Building a Common Navigator Framework (CNF) Viewer Part I: Defining the View Part

IMAGINATION IS THE BEGINNING OF CREATION. YOU IMAGINE WHAT YOU DESIRE, YOU WILL WHAT YOU IMAGINE AND AT LAST YOU CREATE WHAT YOU WILL.
-- GEORGE BERNARD SHAW

I've started fielding questions about the Common Navigator on the eclipse.platform newsgroup and the message from the community is resoundingly that there are not enough examples. In order to help the community adopt the Common Navigator framework, I'm going to be fleshing out some examples (in the Eclipse repo at dev.eclipse.org:/home/eclipse, where you can login as "anonymous"; see the wiki for more information. I will be documenting these examples here in this blog. Eventually I will intgrate the documentation that evolves here back into the Platform SDK, but I want a forum where potential consumers can provide feedback easily and directly to the distribution media (e.g. this blog).

Specific documentation on the extension points and API is available in the Eclipse Platform Help (*Help > Help Content*) under the *Platform Plug-in Developer's Guide > Reference > API Reference* | *Extension Points Reference*. The relevant extension points are **org.eclipse.ui.navigator.viewer** and **org.eclipse.ui.navigator.navigatorContent**. The relevant API packages are **org.eclipse.ui.navigator**. If you'd like more details on the specifics mentioned in this post, please follow up with these references.

So where to begin? First we're going to configure our plugin that will contain the viewer to add **org.eclipse.ui.navigator** to its dependencies. Then we're going to define a view part using the **org.eclipse.ui.views** extension point and specify the **org.eclipse.ui.navigator.CommonNavigator** class as our view part implementation, which will provide a cradle for our viewer. Then we will define a **org.eclipse.ui.navigator.viewer** extension to configure the viewer as a Common Navigator. Finally, we can define **org.eclipse.ui.navigator.navigatorContent** extensions along with *bindings* (***org.eclipse.ui.navigator.viewer/viewerContentBinding***) to associate extensions with our viewer.

You don't have to use **org.eclipse.ui.navigator.CommonNavigator** in order to take advantage of the framework; you could embed content using the **org.eclipse.ui.navigator.INavigatorContentService** virtually anywhere from dialogs to editors or define your own viewer and view part class, but for this example, we're going to stick to the basics.

Basic Setup

The Common Navigator Framework is a feature that is new to Eclipse 3.2. Therefore, you must have an update to Eclipse 3.2 environment installed. The topic of this post will not get into setting up Eclipse for self-hosting development. I assume that you have Eclipse 3.2 setup and are either self-hosting against a target of your own choice or the default.

Before we do anything, we need to make sure that we have our plugin configured with the necessary dependencies. Either create a new Plugin (*File> New> Project: Plug-in Development> Plug-in Project: Set the name and accept the defaults*), or open up the Plug-in Manfiest Editor (select the "plugin.xml" file in your viewer of choice (Project Explorer, Package Explorer, Navigator, etc) and double-click or right-click and select *Open With> Plug-in Manifest Editor*. On the *Dependencies* tab, click *Add...* and begin typing **org.eclipse.ui.navigator** and select it when it is highlighted or when you see it in the list.

Now select the *Extensions* tab of the editor.

Defining the View Part

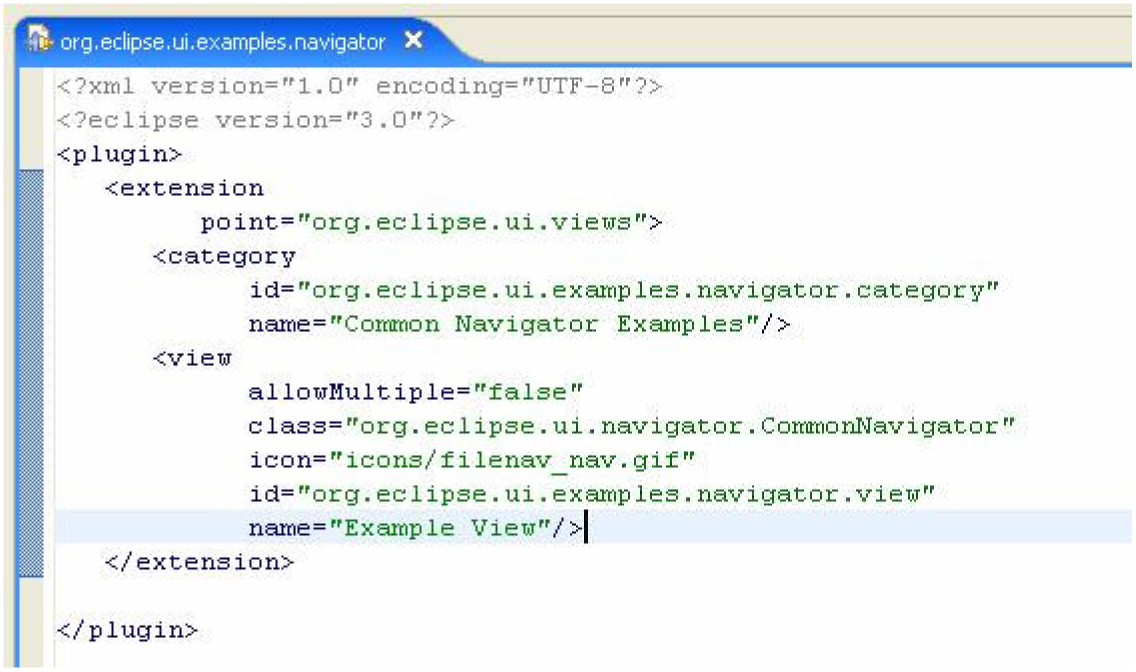
When defining a Common Navigator enabled viewer, you must declare the actual view part. A view part is the container for our viewer; it has a tab handle with a label, a place for a view menu (the little triangle in the top right corner of the view part), and can contain any widget that we need to display to the end user. Eclipse view parts are defined by the **org.eclipse.ui.views** extension point. View parts are not specific to Common Navigator Framework viewers, we just need a cradle to hold our viewer.

You can define the view through the *Extensions* tab by selecting *Add...* and begin typing **org.eclipse.ui.views** until you see it in the list. Then right-click on the entry that is created under the "All Extensions" tree named **org.eclipse.ui.views** and choose *New > view*. This will create the element in the plugin.xml file.

When you select the view element, the available attributes for the element should appear as editable textboxes and widgets on the right. We are going to enter the following values (without the quotes):

id: "org.eclipse.ui.examples.navigator.view"
name: "Example View"
class: "org.eclipse.ui.navigator.CommonNavigator"
icon: "icons/filenav_nav.gif" (or your own)
allowMultiple: false

Now select the "plugin.xml" tab of the editor. You should see something like the following. You can choose to create a category as in the diagram, but be sure to indicate which category your viewer should be associated with by specifying the "category" attribute of the viewer. Otherwise, your viewer will appear in the *Other* category of the *Show View* dialog (*Window > Show View > Other...*).



```xml
<?xml version="1.0" encoding="UTF-8"?>
<?eclipse version="3.0"?>
<plugin>
   <extension
         point="org.eclipse.ui.views">
      <category
            id="org.eclipse.ui.examples.navigator.category"
            name="Common Navigator Examples"/>
      <view
            allowMultiple="false"
            class="org.eclipse.ui.navigator.CommonNavigator"
            icon="icons/filenav_nav.gif"
            id="org.eclipse.ui.examples.navigator.view"
            name="Example View"/>
   </extension>

</plugin>
```

Defining the viewer configuration

Once we define the view part, we need to define a configuration extension for our view part (**org.eclipse.ui.navigator.viewer**) which will tell the framework some basic things like which view part is a Common Navigator, what the structure of the popup menu should be, and whether to respect object contributions, in addition to properties that influence the default behavior of the viewer.

Open the *Extensions* tab again on the editor and click *Add...*; when the dialog appears begin typing **org.eclipse.ui.navigator.viewer** until you see it in the list and then select it. Right-click on the new **org.eclipse.ui.navigator.viewer** element in the "All Extensions" tree and choose *New > viewer*. The element will allow us to associate an abstract Common Navigator viewer with a specific view part. The abstract viewer is what extensions are associated with, regardless of whether the viewer is embedded in a view part or elsewhere. So for this example, we'll use the id we used above in our **org.eclipse.ui.views** extension ("org.eclipse.ui.examples.navigator.view"). Select the element in the view (which will be labeled *name-of-your-plugin.viewer* by default) and change the *viewerId* in the text box that appears on the right to "org.eclipse.ui.examples.navigator.view" without the quotes.

Some comments on popup menus. The Common Navigator framework has two means to allow viewers to customize their menus. The first way to configure the popup menu is to specify the *popupMenuId* of *viewer* to accept the default separators and group marker ids for the menu. The default values are documented under the **org.eclipse.ui.navigator.viewer** extension point, but are reproduced below for convenience. Alternatively, you could choose not to specify a *popupMenuId* and instead specify a <popupmenu /> element as a child of the <viewer /> element. Here, you may define your own separator and group markers for your downstream clients to add to. If you expect to *bind* the content or actions of the content extensions provided by the Platform (Resource, Java^{tm}), then it is recommended that you use the default groupings.

"group.new" separator="true"

"group.goto"

"group.open" separator="true"

"group.openWith"

"group.edit" separator="true"

"group.show" separator="true"

"group.reorganize"

"group.port"

"group.generate" separator="true"

"group.search" separator="true"

"group.build" separator="true"

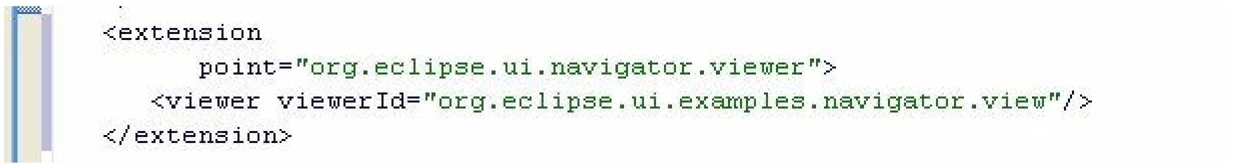
"additions" separator="true"

"group.properties" separator="true"

Some comments on options. The < options /> element under the <viewer /> element allows you to specify String-based name=value pairs. There are a few options used by the base framework (documented in the Examples section of

org.eclipse.ui.navigator.viewer), but the mechanism can be used by your own viewers or extensions to provide extra configuration to extensions *bound* to the viewer. See **org.eclipse.ui.navigator.INavigatorViewerDescriptor** for the API to read the properties specified in a <viewer />element. You can get to the viewer descriptor via the **org.eclipse.ui.navigator.INavigatorContentService** of a Common Navigator viewer.

Once you have set the *viewerId*, you can select the "plugin.xml" tab to see the following element defined.

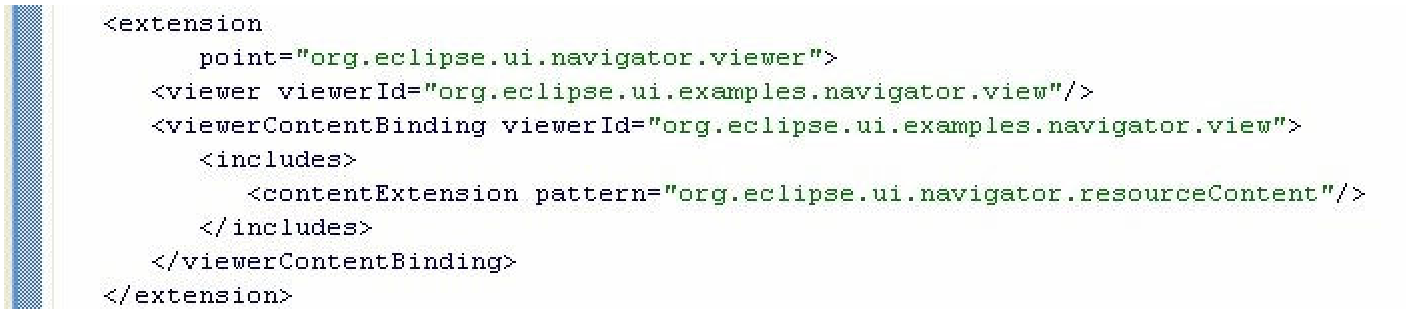


```
<extension
      point="org.eclipse.ui.navigator.viewer">
   <viewer viewerId="org.eclipse.ui.examples.navigator.view"/>
</extension>
```

After defining the viewer, we will need to add content extensions and *bind* them to the viewer. I'll cover this in more detail in the next post. For the example we'll simply *bind* the default resource content (defined by the **org.eclipse.ui.navigator.resources** plugin) to our viewer.

Go back to the *Extensions* tab, right-click on the **org.eclipse.ui.navigator.viewer** extension and choose *New > viewerContentBinding*. Select the *viewerContentBinding* element and set the *viewerId* to the id we are using for our example viewer ("org.eclipse.ui.navigator.examples.view").
Right-click on the new *viewerContentBinding* element, and choose *New > includes*.
Finally, right-click on the new *includes* element
and choose *New > contentExtension.* For the *pattern* attribute of the *contentExtension* we will specify "org.eclipse.ui.navigator.resourceContent" without the quotes, which is the identifier used by the **org.eclipse.ui.navigator.resources** plugin to identify the Resource extension.

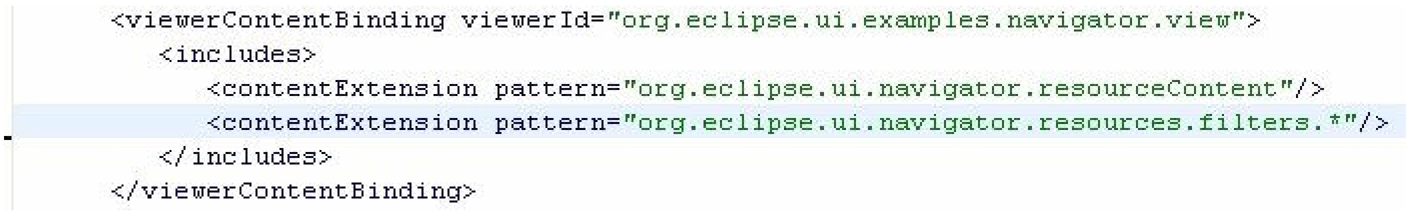
On the "plugin.xml" tab, we should have something like the following:



```
<extension
      point="org.eclipse.ui.navigator.viewer">
   <viewer viewerId="org.eclipse.ui.examples.navigator.view"/>
   <viewerContentBinding viewerId="org.eclipse.ui.examples.navigator.view">
      <includes>
         <contentExtension pattern="org.eclipse.ui.navigator.resourceContent"/>
      </includes>
   </viewerContentBinding>
</extension>
```

You may now launch the workbench (*Run...* > New Eclipse Application) to see the viewer in action. We haven't bound any actions to it yet, so you'll need to use either the Resource Navigator or the Package Explorer to create projects that you can see in the viewer. We'll add Resource actions and filters next, but for now, take notice of the default behavior associated with the viewer. The Collapse All button, the Link with Editor button, the Filters button (along with a Filters ("Available Filters") tab and an Extensions ("Available Content") tab.

To *bind* the resource filters, we need to add another *contentExtension* element to our *includes*. Specify "**org.eclipse.ui.navigator.resources.filters.***" as the identifier. This will pick up all resource filters defined by **org.eclipse.ui.navigator.resources**. Alternatively, you could select the individual filters you want by look at the plugin.xml file of that plugin and picking out the identifiers.

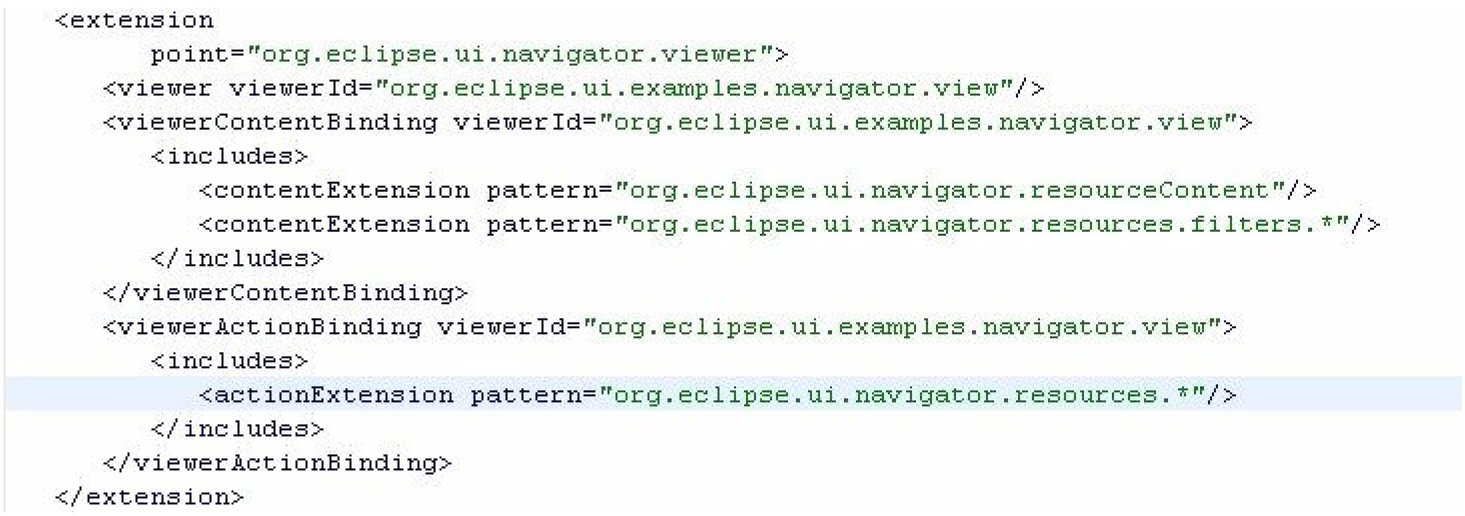


```
<viewerContentBinding viewerId="org.eclipse.ui.examples.navigator.view">
   <includes>
      <contentExtension pattern="org.eclipse.ui.navigator.resourceContent"/>
      <contentExtension pattern="org.eclipse.ui.navigator.resources.filters.*"/>
   </includes>
</viewerContentBinding>
```

Select *Run...* again and verify that you now have several resource filters in your "Available Filters" tab of the Filters dialog.

Next we'll *bind* the default resource actions. To *bind* actions, we need to add a *viewerActionBinding* to the root of our extension point. Right-clikck **org.eclipse.ui.navigator.viewer** and select *New* > *viewerActionBinding*. Make sure the *viewerId* is the correct, and then add an *includes* element that has a *actionExtension* element. For the *pattern* attribute, specify "**org.eclipse.ui.navigator.resources.***". Now when you *Run...* the workbench, you'll see *New*, *Import*, *Export*, and *Refresh* by default in the empty viewer, and other actions approximating the Resource Navigator when you select elements in the viewer.

Your plugin.xml at this point should look like:



```xml
<extension
      point="org.eclipse.ui.navigator.viewer">
   <viewer viewerId="org.eclipse.ui.examples.navigator.view"/>
   <viewerContentBinding viewerId="org.eclipse.ui.examples.navigator.view">
      <includes>
         <contentExtension pattern="org.eclipse.ui.navigator.resourceContent"/>
         <contentExtension pattern="org.eclipse.ui.navigator.resources.filters.*"/>
      </includes>
   </viewerContentBinding>
   <viewerActionBinding viewerId="org.eclipse.ui.examples.navigator.view">
      <includes>
         <actionExtension pattern="org.eclipse.ui.navigator.resources.*"/>
      </includes>
   </viewerActionBinding>
</extension>
```

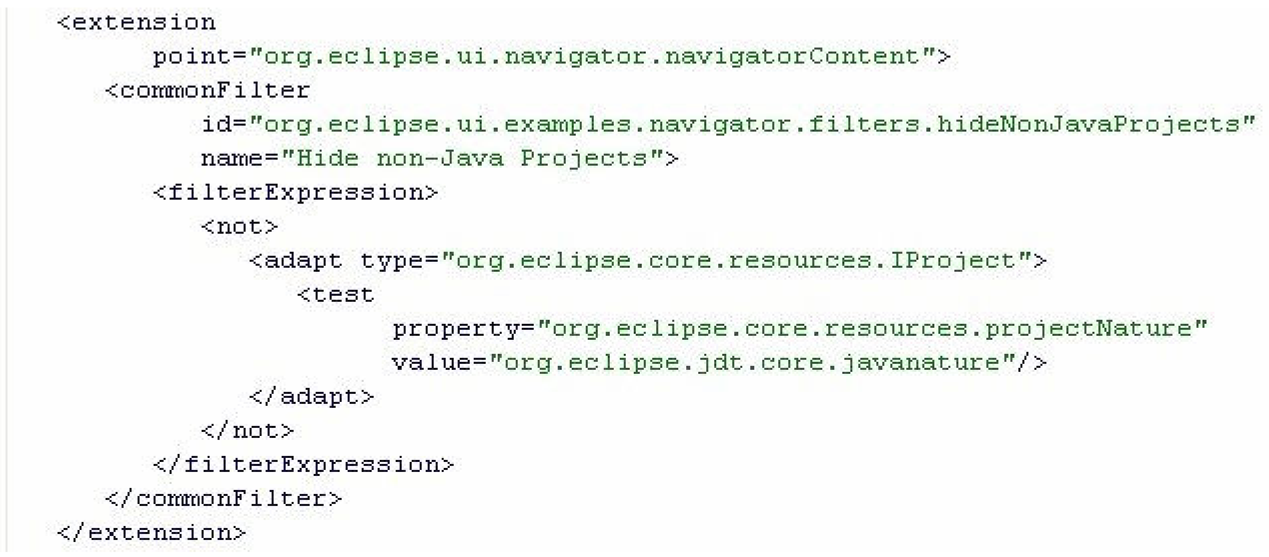
"How does he know all the right ids? This is a little too "magic number for me!" To locate the identifiers of content extensions you would like to *bind* to your viewer, you can peruse the plugin.xml files of plugins that define the extensions. You can use the *Plug-ins* view to make this easier (*Window > Show View > Other...: PDE > Plug-ins*) or you can open the plugin.xml file of **org.eclipse.ui.navigator.navigatorContent** (using the *Plug-ins* view, even) and on the *Extension Points* tab, select *navigatorContent*. Then click *Find References* to locate all extensions in your workspace that define content or action extensions you might want to use in your own viewer. Content extensions are defined by the **navigatorContent** element, so use the *id* attribute of **navigatorContent** extensions you would like to *bind* when you define *contentExtension* elements under *viewerContentBinding*s for your viewer. Action extensions are defined by the **actionProvider** element, so use the *id* attribute of the **actionProvider** extensions you would lik to *bind* when you define *actionExtension* elements under *viewerActionBindings*

for your viewer. Keep in mind that **actionProvider** that are nested under **navigatorContent** extensions are automatically *bound* when their enclosing content extension is *bound* to a viewer.

Defining Filters

The last thing we are going to do today is define a filter for our viewer using Eclipse Core Expressions. Documentation on the Core Expressions framework is available with the **org.eclipse.core.expressions** plugin. We are going to use the property testers defined by **org.eclipse.core.resources** to test for a specific project nature, and hide all projects which do not have this project nature.

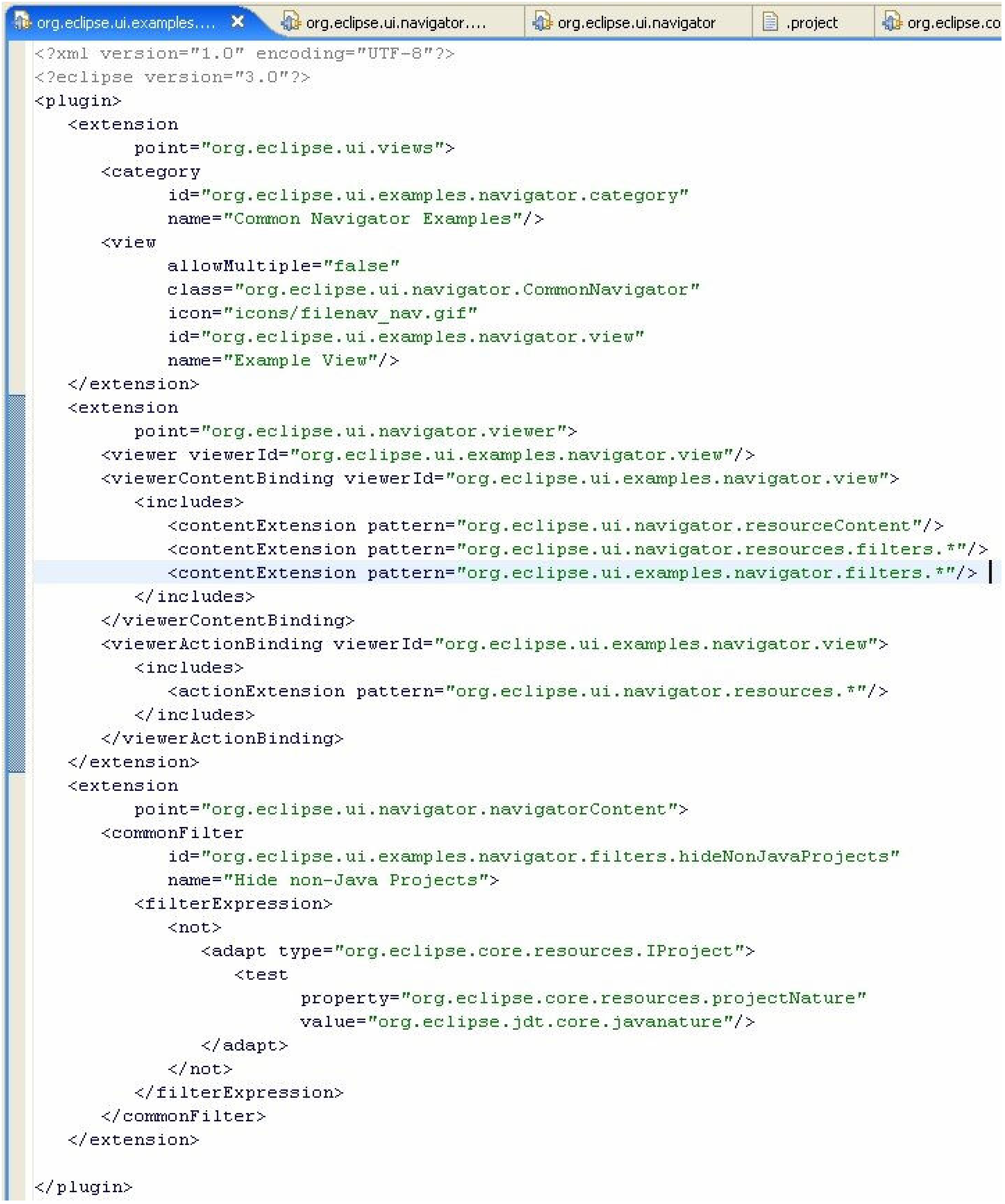
So back on the *Extensions* tab of the *Plug-in Manifest Editor*, select *Add...* and choose **org.eclipse.ui.navigator.navigatorContent**. Then add a new *commonFilter* element to this extension (same as before: right-click on the **org.eclipse.ui.navigator.navigatorContent** element, choose *New* > *commonFilter*). Change the suggested *id* to "org.eclipse.ui.examples.navigator.filters.hideNonJavaProjects", and change the name to "Hide non-Java projects". Instead of specifying a class implementation, we are just going to define the expression in terms of XML. Right-click on the *commonFilter* element and select *New* > *filterExpression*. From here, we can continue using the right click menu to create an expression like the following:



```
<extension
      point="org.eclipse.ui.navigator.navigatorContent">
   <commonFilter
         id="org.eclipse.ui.examples.navigator.filters.hideNonJavaProjects"
         name="Hide non-Java Projects">
      <filterExpression>
         <not>
            <adapt type="org.eclipse.core.resources.IProject">
               <test
                     property="org.eclipse.core.resources.projectNature"
                     value="org.eclipse.jdt.core.javanature"/>
            </adapt>
         </not>
      </filterExpression>
   </commonFilter>
</extension>
```

You can also set the *activeByDefault* attribute in the extension to determine whether the filter is active in the default configuration.

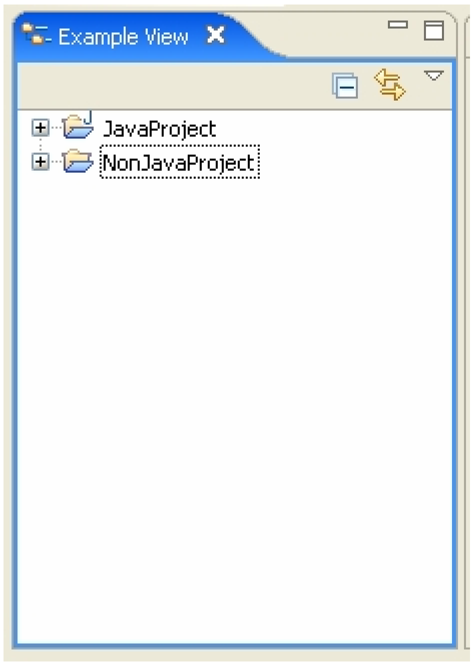
Finally, we need to define a *contentExtension* as part of our *viewerContentBinding* for this viewer. Be sure to use the *id* of our new filter, or a generic pattern (like "**org.eclipse.ui.examples.navigator.filters.***") to *bind* this filter and all future filters that we (or our downstream contributions) define that match this id. Your final plugin.xml should look like the
following:



```xml
<?xml version="1.0" encoding="UTF-8"?>
<?eclipse version="3.0"?>
<plugin>
   <extension
         point="org.eclipse.ui.views">
      <category
            id="org.eclipse.ui.examples.navigator.category"
            name="Common Navigator Examples"/>
      <view
            allowMultiple="false"
            class="org.eclipse.ui.navigator.CommonNavigator"
            icon="icons/filenav_nav.gif"
            id="org.eclipse.ui.examples.navigator.view"
            name="Example View"/>
   </extension>
   <extension
         point="org.eclipse.ui.navigator.viewer">
      <viewer viewerId="org.eclipse.ui.examples.navigator.view"/>
      <viewerContentBinding viewerId="org.eclipse.ui.examples.navigator.view">
         <includes>
            <contentExtension pattern="org.eclipse.ui.navigator.resourceContent"/>
            <contentExtension pattern="org.eclipse.ui.navigator.resources.filters.*"/>
            <contentExtension pattern="org.eclipse.ui.examples.navigator.filters.*"/>
         </includes>
      </viewerContentBinding>
      <viewerActionBinding viewerId="org.eclipse.ui.examples.navigator.view">
         <includes>
            <actionExtension pattern="org.eclipse.ui.navigator.resources.*"/>
         </includes>
      </viewerActionBinding>
   </extension>
   <extension
         point="org.eclipse.ui.navigator.navigatorContent">
      <commonFilter
            id="org.eclipse.ui.examples.navigator.filters.hideNonJavaProjects"
            name="Hide non-Java Projects">
         <filterExpression>
            <not>
               <adapt type="org.eclipse.core.resources.IProject">
                  <test
                        property="org.eclipse.core.resources.projectNature"
                        value="org.eclipse.jdt.core.javanature"/>
               </adapt>
            </not>
         </filterExpression>
      </commonFilter>
   </extension>

</plugin>
```

Now *Run...* the workbench one last time. Create a few Simple projects and a few Java Projects. When the "Hide non-Java Projects" filter is enabled, the Simple projects should disappear from the view.



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Michael has been a Java developer since 1999 and currently contributes to Eclipse in open source and commercial venues. Most recently, Michael has contributed the Common Navigator Framework (CNF) to Eclipse 3.2. Prior to that, he helped design several of the frameworks and API in the Web Tools Platform (WTP), and continues to contribute fixes to WTP through the open source process. Michael is currently part of the Services Oriented Architectures (SOA) Tools Team for IBM Rational® based in Research Triangle Park, NC.