Escenic Content Studio

Plug-in Guide

5.6.13.183224

escenic

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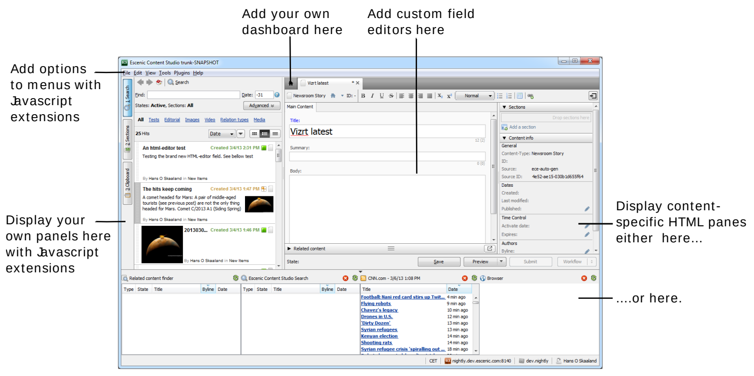
Table of Contents

1 Introduction

This manual describes the various methods you can use to customize and extend Escenic Content Studio. Using the methods described here you can:

- Add options to Content Studio menus.
- Display notification messages.
- Create custom side panels to be displayed in the same area as the **Search**, **Sections** and **Clipboard** panels.
- Create custom editors for selected content item fields.
- Use collection fields to access content published via Atom feeds.
- Create a customized dashboard or home tab (displayed in the same area as the Content Studio editors).
- Create content-specific panes to be displayed either in the attributes panel of content editors or in research panels.


Add your own dashboard here
Add custom field editors here
Add options to menus with Javascript extensions
Display your own panels here with Javascript extensions
Display content-specific HTML panes either here...
....or here.

There are basically four different recommended customization methods:

Javascript extensions

With Javascript extensions you can:

- Add options to Content Studio menus.
- Display notification messages.
- Create custom side panels to be displayed in the same area as the **Search**, **Sections** and **Clipboard** panels.

For a description of how to create Javascript extensions, see chapter 2.

Custom field editors

A custom field editor replaces a standard content editor field with an HTML pane. Within the pane you can use HTML and Javascript to:

- Display the current field value
- Display UI components for modifying the field value

For a description of how to create custom field editors, see chapter 3.

Link header plug-ins

A link header plug-in lets you display an HTML page containing information related to the currently-selected content item. A very simple example of such a page would be a preview of the content item. The page can either be displayed in a pane of the content editor's attributes panel or at the bottom of the Content Studio window in a research pane.

For a description of how to create link header plug-ins, see chapter 4.

Custom dashboard

Content Studio permanently displays a dashboard in the main area used for displaying editors. The dashboard is visible whenever no editors are open but can also be displayed at any time by clicking on its tab, in the same way as any of the editors displayed in the area. The delivered system includes a default dashboard, but you can replace this with your own content.

For a description of how to do this, see chapter 5.

Two older, Java-based extension methods (Java plug-ins and custom property editors) are also described in this manual. **These extensions methods are now deprecated, and you should not use them for new development work.**

2 Javascript Extensions

Development using the Javascript API is very straightforward. You can develop extensions locally on your own computer and test them in Content Studio without affecting other users in any way. Once you are satisfied with an extension, deployment is simply a matter of copying it to the correct location on the server. Content Studio also has a Javascript console: any code you enter in this console is executed immediately. You can use the console both as a quick means of trying out code and as a means of examining the system state for debugging purposes.

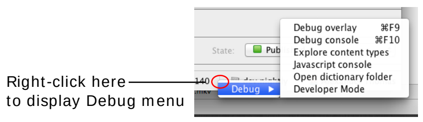
The Content Studio Javascript environment consists of:

- The Javascript language itself
- A number of standard general-purpose Javascript libraries for purposes such as string handling, maths, XML manipulation, regular expressions and so on
- Content Studio-specific objects that provide access to the Content Studio object model

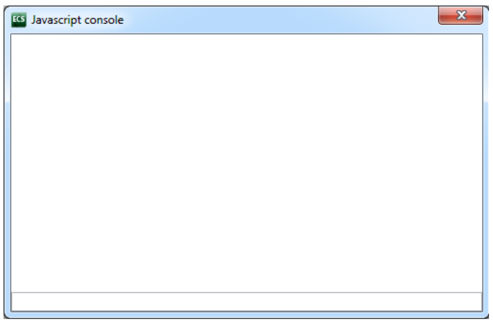
2.1 Hello World

To get an idea of how easy it can be to extend Content Studio using the Javascript API:

1. Start Content Studio in the usual way.
2. - On Windows, select **View** from the menu bar **while holding down the `Ctrl` key**. An extra **Debug** option should be displayed at the bottom of the **View** menu.
   - On Macs, right click between the Content Engine address field and the publication name field in the Content Studio footer:



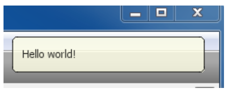
3. Select **Debug** > **Javascript console**. A dialog containing a Javascript console is now displayed:



4. Enter the following Javascript statement in the Javascript console:

```
require('notifier').notify('Hello world!');
```

and press **Enter**. A message bubble containing your "Hello world!" message should immediately appear near the top right corner of the Content Studio window, and disappear after a few seconds:


Hello world!

The **require** function used in this one-line "Hello World" program asks Content Studio to create an object - in this case a **notifier** object that can be used to display notification messages. Usually, of course, you would assign the object to a variable so you can use it more than once. Try entering the following three lines in the console:

```
no = require('notifier');
no.notify('Hello again world!');
no.notify('Goodbye world!');
```

2.2 Requiring Objects

You can use the **require** function to get various objects from Content Studio:

notifier
You can use this object to display notification messages in Content Studio (see section 2.1).

actions
You can use this object to create your own menu items and shortcuts, which you can then add to Content Studio menus.

content-studio
This object represents the whole Content Studio application and you can use it to:

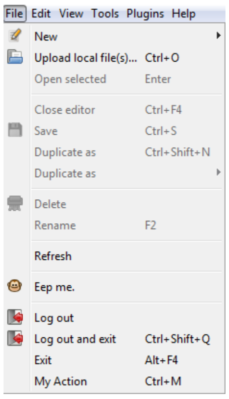
- Open and close content editors.
- Create and display your own side panels (which appear in the same area as the **Sections**, **Search** and **Clipboard** panels).
- Open external browser windows.
- Listen for various events and do something when they occur.

Using the actions object

Try this:

```
actions = require('actions');
myaction = actions.createAction('My Action', 'shortcut M');
actions.addAction(myaction, 'file');
```

Now look at the **File** menu. Your action should appear at the bottom of the menu:



The **`Action`** object you have created also has methods - you can, for example, enable and disable the menu option using its **`enabled`** method:

```
myaction.enabled(false);
```

The menu entry should now be disabled. To re-enable it, enter:

```
myaction.enabled(true);
```

Using the content-studio object

You can get access to the **`content-studio`** object and use its methods in just the same way. This code, for example, opens your default browser and displays a web page:

```
cs = require('content-studio');
cs.browse('http://www.vizrt.com');
```

Displaying side panels

You can create and display your own side panels in the same area as the built-in **Sections**, **Search** and **Clipboard** panels. This is slightly more complicated. The following code, for example, creates a browser panel in which it is possible to display user interface components defined with HTML and Javascript.

```
var cs = require('content-studio');
var mypanel = 'http://example.com/studio/sidepanel/test';
var browserui;

cs.on('panel-init', function(panelcontrol) {
  if (panelcontrol.uri == mypanel) {
    browserui = panelcontrol.show('browser');
  }
});

cs.createPanel(mypanel, '&Test', 'shift F9');
browserui.uri = "/webservice-extensions/test/index.html";
```

In this example, **`cs.createPanel()`** creates a new panel called **Test** that can be identified by the URI **`http://example.com/studio/sidepanel/test`**. The panel is represented by a **`PanelControl`** object and when it is created, **`cs`** emits a **`panel-init`** event. This causes the function registered with the **`cs.on()`** call to be executed. This event function checks which panel control has been created and executes an appropriate action - in this case calling the panel control's **`show()`** method to initialize a browser user interface component inside the panel.

You can then use this browser user interface component by setting its **`uri`** property to point to an HTML file you have created. The content of this HTML file is then displayed in the panel.

For more information about how to create a browser UI component, see section 2.7. For information about the **`on()`** method and event handling, see section 2.3.

> Note that the URI **`http://example.com/studio/sidepanel/test`** in the above example does not refer to any pre-existing resource - it is simply an identifier for the panel you are creating. You can make up any identifier string you want as long as it is a syntactically valid URI.

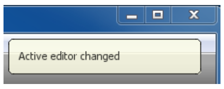
2.3 Handling Events

Content Studio, like most GUI-based applications is **event-based**: once it has been started, it listens for **events** such as user mouse clicks and responds to them. Your extensions need to work in the same way, and the objects in the Javascript API provide ways of both emitting and listening for events.

To listen for and respond to events, you use an object's **`on`** method. The **`content-studio`** object, for example, has an **`on`** method that you can use to listen for various events. Every time the user opens a new editor or switches between editors by clicking on one of the editor tabs, an **`editor-active`** event is emitted. The **`on`** method lets you add a **listener** that associates a function with this event, so that every time an editor is activated, your function is executed. Try entering this code in the console:

```
no = require('notifier');
cs = require('content-studio');
cs.on('editor-active', function(editorcontrol) {no.notify('Active editor changed');});
```

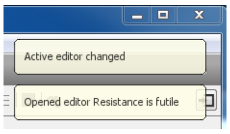
Now try opening a new editor or clicking on a editor tab to change the active editor. The notification message "Active editor changed" should appear in the top right corner of the window:


Active editor changed

The **`editor-active`** event contains a parameter that the listener passes to the associated function. This parameter, **`editorcontrol`**, is an object representing the editor that has become active. You can access event parameters from inside listener functions. In this case you could use the **`editorcontrol`** object's **`displayName`** property to make a more informative message:

```
cs.on('editor-active', function(editorcontrol) {no.notify('Opened editor ' +
 editorcontrol.displayName);});
```

More than one function can be associated with the same event. You have now associated two functions with the **`editor-active`** event, so if you click on an editor tab they will both be executed and you will see two messages displayed:


Active editor changed

Opened editor Resistance is futile

You can clear all the functions associated with an event by calling the **`removeAllListeners`** method:

```
cs.removeAllListeners('editor-active');
```

No messages will be displayed if you click on an editor tab now.

The **`content-studio`** object can also emit other events:

- **`editor-inactive`**
- **`panel-init`**
- **`panel-destroy`**
- **`panel-show`**
- **`panel-hide`**
- **`drop-listen`**

For information about these events, see the **Content Studio Javascript API Reference** on documentation.vizrt.com.

Other objects that emit events (and therefore have **`on`** methods) include:

`Action` objects

An **`Action`** object emits an **`action`** event whenever the Content Studio user either clicks on its menu item or presses its keyboard shortcut. The **`action`** event has no parameters. You can therefore make a "Click me" menu item as follows:

```
no = require('notifier');
actions = require('actions');
myaction = actions.createAction('Click me', 'shortcut C');
myaction.on('action', function() {no.notify('I got clicked!');});
actions.addAction(myaction, 'file');
```

If you now click on **File** > **Click me**, you will see the notification message "I got clicked!".

`EventEmitter` objects

When you create a Content Studio side panel, an **`EventEmitter`** object is returned. This object emits an **`action`** event whenever the Content Studio user clicks inside the panel. For more information about this object, see the **Content Studio Javascript API Reference** on documentation.vizrt.com.

2.4 Making a Development Environment

The Javascript console is very useful for testing code and getting instant feedback, but for development purposes you need to be able to store your code somewhere and load your stored code into Content Studio. To set up a development environment on your computer:

1. Create a folder for your Content Studio extensions somewhere on your computer (for example **`C:\Users\`***your-name***`\cs-extensions`**).
2. Create one sub-folder for each extension you want to create (for example **`C:\Users\`***your-name***`\cs-extensions\hello-world`**).

3. In each extension sub-folder create a Javascript file (for example **`C:\Users\`***your-name***`\cs-extensions\hello-world\main.js`**) containing your extension code. For **`hello-world`** this could be:

   ```
   require('notifier').notify('Hello world!');
   ```

4. Add a file called **`package.json`** to each extension sub-folder. This must contain the following JSON data:

   ```
   {
     "main" : "js-file-name",
     "name": "extension-name",
     "version" : "extension-version"
   }
   ```

   where:

   - *js-file-name* is the name of your extension Javascript file (for example, **`main.js`**). Note that currently this file must contain **all** your extension code - it cannot load other **`.js`** files.
   - *extension-name* is the name of your extension (for example, **`hello-world`**). The name may contain alphanumeric characters and hyphens only.
   - *version* is the version number of your extension. Currently this is not used for anything, but it must be supplied.

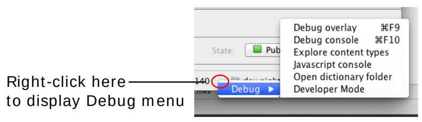
5. Open a command prompt window.
6. Start Content Studio by entering:

   ```
   javaws http://content-engine-host/studio/Studio.jnlp?com.escenic.script.root=dev-folder
   ```

   where:

   - *content-engine-host* is the name of your Content Engine host.
   - *dev-folder* is the absolute path of your extensions folder (**`C:\Users\`***your-name***`\cs-extensions`** in the example given above).

7. - On Windows, select **View** from the menu bar **while holding down the `Ctrl` key**. An extra **Debug** option should be displayed at the bottom of the **View** menu.
   - On Macs, right click between the Content Engine address field and the publication name field in the Content Studio footer:



8. Select **Debug** > **Developer Mode**. All the extensions in your extensions folder will now be loaded and executed. If you have included the hello-world extension described above then you should immediately see the "Hello World!" message appear in the top right corner of the Content Studio window.

2.5 Deploying Your Extensions

Deploying extensions is simply a matter of copying them to a fixed location on the Content Engine host. You can, however, use an **`autoinstall`** flag in the extensions' **`package.json`** files to determine whether or not they are automatically installed by Content Studio. This makes it possible to start out with a limited deployment for testers and/or advanced users before making an extension fully available. These stages are described below:

Limited deployment

Without making any changes to your **`package.json`** files, copy the contents of your local extensions folder to the **`/opt/escenic/engine/studio/extensions`** folder on your Content Engine host (but see note below).

The extensions are now available for use by Content Studio, but will not be automatically installed. Testers/advanced users can install specific extensions by starting Content Studio with the following command:

```
javaws http://content-engine-host/studio/Studio.jnlp?
com.escenic.studio.extension.enable=extension-list
```

where:

- *content-engine-host* is the name of your Content Engine host.
- *extension-list* is a comma-separated list of the extensions to load.

> In a standard installation, Content Studio will look for plug-ins in the default location specified above, **`/opt/escenic/engine/studio/extensions`**. This location is, however, configurable. You can change it by setting the property **`studioExtensionRoot`** in *configuration-root*/**`ServerConfig.properties`** in one of your configuration layers.

Full deployment

When an extension is ready for full deployment, edit its **`package.json`** file and add an **`autoinstall`** flag. For our **`hello-world`** example the **`package.json`** file should look something like this:

```
{
  "main" : "main.js",
  "name": "hello-world",
  "version" : "1.0.0.0",
  "flags": ["autoinstall"]
}
```

Note that the **`flags`** property is an array, so the **`"autoinstall"`** value must be enclosed in braces.

Upload the edited file to the correct location. This extension will now be automatically installed when Content Studio is started.

Preventing auto-installation

You can prevent Content Studio from installing extensions even if the **`autoinstall`** flag is set by starting Content Studio with the following command:

```
javaws http://content-engine-host/studio/Studio.jnlp?
com.escenic.studio.extension.disable=extension-list
```

where:

- *content-engine-host* is the name of your Content Engine host.

- *extension-list* is a comma-separated list of extensions that are not to be loaded. You can prevent installation of all extensions by specifying the special value `*`.

2.6 A Simple Extension

This simple extension adds bookmarking functionality to Content Studio. It adds two options, **Bookmark** and **Remove bookmark** to the **Tools** menu. Clicking on **Bookmark** adds the current editor to a list of bookmarks, clicking on **Remove bookmark** removes the current editor from the list of bookmarks. For each bookmarked editor, a menu item is added to the **Tools** menu. Clicking on a bookmark menu item opens the corresponding bookmarked editor.

Create a text file called **`main.js`** in **`C:\Users\`***your-name***`\cs-extensions`** (for example) and open it for editing, then add the code described below.

> A more complete version of this example can be downloaded from https://bitbucket.org/mogsie/studio-extension-tutorial-bookmarks. This mercurial repository takes the form of a tutorial. If you look at the "Commits" page (https://bitbucket.org/mogsie/studio-extension-tutorial-bookmarks/changesets) you will see that each revision is a "lesson" consisting of:
>
> - The code so far
> - The commit message, which contains a detailed explanation of the changes made in the step
> - A **diff** showing exactly what was changed since the previous step
>
> The lessons are listed in reverse order, so start at the bottom.
>
> If you install mercurial then you can download the repository, read the commit messages and try to create your own "fork" of the extension.

The extension Javascript code

Use **`require`** to create the necessary Content Studio objects:

```
var notifier = require('notifier');
var actions = require('actions');
var CS = require('content-studio');
```

Create the **Bookmark** and **Remove bookmark** actions, and disable them - they will only be enabled when appropriate:

```
var bookmarkAction = actions.createAction('Bookmark', 'shortcut D');
var unbookmarkAction = actions.createAction('Remove bookmark', 'shortcut shift D');
bookmarkAction.enabled(false);
removeBookmarkAction.enabled(false);
```

Create the other variables you will need - an array to hold the bookmarks, two variables to keep track of the current editor's URI and title, and an array to keep track the number of bookmarks:

```
var currentURI = null;
var currentName = null;
var allBookmarks = {};
```

Add the actions you have created to the **Tools** menu:

```
actions.addAction(bookmarkAction, 'tools');
actions.addAction(removeBookmarkAction, 'tools');
```

The **Bookmark** and **Remove bookmark** actions should only be enabled if an editor is open. In addition, the **Bookmark** action should only be enabled if the current editor is **not** bookmarked, and the **Remove bookmark** action should only be enabled if the current editor **is** bookmarked. So you need add a call to a function that will perform these checks and initialize the menu items correctly:

```
enableDisableActions();
```

Then, of course, you need to actually define this **`enableDisableActions`** function. The following function first checks to see if an editor is actually open by checking the **`currentURI`** variable and disabling both actions if it is **`null`**. If not, it checks whether or not the current editor is in the **`allBookmarks`** array and enables/disables the actions accordingly.

```
function enableDisableActions() {
  if (currentURI == null) {
    bookmarkAction.enabled(false);
    removeBookmarkAction.enabled(false);
    return;
  }
  if (allBookmarks[currentURI]) {
    removeBookmarkAction.enabled(true);
    bookmarkAction.enabled(false);
  }
  else {
    removeBookmarkAction.enabled(false);
    bookmarkAction.enabled(true);
  }
}
```

Now you can add the actual bookmarking code that needs to be executed when the user clicks on one of your menu entries. Here is the code for the **Bookmark** action:

```
bookmarkAction.on('action', function() {
  if (currentURI == null) {
    return;
  }
  if (allBookmarks[currentURI]) {
    notifier.notify('Already bookmarked...');
    return;
  }
  var uri = currentURI;
  var bookmark = actions.createAction(currentName);
  actions.addAction(bookmark, 'tools');
  bookmark.on('action', function() {
    CS.openEditor(uri);
  });
  allBookmarks[uri] = bookmark;
  enableDisableActions();
});
```

What is happening here? First of all **`currentURI`** is checked: if there is no current editor to bookmark, then the function exits. Then if the current editor is already bookmarked, the function displays a message and exits. If these checks are passed, then the function:

- Creates a new action with the name of the current editor (**`currentName`**)

- Adds this action to the **Tools** menu
- Defines the event code for the new action
- Adds the editor's URI to the **allBookmarks** array
- Calls **enableDisableActions** to update the state of the **Bookmark** and **Remove Bookmark** menu items.

Here is the corresponding code for the **Remove Bookmark** action:

```
removeBookmarkAction.on('action', function() {
  if (currentURI == null) {
    return;
  }
  if (! allBookmarks[currentURI]) {
    return;
  }
  var bookmark = allBookmarks[currentURI];
  delete allBookmarks[currentURI];
  actions.removeAction(bookmark);
  enableDisableActions();
});
```

As you can see, it's more or less a mirror of the **Bookmark** action code.

Finally, you need to add some code to react to changes in the current editor. This code needs to set the **currentURI** and **currentName** variables used in the functions described above. Here is the missing event code:

```
function editorActive(editorControl) {
  console.log('Editor activated: ' + editorControl.uri);
  currentURI = editorControl.uri;
  currentName = editorControl.displayName;
  enableDisableActions();
}

function editorInactive(editorControl) {
  console.log('Editor deactivated: ' + editorControl.uri);
  currentURI = null;
  currentName = null;
  enableDisableActions();
}

CS.on('editor-active', editorActive);
CS.on('editor-inactive', editorInactive);
```

Save **main.js**.

The extension package file

In the same folder create a text file called **package.json**. Open it for editing and add the following code:

```
{
  "main" : "main.js",
  "name": "bookmarks",
  "version" : "1"
}
```

Save **package.json**.

Testing the extension

Open a command terminal and start Content Studio by entering the following command:

```
javaws http://content-engine-host/studio/Studio.jnlp?com.escenic.script.root=C:\Users
\your-name\cs-extensions
```

Select **View** from the menu bar while holding down the **Ctrl** key, then select **Debug** > **Developer Mode**. Your **Tools** menu should now contain the **Bookmark** and **Remove bookmark** options you have defined. If you open a content item in an editor and click on the **Bookmark** option then a new option with the name of the content item should be added to the **Tools** menu. If you close the content item editor and click on this new option, then the content item should be reopened for editing.

2.7 Creating Browser UIs

As described in section 2.2, the content-studio object's **createPanel()** method returns a **PanelControl** object representing a Content Studio side panel, and the **PanelControl.show('browser')** method can then be used to create a **BrowserModel** object. A **BrowserModel** object represents a browser component. It has two properties:

content
: This property is a string to which you can supply HTML that you want to display in the panel.

uri
: This property can be used to specify the URI of an HTML file that you want to display in the panel.

So in order to display your own own user interface component in a side panel using the **BrowserModel**'s **uri** property, all you need to do is:

1. Create an HTML file containing the user interface component you want to display.
2. Store the HTML file in a location that will be accessible from Content Studio.
3. Write the Javascript code needed to create the panel and display your component in it.

To create a "hello world" panel, for example, you would need to make an HTML file something like this:

```
<!DOCTYPE html>
<html>
  <head>
    <title>Hello</title>
    <script type="text/javascript">
    function sayHello() {
      var script = 'require("notifier").notify("Hello world!");';
      scriptExecutor.executeScript(script);
    }
    </script>
  </head>
  <body>
    <input type="button" value="Say it" onclick="sayHello()" />
  </body>
```

```
</html>
```

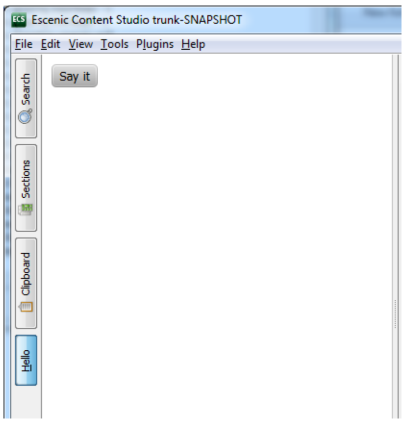
If you save the file on your local machine as **`hello.html`** (and you have a web server running) then you might display it in Content Studio by entering the following code into your Javascript console:

```
var cs = require('content-studio');
var mypanel = 'http://example.com/studio/sidepanel/hello';
var browserui;

cs.on('panel-init', function(panelcontrol) {
  if (panelcontrol.uri == mypanel) {
    browserui = panelcontrol.show('browser');
  }
});

cs.createPanel(mypanel, '&Hello', 'shift F9');
browserui.uri = "http://localhost:8080/hello.html";
```

The result in Content Studio looks something like this:


Escenic Content Studio trunk-SNAPSHOT
File Edit View Tools Plugins Help
Say it
Search
Sections
Clipboard
Hello

and clicking on the button displays a "Hello world" notification.

2.7.1 Writing Javascript for Side Panels

In order to be useful, the Javascript you write in side panel UI components needs to have access to the same environment and built-in objects as other Javascript plug-in code. You need to be able to **`require()`** the **`content-studio`** object, the **`notifier`** object and so on. You can do this, but you cannot do it directly.

The **`sayHello()`** function in the previous example shows what you have to do in order to access the full Content Studio environment:

```
function sayHello() {
  var script = 'require("notifier").notify("Hello world!");';
  scriptExecutor.executeScript(script);
}
```

From a side panel HTML file, you have access to a built-in object called **`scriptExecutor`**, which has a method called **`executeScript()`**. Any code executed by this method has full access to the Content Studio Javascript environment. All the Javascript code you want to execute in a side panel HTML file must therefore be predefined as a string and then passed in as an argument to **`scriptExecutor.executeScript()`**.

Note that each call to **`scriptExecutor.executeScript()`** is executed independently and no context is preserved between calls. So this, for example, will work:

```
scriptExecutor.executeScript('hw="Hello world!";require("notifier").notify(hw);');
```

whereas this will not:

```
scriptExecutor.executeScript('hw="Hello world!";');
scriptExecutor.executeScript('hw="require("notifier").notify(hw);');
```

2.7.2 Deploying Browser UIs

The XHMTL browser components you create must be accessible from Content Studio. For development purposes you can always use your own computer (as long as you have a web server running on it), as shown in the example in section 2.7. For production purposes, however, the recommended location is **`http://`***content-engine-domain***`/webservice-extensions`**. If, for example, you deploy your "Hello World" component to **`http://`***content-engine-domain***`/webservice-extensions/hello/index.html`** then you can access it from your Javascript extension code as follows:

```
browserui.uri = "/webservice-extensions/hello/index.html";
```

3 Custom Field Editors

A custom field editor is a browser pane that is displayed in place of one of the built-in content editor field types normally displayed by Content Studio. The pane can contain any valid combination of HTML and Javascript code, and simply renders whatever HTML is supplied in the usual way.

The pane's Javascript environment is similar to the extension Javascript environment described in chapter 2, and provides the same general-purpose Javascript libraries. It does not, however, provide the same Content Studio-specific objects. When writing Javascript code for a field editor, there is only one built-in object that you can access with the **`require`** method. This object is called **`field-editor`**, and it represents the field itself. The **`field-editor.value()`** method can be used both to retrieve and set the value of the field.

In order to create a custom field editor you need to:

1. Create an HTML file containing the field editor definition and deploy it to some location that is accessible from your Content Engine.
2. Register the field editor you have created in one of your Content Engine configuration layers.
3. Associate the registered field editor with one or more field definitions in your publication's **`content-type`** resource (see section 3.3).

3.1 Creating a Field Editor

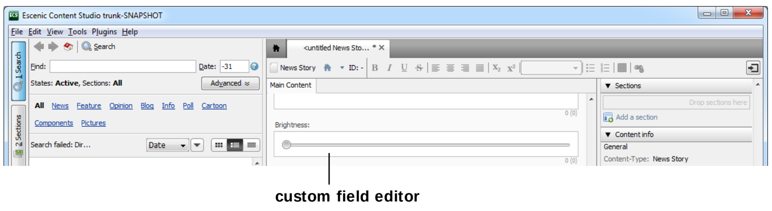
A field editor is an HTML document that displays an editable representation of the data stored in a content item field. Javascript code is used to provide the editing functionality, and this code is able to make use of a built-in **`field-editor`** that can:

- Retrieve data from the field.
- Retrieve a VDF model defining the structure of the data stored in the field.
- Write modified data back to the field.
- Fire an event whenever the value in the field changes.
- Display a pop-up dialog (useful for custom fields that have a large interface requiring a lot of screen space).

The field editor must be a valid and complete HTML document. The following example defines a field editor consisting of a slider control:

```
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/html">
<html>
  <head>
    <script src="jquery-1.7.2.min.js"></script>
    <script type="text/javascript">
      $(window).load(function () {
        var editor = require("field-editor");
        $("#thefield").val(editor.value);
        editor.on('value-changed', function() {
           $("#thefield").val(editor.value);
         });
      $('#thefield').change(function(){
          editor.value = $(this).val();
        });
      });
    </script>
    <style>
      #viewport {margin: 0; padding: 0;}
      .spacer {padding: 10px;}
      #thefield {width: 100%;}
    </style>
  </head>
  <body id="viewport" style="height: 80px; overflow: hidden;">
    <div class="spacer">
      <input id="thefield" type="range" max="100" min="0" value="0"><br/>
    </div>
  </body>
</html>
```

Here is what this field editor looks like in Content Studio:



The important points to note here are:

- A **field-editor** object called **editor** is created in the **window.load()** event code.
- The **editor.value** property is used to retrieve the field value and initialize the slider **input** element (called **thefield**).
- **editor.value** is also used in **thefield.change** event to write changes back to the content item field.
- **editor.on()** is used to listen for **value-changed** events and update the slider **input** element. This ensures that the editor will respond if changes are made to the field by other users.

This is obviously a very simple example, but it is possible to make much more sophisticated editors that allow the editing of complex fields containing many different atomic values, or fields that contain structured data stored in JSON format. The **field-editor** object has a **model** property that returns the field's VDF model. This may be useful for creating editors that can handle a variety of different complex field types. For a full description of the **field-editor** object, see the on Content Studio Javascript API Reference.

In order to be able to use the field editor, you must then deploy it to some location on the net that is accessible from the Content Engine. The recommended location is **http://***content-engine-domain***/webservice-extensions**.

3.2 Registering a Custom Field Editor

Once you have deployed your field editor you must register it with the Content Engine. To do this, create a file called *configuration-root***/com/escenic/resolver/**

NamedServiceResolver.properties in one of your configuration layers (if it does not already exist) and add a definition like this to it:

```
service.editor-name=editor-url
```

where:

- *editor-name* is a name that you will use to refer to the editor when configuring fields in your **content-type** resource.
- *editor-url* is the URL of the location to which you deployed the field editor. If you deployed it to a location in your local domain then you can omit the domain name component of the URL. If you deployed it in some other domain, then you must specify an absolute URL including the **http**: prefix.

If, for example, you deployed the field editor to the standard location in your own domain - **http://your-domain.com/webservice-extensions/slider.html** - and you want to call it **slider**, then you would add the following to **NamedServiceResolver.properties**:

```
service.slider=/webservice-extensions/slider.html
```

If for some reason you had deployed the editor to a different domain than your Content Engine, then you would need to enter:

```
service.slider=http://some-other-domain/field-editors/slider.html
```

NamedServiceResolver.properties can contain many such entries, so you can register all your field editors in the same file.

> You are recommended to always deploy your field editors to **http://***content-engine-domain***/webservice-extensions**. If for some reason you need to use a field editor that is deployed elsewhere outside the local domain, then you should consider setting up a Content Engine proxy service and access the field editor via the proxy service. This is likely to simplify firewall configuration and ultimately be more secure. For detailed information about Content Engine proxy services and how to create them, see **Escenic Content Engine Advanced Developer Guide, chapter 19**.

3.3 Using a Custom Field Editor

To make use of custom field editor in a publication, all you need to do is associate it with the required fields in the publication's **content-type** resource. You do this by including a **ui:editor** element as a child of the require **field** elements. For example:

```
<field  name="brightness" type="basic" mime-type="text/plain">
  <ui:label>Brightness</ui:label>
  <ui:editor type="html" name="slider"/>
</field>
```

The **type** attribute must always be set to **html**. The **name** attribute must reference one of the entries in the **NamedServiceResolver.properties** file (see section 3.2).

4 Link Header Plug-ins

Content Studio can also be extended by the use of **link header plug-ins**. You implement a link header plug-in by modifying the Content Engine to attach a **link header** to some or all of the content items it returns. A link header is an HTTP header field that can be used to link to additional information about the returned resource. In this case, the link must point to an HTML document, which Content Studio will then display in an HTML pane inside the Content Studio window.

The Content Engine API for attaching link headers to content items lets you specify a template for constructing the link header URL from strings such as the type and id of the requested content item. In this way you can get Content Studio to display content related to the requested content item in the HTML pane. You could, for example, in the very simplest case, define a template that caused Content Studio to display a view of the published content item. Alternatively you could construct a URL that accesses some public or private web service (readability analysis, for example) and display the results.

You can direct link header content to two different types of pane:

The content item's attributes panel
This is the preferred destination for link header content, since information displayed here is obviously associated with the current content item. A new attributes panel section is created for each link header plug-in you define.

A research panel
You can also direct link header content to a research panel should you wish. From a usability perspective, it is less obvious that content displayed in a research panel is associated with a specific content item.

You can create link header plug-ins in two different ways:

- Use the default link header plug-in included with the Content Engine.
- Create your own link header plug-ins from scratch

These options are described in the following sections.

4.1 Using the Default Link Header Plug-in

Using the default link header plug-in involves the following steps:

1. Create a **`.properties`** file for each required link header component in one of your configuration layers as described in section 4.1.1.
2. Add an entry to *configuration-root*`/com/escenic/service/LinkHeaderManager.properties` for each of your plug-in components.

4.1.1 Configuring the Default Link Header Plug-in

You can use the default link header plug-in to create as many different link header components as you wish, you just create a separate **`.properties`** file for each component. You can call the components whatever you like and place them anywhere in your chosen configuration layer. It is probably a good idea to place them in your own subtree. You might, for example, create two properties files called:

configuration-root/**com/myCompany/linkHeaderPlugins/MyFirstLinkHeaderPlugin.properties**
configuration-root/**com/myCompany/linkHeaderPlugins/MySecondLinkHeaderPlugin.properties**

These properties files must contain the following settings:

```
$class=com.escenic.webservice.spi.DefaultLinkHeaderPlugin
vendor=vendor-name
version=version-number
description=description

relation=relation
mimeType=mime-type
title=plug-in-title
uriTemplate=uri-template
objectLoader=/io/api/ObjectLoader
```

where:

vendor-name
Should in most cases be the name (ideally the domain name) of your organisation: for example, **mycompany.com**.

version-number
A version number. You can use this to keep track of changes to the plug-in configuration.

description
A description of the plug-in configuration, for information only.

relation
A name defining the relation of the content provided by the plug-in to the content displayed in Content Studio. This property is used to determine where the content displayed by the plug-in will be displayed as follows:

http://www.vizrt.com/types/relation/more-info
If you specify this value then the plug-in content is displayed in the attributes panel of the content item editor to which it is related. If you define several plug-ins with this relation then a separate section is created for each plug-in. Since attributes panel sections are collapsible this is not a problem.

Any other value
If you specify any other value then the plug-in content is displayed in a research panel.

mime-type
The MIME type of the content that will be displayed in the browser panel, typically **text/html** for HTML content.

title
The title of the content provided by the plug-in. It is used as the title of the attribute panel section or research panel to which output is directed.

uri-template
A URI template for the resource to be displayed. For example:

```
{scheme}://{host}:{port}/webservice/escenic/content/{articleid}
```

The items enclosed in braces (`{` and `}`) are placeholders, and are replaced at run-time by values that depend on the content editor currently displayed in Content Studio. The URI template may contain any of the following placeholders:

{publication}
: Gets replaced by the name of the currently displayed content item's home publication.

{content-type}
: Gets replaced by the name of the currently displayed content item's content type.

{source}
: Gets replaced by the currently displayed content item's **`source`** property.

{sourceid}
: Gets replaced by the currently displayed content item's **`sourceid`** property.

{articleid}
: Gets replaced by the currently displayed content item's database ID.

{host}
: Gets replaced by the host name of the web service.

{scheme}
: Gets replaced by the scheme of the web service. This will normally be either **`http`** or **`https`**

{port}
: Gets replaced by the port of the web service.

You can use the placeholders in any way you like to construct URIs that will access the content you want to display in the research panel.

Optional settings in the property file

includeContentTypes

A comma separated list of content types the plug-in will support. If the property for instance is defined like this

```
includeContentTypes=news,poll
```

the plug-in will only add the link header if the content type is either **`news`** or **`poll`**

excludeContentTypes

A comma separated list of content types the plug-in will not support. If the property for instance is defined like this

```
excludeContentTypes=news,poll
```

the plug-in will not add a link header if the content type is either **`news`** or **`poll`**. A link header will be added for all other content types.

includeObjectTypes

A comma separated list of object types the plug-in will support. If the property for instance is defined like this

```
includeObjectTypes=article
```

the plug-in will only add the link header if the object type is **`article`**. Other possible values could be **section** and **person**.

4.1.2 Enabling Your Plug-in Components

To enable the plug-in components you have defined, you must add a *configuration-root*`/com/escenic/service/LinkHeaderManager.properties` file to the same configuration layers and define a **`service`** property for each plug-in component as shown below:

```
$class=com.escenic.webservice.manager.LinkHeaderPluginManager

service.myProvider-1=/com/myCompany/linkHeaderPlugins/MyFirstLinkHeaderPlugin
service.myProvider-2=/com/myCompany/linkHeaderPlugins/MySecondLinkHeaderPlugin
```

Each **`service`** property must have a unique suffix after the `.`, but you can choose any naming convention you like. The properties must define the locations of the plug-in configurations you created in section 4.1.1.

4.2 Creating Your Own Link Header Plug-in

If the default link header plug-in does not meet your requirements, then you can create your own by implementing the **`LinkHeaderPlugin`** interface. The following example shows a very basic **`LinkHeaderPlugin`** implementation that simply adds the URL of an image (a monkey's face) to the header of all returned sections and content items.

```
package com.escenic.plugins.monkeyface.core;

import com.escenic.webservice.spi.LinkHeaderPlugin;
import com.escenic.webservice.helper.ServiceLocator;
import com.escenic.domain.Link;
import neo.xredsys.api.IOObject;
import java.util.Collections;
import java.util.List;
import java.net.URI;

/**
 * A LinkHeaderPlugin that adds a linkheader referencing a picture of a monkey
 */
public class MonkeyFaceLinkHeaderPlugin implements LinkHeaderPlugin {
  public List<Link> createLinks(IOObject pContent, ServiceLocator pLocator) {
    return Collections.singletonList(new Link(URI.create("http://upload.wikimedia.org/
wikipedia/commons/6/64/Cebus_albifrons_edit.jpg"),
                                              "monkey",
                                              "image/jpeg",
                                              "Mr. Monkey"));
  }
}
```

In order to make your plug-in known to the system you must also implement the corresponding service provider interface (**`LinkHeaderPluginSpi`**) and register it. For example:

```
package com.escenic.plugins.monkeyface.core;
import com.escenic.webservice.spi.LinkHeaderSpi;
import com.escenic.webservice.spi.LinkHeaderPlugin;

/**
 * The service provider interface of our monkey plugin
 */
public class MonkeyFaceLinkHeaderSpi extends LinkHeaderSpi {
    public MonkeyFaceLinkHeaderSpi() {
      super("Escenic", "1.0", "Creates a LinkHeaderPlugin");
    }

    @Override
    public LinkHeaderPlugin createLinkHeaderPlugin() {
      return new MonkeyFaceLinkHeaderPlugin();
    }
  }
```

To register your service you must create or edit **`META-INF/services/com.escenic.webservice.spi.LinkHeaderSpi`** and add a line naming the service:

```
com.escenic.plugins.monkeyface.core.MonkeyFaceLinkHeaderSpi
```

You then need to:

1. Compile your classes and package them together with the service declaration in a JAR file.
2. Add the JAR file to the server classpath

When this has been done, the Content Engine will see the plug in and load it using Java's **`ServiceProvider`** API (see http://download.oracle.com/javase/6/docs/api/java/util/ServiceLoader.html for details). The "monkey face" link header will then be included with all sections and content items returned by the Content Engine.

4.3 Adding Link Header Options to Content Studio

In order to enable access to link header plug-ins from Content Studio, you need to add their names to a Content Studio system property called **`com.escenic.studio.browserbox.linkheaders`**. The best way to do this is to add a line like this to **`com/escenic/webstart/StudioConfig.properties`** in your common configuration layer:

```
property.com.escenic.studio.browserbox.linkheaders=monkey
```

The value you specify (**`monkey`** in this case) must match the name you specified when creating your own plug-in (see section 4.2), or the **`relation`** property you specified in a default link header plug-in configuration (see section 4.1.1).

If you have defined/created several link header plug-ins, then you can enter all their names separated by commas. For example:

```
property.com.escenic.studio.browserbox.linkheaders=monkey,readability
```

4.4 Using a Content Engine Proxy Service

If your link header plug-in is intended to access a public service or other resource outside the local domain, then it is a good idea to set up a Content Engine proxy service for the target resource and address the links it generates to the proxy service rather than directly to the target resource.

If, for example, your plug-in is intended to access resources at `http://www.external-service.com`, you could set up a Content Engine proxy service for this URL called `external-service`. You would then set up your plug-in to access resources at `http://`*content-engine-domain*`/webservice/escenic/proxy/external-service` and the proxy service would forward the requests to `http://www.external-service.com`. The advantages of doing this are:

- It simplifies firewall configuration, since Content Studio and other Content Engine clients can always access the Content Engine web service. You then only need to make sure that the Content Engine itself has access to the external resources.
- You can ensure that any sensitive information such as domain credentials are removed from requests before they are forwarded.
- You can insert any authentication credentials that may be required by target hosts before requests are forwarded.

For detailed information about Content Engine proxy services and how to create them, see **Escenic Content Engine Advanced Developer Guide**, **chapter 19**.

5 Making a Custom Dashboard

Content Studio permanently displays a dashboard in the main area used for displaying editors. The dashboard is visible whenever no editors are open but can also be displayed at any time by clicking on its tab, in the same way as any of the editors displayed in the area. The delivered system includes a default dashboard, but you can replace this with your own content.

The dashboard is actually a browser pane, so your custom content must consist of valid HTML/ Javascript. You can use the page to display useful information about your publications: current usage statistics from a monitoring service, for example.

All you need to do to create your own dashboard for Content Studio is:

1. Create an HTML file containing the content you want to display on the dashboard.
2. Deploy the file to a location that is accessible from Content Studio.
3. Configure Content Studio to use the deployed file as a dashboard.

5.1 Creating Dashboard Content

The file you create must be valid HTML. It can contain links to other pages and resources but remember that in order for links to work, the link targets must be in locations that are accessible from Content Studio. You should also bear in mind that the dashboard is intended as an information page rather than a full-scale browser. Clicking on the dashboard's tab will always redisplay the dashboard rather than whatever page the user may have selected by following links, so it's not a good idea to create a page that encourages browsing - try to include all the information you want to show directly on the page instead.

5.2 Deploying The Dashboard File

The dashboard content must be accessible from Content Studio. For development purposes you can always use your own computer (as long as you have a web server running on it). For production purposes, however, the recommended location is **`http://`***content-engine-domain***`/webservice-extensions`**. You might, for example deploy your dashboard page to **`http://`***content-engine-domain***`/webservice-extensions/dashboard/index.html`**.

5.3 Configuring Content Studio

To make Content Studio display the dashboard file you have created you need to add the following setting to *configuration-root***`/com/escenic/webstart/StudioConfig.properties`** in one of your configuration layers:

```
property.com.escenic.studio.dashboard.uri=dashboard-uri
```

where *dashboard-uri* is the URI of your dashboard file. If, for example, you deployed your dashboard page to **`http://`***content-engine-domain***`/webservice-extensions/dashboard/index.html`**, then you would need to specify:

```
property.com.escenic.studio.dashboard.uri=/webservice-extensions/dashboard/index.html
```

6 Java Plug-ins (deprecated)

The extension method described in this chapter is deprecated and you should avoid using it for new development.

To creating Java plug-ins you need Java programming skills and knowledge of:

- The Swing GUI component kit
- The Escenic content model

The class **`StudioPlugin`** can be used to create standard plug-ins for Content Studio. You can use a plug-in based on **`StudioPlugin`** for a wide range of purposes. A **`StudioPlugin`** may be an "invisible" component that runs entirely in the background, but it may also add menu items to the Content Studio user interface and display its own user interface components (dialogs, messages and so on). The plug-in starts up and terminates together with Content Studio. During its life, it communicates with Content Studio via the **`StudioContext`** object.

Note that any **`StudioPlugin`**s you write must adhere strictly to Swing's **event dispatch thread (EDT)** conventions, as described here:http://java.sun.com/docs/books/tutorial/uiswing/concurrency/dispatch.html

Failure to do so may cause Content Studio to become unresponsive.

The main classes involved in writing a plug-in are:

`com.escenic.studio.plugins.StudioPlugin`
The plug-in class itself. You create a plug-in by extending this class.

`com.escenic.studio.plugins.spi.StudioPluginSpi`
The SPI class that creates **`StudioPlugin`** instances. You extend this class to create an SPI class that creates instances of your plug-in.

`com.escenic.studio.StudioContext`
All plug-ins communicate with Content Studio via this class. **`StudioPlugin`** has a **`getContext()`** method that returns a **`StudioContext`** object. **`StudioContext`** has methods the plug-in can use to subscribe to various events and to gain access to various components of the Content Studio session.

- **`addLifeCycleListener()`**: This method adds a **`StudioLifeCycleListener`** to the **`StudioContext`** object.
- **`getContentEditorContainer()`**: This method returns a **`ContentEditorContainer`** object.
- **`getContentService()`**: This method returns a **`ContentService`** object.
- **`getUser()`**: This method returns a **`Content`** object containing information about the current user.
- **`execute()`**: This method can be used to execute code encapsulated in **`PluginTask`** objects.

`com.escenic.studio.StudioLifeCycleListener`
This class provides plug-ins with a means of listening for and reacting to important events in a session's life cycle such as **`launched`**, **`userSessionStarted`**, **`userSessionEnded`** and **`exiting`**.

`com.escenic.studio.editors.ContentEditorContainer`
: This object is a container for all the editors opened in a Content Studio session. You can use this object to get access to all the editors in a session. It also has an **`addEditorListener()`** method that adds an **`EditorListener`** to the **`ContentEditorContainer`**. Note that this object is not available until Content Studio is completely initialized, so you should always access it via the **`userSessionStarted`** event (see the example code in section 6.1).

`com.escenic.studio.editors.EditorListener`
: This class provides plug-ins with a means of listening for and reacting to editor events such as **`editorOpened`** and **`editorClosed`**.

`com.escenic.client.content.ContentService`
: This object provides access to content items. It also has an **`addContentListener()`** method that adds a **`ContentListener`** to the **`ContentService`**.

`com.escenic.client.content.ContentListener`
: This class provides plug-ins with a means of listening for and reacting to content item events such as **`contentCreated`**, **`contentCreated`** and **`contentDeleted`**.

`com.escenic.studio.plugins.PluginTask`
: This class is a container for any time-consuming tasks that a plug-in performs. You must use this class to wrap any actions that are potentially time-consuming, such as disk reads or accessing Internet resources. You create a task by extending **`PluginTask`** and execute it using **`StudioContext.execute()`**. For further information, see section 6.2.

> For detailed information about the classes listed, see the javadoc documentation in your ***`engine-distribution`*****`/apidocs`** folder.

6.1 Writing a Basic Plug-in

Follow these steps to write a basic plug-in for Content Studio:

1. **Set up the classpath**

   In order to write the plug-in you need **`studio-api.jar`** and **`client-core.jar`** in your classpath. You will find these in either ***`engine-distribution`*****`/contrib/lib`** or ***`engine-distribution`*****`/lib`**.

2. **Create a subclass of `StudioPlugin`**

   Use the following example as a basis. You must implement an **`initialize()`** method that uses the **`StudioContext`** object to retrieve the information it needs from Content Studio.

```
public class CustomStudioPlugin extends StudioPlugin {

  public CustomStudioPlugin(final StudioPluginSpi pPluginSpi, final StudioContext
 pContext) {
    super(pPluginSpi, pContext);
  }

  @Override
  public void initialize() {
    // You need to put your initialization code here.
    getContext().addLifeCycleListener(new StudioLifeCycleListener.Stub() {
      @Override
      public void userSessionStarted(final SessionEvent pEvent) {
        getContext().getContentEditorContainer().addEditorListener(new
EditorListener.Stub() {
          @Override
          public void editorOpened(final EditorEvent pEvent) {
            // This example starts a background task when the editor is opened.
            // But you can do whatever you want.
            // You can also use other listener methods like editorClosed() etc.
            ResourceHandle handle = pEvent.getEditor().getResourceHandle();
            getContext().execute(new
IconFetcherTask(getContext().getContentService(), handle));
          }
        });
      }
    });
  }
}
```

Note that **`getContentEditorContainer()`** is called inside the **`userSessionStarted()`** method implementation. This ensures that it does not get called until Content Studio is fully initialized and the **`ContentEditorContainer`** is available.

3. **Create a subclass of `StudioPluginSpi`**

   Your subclass must override the **`createStudioPlugin()`** method and return an instance of the **`StudioPlugin`** subclass you created in the previous step.

```
public class CustomStudioPluginSpi extends StudioPluginSpi {
  public CustomStudioPluginSpi() {
    super("Custom Studio Plugin", "1.0", "Escenic");
  }

  @Override
  public StudioPlugin createStudioPlugin(final String pId, final StudioContext
pContext) {
    return new CustomStudioPlugin(this, pContext);
  }
}
```

6.2 Making a Plug-in Task

In order to ensure that your plug-in does not make the Content Studio user interface freeze up, you must never directly include any code that executes potentially time-consuming operations. You must always create **plug-in tasks** for such operations, in order to ensure that they are handled correctly.

You can create a plug-in task by extending the **`com.escenic.studio.plugins.PluginTask`** class. The following example shows the outline of an **`IconFetcherClass`** that is intended to retrieve an icon from the web or a file system and do something with it. Any code involving such a retrieval operation should always be implemented as a plug-in task.

```
private class IconFetcherTask extends PluginTask<Icon> {

  @Override
  public String getTitle() {
    return "Icon Fetcher";
  }

  @Override
```

```
      public Icon doInBackground() throws Exception {
        // In this method you can do some long running operations.
        Icon icon = fetchIconFromSomePlace();
        return icon;
      }

      @Override
      public void succeeded(Icon pIcon) {
        // Do something with the icon here
      }
    }
```

Once you have defined a plug-in task in this way, you can call it from your plug-in class using **`StudioContext.execute()`**:

```
getContext().execute(new IconFetcherTask());
```

For further information see the **`PluginTask`** Javadoc.

6.3 Adding User Interface Components

Currently, you can extend the Content Studio user interface using plug-ins in the following ways:

- You can add options to the Content Studio menus
- You can display your own dialogs

You cannot, however, currently use plug-ins to modify the main window of the application in any way. (It is possible to create custom property editors for Content Studio, as described in chapter 7, but this is not done using the **`StudioPlugin`** class.)

6.3.1 Adding Custom Menu Items

The **`StudioPlugin`** class has a **`getDeclaredActions()`** method that returns a **`DeclaredActions`** object. This object contains all the menu items displayed by Content Studio. You can add menu items of your own by calling its **`addAction()`** method. **`addAction()`** has two signatures:

`addAction(`*action*`)`
: This form of **`addAction`** adds the menu item defined by the *action* parameter to Content Studio's **Plug-in** menu.

`addAction(`*placement*`,`*action*`)`
: This form of **`addAction`** adds the menu item defined by the *action* parameter to the menu specified with the *placement* parameter.

The following example shows how you can add a custom menu item to Content Studio's **View** menu:

```
private void createActions() {
  Action action = new MyCustomAction(name, icon);
  getDeclaredActions().addAction(DeclaredActions.Placement.VIEW_MENU, action);
}
```

This method can be called from inside your plug-in's **`initialize()`** method. An **`Action`** class contains both code to execute some action and the information needed to display a menu item.

You can create your own **Action** classes by extending **AbstractAction** (see section 6.3.2 for an example).

6.3.2 Displaying Custom Dialogs

You can display your own user interface components using the **JOptionPane** class. The following example shows the definition of a custom **Action** class that displays an information message:

```
private class MyCustomAction extends AbstractAction {
    public MyCustomAction(final String name, final Icon icon) {
      // give a name and icon to your action
    }

    @Override
    public void actionPerformed(final ActionEvent e) {
      JOptionPane.showMessageDialog(null,
          "Message from studio plugin",
          "Plugin dialog",
          JOptionPane.INFORMATION_MESSAGE
      );
    }
}
```

You can, of course display much more sophisticated user interface components using **JOptionPane**. For further information about JOptionPane and about Swing in general, see:

http://java.sun.com/javase/6/docs/api/javax/swing/JOptionPane.html
http://java.sun.com/docs/books/tutorial/uiswing/components/dialog.html

6.4 Packaging and Deploying a Plug-in

To make your plug-in available to Content Studio users, you must package it correctly in a JAR file, deploy it to the correct folder in your Content Engine installation, reassemble the Content Engine and redeploy the **studio** application that serves Content Studio to users.

You must package your plug-in in accordance with the standard for Java service provider interfaces. To do this you must create a file called **com.escenic.studio.plugins.spi.StudioPluginSpi** and add a line to the file that contains the fully-qualified name of your new SPI class. For example:

```
com.mycompany.contentstudio.plugin.CustomStudioPluginSpi
```

You must then make sure that this file is included in the **META-INF/services** folder of the JAR file you build, as specified in the standard for Java service provider interfaces. For further information about this, see:

http://java.sun.com/javase/6/docs/technotes/guides/jar/jar.html#Service%20Provider

Once you have created a correctly structured JAR file, you deploy it as follows:

1. Create a folder called **plugins** on the server in your *engine-home* folder (if it doe not already exist).
2. Create a subfolder for your plug-in (any name you choose) under *engine-home***/plugins**.
3. Upload the JAR file to *engine-home***/plugins/***your-plugin***/studio/lib**.

4. Use the assembly tool to assemble the Content Engine
5. Redeploy the **`studio`** application.

If you now start Content Studio, you should be able to see that your plug-in is running.

7 Property Editors (deprecated)

The extension method described in this chapter is deprecated and you should avoid using it for new development.

To creating Java plug-ins you need Java programming skills and knowledge of:

- The Swing GUI component kit
- The Escenic content model

When a Content Studio user opens a content item for editing, it is opened in a **content editor**: a tab displayed in the main editing area of the Content Studio window. Content editors are specialized for each content type: only the appropriate fields for each content type are displayed, and each field is displayed in a specialized control suited to the field's data type. A plain text field, for example, is displayed in a simple text field control, an HTML field is displayed in a rich text editing field, a boolean field is displayed as a check box, an enumeration field is displayed as a combo box and so on. These field editing controls are called **property editors**.

If the built-in property editors are not sufficient for your needs, you can implement more specialized property editors as plug-ins. You might, for example, want to build an editor composed of several inter-dependent controls to represent a complex field.

In order to make a custom property editor, you must be familiar with Swing. If you are familiar with Swing, making a property editor is quite straightforward. It involves the following tasks:

- Define the mark-up that will be used in the **`content-type`** resource to identify the fields for which the custom property editor is to be used.
- Add the defined markup to the required fields in the **`content-type`** resource.
- Implement a class to display the custom property editor. This class must implements the **`PropertyEditorUI`** interface.
- Implement a **`PropertyEditorSpi`** subclass that responds to property descriptors containing the markup values you have defined by creating an instance of your **`PropertyEditorUI`** implementation.
- Create a JAR file containing your property editor components and a service loader definition file.

The first of the above tasks is straightforward Swing programming. For detailed information about **`PropertyEditorUI`**, see the API Javadoc.

7.1 Defining Custom Property Editor Mark-up

You indicate that a custom editor is required for a field by adding special elements and attributes you have defined yourself to the field definition in the **`content-type`** resource. You need to determine the following values:

Namespace URI
: Define a URI that you will use to identify the special elements you add to the **`content-type`** resource. For example "**`http://my-company.com/2008/studio-plugin`**".

Property editor name
: Define a name for your property editor. This name will also be the name of the element you add to the `content-type` resource, so it must not contain any spaces or special characters other than '-' and '_'. For example `"my-custom-property-editor"`.

Enabled attribute name
: The name of the attribute that is to be used to determine whether or not the editor is enabled. This will usually be `"enabled"`.

Enabled attribute value
: The value that is to indicate that the editor is enabled. This will usually be `"true"`.

Parameter names
: If you want to allow parameters to be set in the `content-type` resource, then you should decide on the names of the parameters. These will be XML element names so they must not contain any spaces or special characters other than '-' and '_'. You might, for example, decide that you need a `"min"` and a `"max"` parameter.

7.2 Adding Mark-up to the content-type Resource

Once you have decided on the mark-up to use, you can add it to the required field definitions in your `content-type` resource. For example:

```
<field name="my-custom-field" type="number">
 <my-custom-property-editor xmlns="http://my-company.com/2008/studio-plugin"
 enabled="true">
   <min>2</min>
   <max>300</max>
 </my-custom-property-editor>
</field>
```

7.3 Implement PropertyEditorUI

The class that actually displays the custom property editor must implement the `com.escenic.studio.editors.PropertyEditorUI` interface. The main body of this class will be standard Swing programming and is not discussed here. In addition to ensuring that the class implements `PropertyEditorUI` correctly, however, you also need to be aware of the following:

- The `PropertyEditorSpi` class that creates instances of this class passes two parameters to the constructor: an `AbstractPropertyBinding` and a `ResourceRecorder`.
- The `AbstractPropertyBinding` object has a `getPropertyDescriptor()` method that gives you access to the contents of the field definition in the `content-type` resource.
- The `PropertyDescriptor` you obtain in this way has `getModule()` and `getModules()` methods that you can use to access any parameters specified in the field definition.
- Your class should include a `dispose()` method that calls the `ResourceRecorder`'s `disposeAll()` method for all the `AbstractPropertyBinding`'s `BindingListener`s. For example:

  ```
      public void dispose() {
        List<BindingListener> listeners = new
     ArrayList<BindingListener>(mBinding.getBindingListeners());
        for (BindingListener listener : listeners) {
  ```

```
        mBinding.removeBindingListener(listener);
      }
      mResourceRecorder.disposeAll();
    }
```

7.4 Implement PropertyEditorSpi

When you have a class that implements **`PropertyEditorUI`**, you must create a subclass of **`com.escenic.studio.editors.spi.PropertyEditorSpi`** that will create instances of it. This class's **`supports()`** method must check for the markup values you have defined for your custom property editor, and its **`createPropertyEditor()`** must return an instance of your custom property editor class. For example:

```
public class MyCustomPropertyEditorSpi extends PropertyEditorSpi {
  public static final URI PLUGIN_URI = URI.create("http://xmlns.escenic.com/2008/
studio-plugin");
  public static final String EDITOR = "my-custom-property-editor";
  public static final String ENABLED_ATTRIBUTE = "enabled";
  public static final String ENABLED_ATTRIBUTE_VALUE = "true";

  public boolean supports(final PropertyDescriptor pPropertyDescriptor) {
    return Number.class.isAssignableFrom(pPropertyDescriptor.getType()) &&
        pPropertyDescriptor.getModule(PLUGIN_URI, EDITOR, ENABLED_ATTRIBUTE,
 ENABLED_ATTRIBUTE_VALUE) != null;
  }

  public PropertyEditorUI createPropertyEditor(final AbstractPropertyBinding pBinding,
 final ResourceRecorder pResourceRecorder) {
    return new MyCustomPropertyEditorUI(pBinding, pResourceRecorder);
  }
}
```

7.5 Package The Property Editor

Create a JAR file containing all the components of your custom property editor.
The JAR file must also contain a service loader definition file. This file must be located in the JAR file's **`META-INF/services/`** folder, and must be called: **`com.escenic.studio.editors.spi.PropertyEditorSpi`**. It must contain the name of your **`PropertyEditorSpi`** subclass. For example:

```
com.mycompany.studio.plugin.MyCustomPropertyEditorSpi
```

You must then deploy the JAR file as described in section 6.4 and restart Content Studio in order to test your property editor.

7.6 Example Code

The following sections contain code for an extremely simple custom property editor called **`rating-editor`**. This editor displays a number field and prevents the user from entering values greater than 10.

This property editor can be enabled for a field by entering the following mark-up in the **`content-type`** resource:

```
<field name="rating" type="number">
 <rating-editor xmlns="http://xmlns.escenic.com/2008/studio-plugin" enabled="true">
   <amount xmlns="http://xmlns.escenic.com/2008/studio-plugin">4</amount>
 </rating-editor>
</field>
```

7.6.1 RatingPropertyEditorUI Example

```
package com.escenic.studio.plugin;

import com.escenic.domain.PropertyDescriptor;
import com.escenic.module.Module;
import com.escenic.studio.binding.AbstractPropertyBinding;
import com.escenic.studio.editors.PropertyEditorUI;
import com.escenic.studio.editors.ResourceRecorder;
import com.escenic.swing.DesaturatedIcon;
import com.escenic.swing.IterableButtonGroup;
import com.escenic.swing.SwingHelper;
import com.escenic.swing.binding.BindingEvent;
import com.escenic.swing.binding.BindingListener;
import com.escenic.swing.binding.BindingState;

import com.jgoodies.forms.factories.Borders;
import org.apache.commons.lang.Validate;
import org.apache.commons.lang.math.NumberUtils;
import org.jdesktop.application.Application;
import org.jdesktop.application.ResourceMap;

import javax.swing.AbstractButton;
import javax.swing.Icon;
import javax.swing.JButton;
import javax.swing.JComponent;
import javax.swing.JPanel;
import javax.swing.JToggleButton;

import java.awt.FlowLayout;
import java.beans.PropertyChangeEvent;
import java.beans.PropertyChangeListener;
import java.math.BigDecimal;
import java.util.ArrayList;
import java.util.List;

public class RatingPropertyEditorUI implements PropertyEditorUI {

  private static final int DEFAULT_VALUE = 10;

  private final AbstractPropertyBinding mBinding;
  private final List<RatingModel> mRatingModels = new ArrayList<RatingModel>();
  private final IterableButtonGroup mButtonGroup = new IterableButtonGroup();
  private final Icon mUnselectedIcon;
  private final Icon mSelectedIcon;
  private final JPanel mRootPanel;
  private boolean mIgnoreChangeEvents;
  private final ResourceRecorder mResourceRecorder;

  public RatingPropertyEditorUI(final AbstractPropertyBinding pBinding,
                                      ResourceRecorder pResourceRecorder) {
    Validate.notNull(pBinding, "Binding may not be null");
    Validate.notNull(pResourceRecorder, "Resource recorder may not be null");
    mResourceRecorder = pResourceRecorder;
    mRootPanel = new JPanel();
    mBinding = pBinding;
    ResourceMap resourceMap =
 Application.getInstance().getContext().getResourceMap(getClass());
    mRootPanel.setName(getClass().getName());
    mSelectedIcon = resourceMap.getIcon("selected-icon");
    mUnselectedIcon = new DesaturatedIcon(mSelectedIcon);
    SwingHelper.initialize(this);
  }

  public PropertyDescriptor getPropertyDescriptor() {
    return mBinding.getPropertyDescriptor();
  }

  public AbstractPropertyBinding getBinding() {
    return mBinding;
  }

  public void dispose() {
    List<BindingListener> listeners = new
 ArrayList<BindingListener>(mBinding.getBindingListeners());
    for (BindingListener listener : listeners) {
      mBinding.removeBindingListener(listener);
    }
    mResourceRecorder.disposeAll();
  }

  public void initModels() {
    Module ratingEditor =
 getPropertyDescriptor().getModule(RatingPropertyEditorSpi.PLUGIN_URI,

 RatingPropertyEditorSpi.RATING_EDITOR,

 RatingPropertyEditorSpi.ENABLED_ATTRIBUTE,

 RatingPropertyEditorSpi.ENABLED_ATTRIBUTE_VALUE);
    Module amountModule = ratingEditor.getModule(RatingPropertyEditorSpi.PLUGIN_URI,
 "amount");
    int amount = NumberUtils.toInt(amountModule.getContent(), DEFAULT_VALUE);
    if (amount > DEFAULT_VALUE) {
      amount = DEFAULT_VALUE;
    }
    for (int i = 1; i < amount + 1; i++) {
      mRatingModels.add(new RatingModel(i));
    }
  }

  public void initCommands() {
  }

  public void initComponents() {
    for (RatingModel ratingModel : mRatingModels) {
      JButton button = new JButton();
      button.setBorder(Borders.EMPTY_BORDER);
      button.setContentAreaFilled(false);
      button.setFocusable(false);
      button.setOpaque(false);
      button.setIcon(mUnselectedIcon);
      button.setDisabledIcon(mUnselectedIcon);
      button.setModel(ratingModel);
      mButtonGroup.add(button);
    }
  }

  public void initListeners() {
    mBinding.addPropertyChangeListener(
        "value",
        new PropertyChangeListener() {
          public void propertyChange(final PropertyChangeEvent pEvent) {
            setValueFromBinding();
          }
        }
    );
    mBinding.addPropertyChangeListener("readOnly", new PropertyChangeListener() {
      public void propertyChange(PropertyChangeEvent pEvt) {
        setComponentState();
      }
    });

    mBinding.addBindingListener(new BindingListener<Object>() {
      public void bindingUpdated(BindingEvent<Object> pEvent) {
        setComponentState();
      }
    });
    mButtonGroup.addPropertyChangeListener(IterableButtonGroup.SELECTED_PROPERTY,
                                           new PropertyChangeListener() {
      public void propertyChange(PropertyChangeEvent pEvent) {
        if (!mIgnoreChangeEvents) {
          updateBindingValue((RatingModel) pEvent.getNewValue());
        }
      }
    });
  }

  public void initLayout() {
    mRootPanel.setLayout(new FlowLayout(FlowLayout.LEFT));
    for (AbstractButton button : mButtonGroup) {
      mRootPanel.add(button);
    }
  }

  public void initState() {
    setValueFromBinding();
    setComponentState();
  }

  public JComponent getRootComponent() {
    return mRootPanel;
  }

  private void updateBindingValue(final RatingModel pValue) {
    mIgnoreChangeEvents = true;
    mButtonGroup.setSelected(pValue, true);
    mBinding.setValue(pValue == null ? null : new BigDecimal(pValue.getValue()));
    updateSelectedIcon(pValue);
    mIgnoreChangeEvents = false;
  }

  private void setValueFromBinding() {
    if (!mIgnoreChangeEvents) {
      BigDecimal value = (BigDecimal) mBinding.getValue();
      if (value != null) {
        for (RatingModel ratingModel : mRatingModels) {
          if (ratingModel.getValue() == value.intValueExact()) {
            mButtonGroup.setSelected(ratingModel, true);
            updateSelectedIcon(ratingModel);
            break;
          }
        }
      }
      else {
        updateSelectedIcon(null);
      }
    }
  }

  private void updateSelectedIcon(final RatingModel pRatingModel) {
    long value = pRatingModel == null ? -1 : pRatingModel.getValue();
    for (int i = 0; i < mButtonGroup.getButtonCount(); i++) {
      Icon icon = mUnselectedIcon;
      AbstractButton button = mButtonGroup.get(i);
      if (i <= value - 1) {
        icon = mSelectedIcon;
      }
      button.setIcon(icon);
    }
  }

  private void setComponentState() {
    if (mBinding.getState() == BindingState.UNBOUND) {
      for (AbstractButton button : mButtonGroup) {
        button.setEnabled(false);
        button.setSelected(false);
      }
    }
    for (AbstractButton button : mButtonGroup) {
      button.setEnabled(!mBinding.isReadOnly());
    }
  }


  private class RatingModel extends JToggleButton.ToggleButtonModel {
    private final int mValue;

    public RatingModel(final int pValue) {
      mValue = pValue;
      setRollover(false);
    }

    public int getValue() {
      return mValue;
    }
  }
}
```

7.6.2 RatingPropertyEditorSpi Example

```
package com.escenic.studio.plugin;

import com.escenic.domain.PropertyDescriptor;
import com.escenic.studio.binding.AbstractPropertyBinding;
import com.escenic.studio.editors.PropertyEditorUI;
import com.escenic.studio.editors.ResourceRecorder;
import com.escenic.studio.editors.spi.PropertyEditorSpi;

import java.net.URI;

public class RatingPropertyEditorSpi extends PropertyEditorSpi {
  public static final URI PLUGIN_URI = URI.create("http://xmlns.escenic.com/2008/
studio-plugin");
  public static final String RATING_EDITOR = "rating-editor";
  public static final String ENABLED_ATTRIBUTE = "enabled";
  public static final String ENABLED_ATTRIBUTE_VALUE = "true";

  public boolean supports(final PropertyDescriptor pPropertyDescriptor) {
    return Number.class.isAssignableFrom(pPropertyDescriptor.getType()) &&
        pPropertyDescriptor.getModule(PLUGIN_URI,
                                      RATING_EDITOR,
                                      ENABLED_ATTRIBUTE,
                                      ENABLED_ATTRIBUTE_VALUE) != null;
  }

  public PropertyEditorUI createPropertyEditor(final AbstractPropertyBinding
 pBinding,
                                                final ResourceRecorder
 pResourceRecorder) {
    return new RatingPropertyEditorUI(pBinding, pResourceRecorder);
  }
}
```