Use UTF-8 as your encoding. Lesser encodings cannot properly represent Japanese characters.
2. Pick a valid character set, such as Shift-JIS or UTF-8/Unicode, and stick with it. You cannot change character sets midstream—if you change character sets, you must re-enter your values.
3. Make sure the character set in your text editor matches the character set in `native2ascii`.

For more information about working with non-Unicode characters, see the Liferay Portal website.

Localizing a component to a non-Unicode language

The following example demonstrates how to localize a component to a double-byte, extended character language.

If you want to use this example as a learning exercise but do not have non-Unicode text of your own to deploy, you can machine-translate your English-language file and use that text in step 5 below.

To localize your portlet to a non-Unicode language (such as Japanese):

1. Within your portlet, create a file `PluginResource_<locale-code>.properties.native` at the appropriate location.

   For example, if you are working with Japanese, the file name would be `PluginResource_ja.properties.native`.

2. Commit both the `.native` and `.properties` file to your portlet.

   The `.properties` file is used by the component, but because that file uses escaped Unicode notation, it is extremely hard for humans to read.

   It is easier to make any necessary changes in the `.native` file.

3. Open the `.native` file in an encoding- and character-set-aware text editor such as Notepad++.

   Make sure the `.native` file uses UTF-8 as its encoding and Shift-JIS as its character set.

4. Copy the contents of the English resource bundle into the `.native` file.

5. Within your text editor, using your translation service, replace the English values with the Japanese values.

6. Save the file.

7. From the command line, run Java's `native2ascii` converter. This tool is typically included in the JDK.

   In the `encoding` argument, specify:

   - Shift_JIS as the character set
   - Your `.native` file as the input
   - Your final `.properties` file as the output

   ```
   native2ascii -encoding Shift_JIS PluginResource_ja.properties.native
   PluginResource_ja.properties
   ```

8. Commit both the `.native` and `.properties` file to your component.

   The `.properties` file is used by the component, but uses escaped Unicode notation, which is hard to read. The `.native` file is easier to modify.

How the build process works with resource files

The build process combines resource files into a single resource file that the component reads messages from.

The build combines:

- The component's `com/endeca/PluginResource_[locale].properties` file, and
- Any file in a shared library's directory that matches `com/endeca/*Resource_[locale].properties`

to create a single `com/endeca/Resource_[locale].properties` file.

The messages from your component's `PluginResource_[locale].properties` appear at the top of the final `Resource_[locale].properties`, so you can easily override any messages from shared libraries.

However, if your component includes more than one shared library, no guarantee can be made about the order in which the resource files from shared libraries will be appended.

Localizing your own shared libraries

If you have included localized messages in your shared libraries, make sure you choose a prefix other than Plugin for the resource file `com/endeca/[prefix]Resource_[locale].properties`.

If you do not, this file will override your component's `com/endeca/PluginResource_[locale].properties` file during the build, and your final `com/endeca/Resource_[locale].properties` will be incorrect.

We recommend that you choose a prefix for your library's resource file that is distinct and similar to your library's name to avoid file name conflicts with components or other shared libraries.

Using the LanguageUtils class to retrieve localized messages

Studio provides the core class `com.endeca.portlet.util.LanguageUtils` to retrieve the localized messages to display on a component. There are several ways to use this class.

Calling static methods from Java

You can access `LanguageUtils` by calling static methods from your Java class.

The following example shows the static use of the `getMessage` methods to retrieve messages (with token substitution in the third line).

```
LanguageUtils.getMessage(request, "reset");
LanguageUtils.getMessage(request, "num-records");
LanguageUtils.getMessage(request, "search-for", new String[]{ "American" });
```

A number of convenience method signatures are provided, allowing the user to specify the component request and message ID, and optionally to include parameters for token substitution and a default string.

The default string may be useful for shared localized messages, allowing components to function with a default (un-localized) message if the localized message is not retrieved from the resource bundle.

All method signatures require specifying the `PortletRequest`.

Using the Discovery taglib in JSP

The Discovery `taglib` provides a tag for retrieving localized messages. This is the recommended way to retrieve localized messages in JSPs.

The following is an example using the `taglib`:

```
<%@ taglib uri='http://endeca.com/discovery' prefix="edisc"%>
<edisc:getMessage messageName="no-matching-values"/>

<edisc:getMessage messageName="message-with-params">
    <edisc:param value="test" />
</edisc:getMessage>
```

Using the LanguageUtils class from JSP

You can access `LanguageUtils` to retrieve localized messages in JSP pages.

This is similar to accessing `LanguageUtils` from Java.

```
<%@ page import="com.endeca.portlet.util.LanguageUtils" />
<portlet:defineObjects />
<%= LanguageUtils.getMessage(renderRequest, "reset") %>
```

Instantiating the object and call instance methods from Java/JSP

You can instantiate the `LanguageUtils` object and call methods from Java/JSP.

This approach provides the same convenience methods as the static approach, but simplifies the method signatures by removing the need to specify the request on every call.

This may be useful for developers who make many calls for localized strings and would prefer to instantiate the object once and simplify the subsequent method calls.

```
<%@ page import="com.endeca.portlet.util.LanguageUtils" %>
<%
LanguageUtils lang = new LanguageUtils(renderRequest);
%>
<%= lang.getMessage("reset") %>
<%= lang.getMessage("num-records", "Num records:") %>
<%= lang.getMessage("search-for", "Search for \"{0}\"", new String[]{ "American" }) %>
```

Retrieving all resource bundle messages in one call

You can retrieve all of the messages at once using a single call from Java/JSP.

This approach may improve performance in components that require frequent access to the resource bundle. The message retrieval is consolidated to a single call. The rest of the page then makes lookups into the loaded map.

```
<%@ page import="com.endeca.portlet.util.LanguageUtils" %>
<%@ page import="java.util.Map" %>
<%
Map<String, String> messages = LanguageUtils.getAllPortletMessages(renderRequest);
%>
<%= messages.get("reset") %>
<%= messages.get("num-records") %>
<%= LanguageUtils.replaceMessageTokens(messages.get("search-for"), new String[]{ "American" }) %>
```

Adding a translation to a released component

In this scenario, the component's English-language message strings have been externalized into the portlet WAR file's resource bundle. These strings can be translated to the target language and then made available to Studio.

This procedure can be followed whether you want to translate the content yourself or obtain the translation from a third party.

To add translated message strings to a released component:

1. Unzip the `.war` file of the localized component you want to modify.
2. Edit its `portlet.xml` file to enable the additional locale you want to support.

   For example, to add French, include `<supported-locale>fr</supported-locale>`.
3. In `WEB-INF/classes/com/endeca/` (or other location, based on your component's class structure), generate a `Resource_[locale].properties` file for the new language.

   This file should contain target-language values of the properties used in the component.

   To see the supported properties, refer to the `WEB-INF/classes/com/endeca/Resource_en.properties` file already in the component.

   Your file should contain a version of each of those messages in your target language.
4. Re-zip the `.war` file of the component and place it in the `endeca-portal/deploy` directory.

   Liferay hot-deploys the component.
5. Repeat steps 1 through 4 for each component you want to enable for your target language.
6. Start Studio, then add your components, as well as the **Language** component, to the page.
7. In the **Language** component, click the flag associated with your target language.

   Studio displays the component messages from your resource bundle in your target language.

   In addition, because the portal itself is also localized, menus and other portal controls also appear in your target language.
8. In the **Language** component, to switch back to English, click the United States flag.

Switching the locale of a component

Studio includes resources that you can use to switch a component's locale.

The **Language** component can be used to change the locale of a portlet.

There are also controls available in the **Display Settings** section of Liferay's **Control Panel** (as well as configuration properties in the `portal.properties` file) for setting the default container locale and the available locales.

For full details on using these Liferay features, see the *Liferay Portal documentation*.

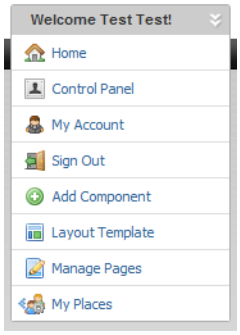
Adding the Language component to your Studio application

The **Language** component is the recommended method for selecting a different language in which to display Studio.

To add the **Language** component and select a different language:

1. Point the cursor at the Dock in the upper-right corner of the page.

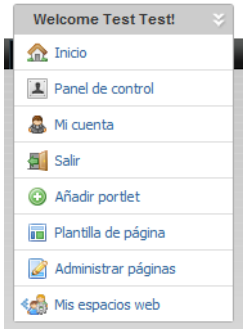
The Dock is labeled "Welcome *<user name>*!"



2. In the drop-down menu, select **Add Component**.
3. In the **Add Component** dialog, expand the **Tools** category.
4. From the **Tools** category, either drag the **Language** component to the page, or click the component's **Add** link.
5. To select a language, click the corresponding flag.

The application switches to that language, replacing English with the target language.

For example, after clicking the Spanish flag, the Dock menu looks like:



Obtaining more information about portal localization

For information about editing `Language_<langcode>.properties`, see the *Liferay Portal Administrator's Guide*.

For extensive documentation on Liferay language display customization, see this *wiki page*.

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