convertigo
MASHUP YOUR BUSINESS

Starting with Convertigo Web Integrator

Quick Guide

CEMS 5.1.0

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1 Getting Familiar with Convertigo Web Integrator

This chapter presents the purpose, concepts and objects of **Convertigo Web Integrator** (**CWI**), one of Convertigo Enterprise Mashup Studio's components.

It also describes the four views of the Eclipse-based CWI Studio and their elements (tabs, icons, menu).

- CWI Purpose
- CWI Concepts and Objects
- CWI Studio

1.1 CWI Purpose

The purpose of Convertigo Web integrator (CWI) is to expose Web sites and applications as SOAP or REST Web services, thus allowing any application to programmatically access data and business logic from the target Web site.

Figure 1 - 1: CWI exposes any Web application as SOAP or REST Web service

CWI encompasses a large number of applications:

- *Reusing* a company's Web applications assets to build new SOA based architectures.
- *Integrating* non intrusively existing enterprise Web applications into SOA.

- *Creating* APIs on any extranet or public Web application.
- *Collecting* data from Web sites to be inserted in databases.
- *Exchanging* data with any Web application such as eGoverment sites or partner sites.
- *Integrating* Web applications into workflow managers or complex BPM processes.

1.2 CWI Concepts and Objects

This section presents the general concept and notions of the application. It then relates notions to real CWI objects, which are defined in detail in a dedicated sub-section.

- General Concept
- CWI Objects
- Definitions

1.2.1 General Concept

CWI accesses a target HTML Web site and navigates through HTML Web *screens* (Web pages, application forms, etc.) following variable-based *transactions* while extracting information on the fly. During the extraction process, information is structured into XML format.

Navigation and extraction depend on events, actions and rules based on CWI objects, that are set as part of a Web integration project.

1.2.2 CWI Objects

The following table describes CWI objects:

Table 1 - 1: CWI objects

Object[a]	Description
Connector	Defines the type of application (HTTP, HTML, etc.) CWI connects to.
Screen class	Defines a family of HTML pages with common characteristics.
Criterion	Is a characteristic element defining a specific screen class.
Extraction rule	Is a rule defining how information is extracted from a Web screen.
Transaction	Defines the actions Convertigo must perform on HTML pages.
Screen class handler	Is a set of statements triggered on detection of a specific screen class.
Statement	Is an action or set of actions performed on HTML pages.
Variable	Is the transaction input variable.

a. *Objects are indented in the column according to their indentation level in the Project tree of the Projects View (see Figure 1 - 2)*

All of these objects are set when developing a Web integration project. Once the project has been created, these objects appear in the **Projects View** of the CWI Studio (*"CWI Studio"* on page 1 - 7):

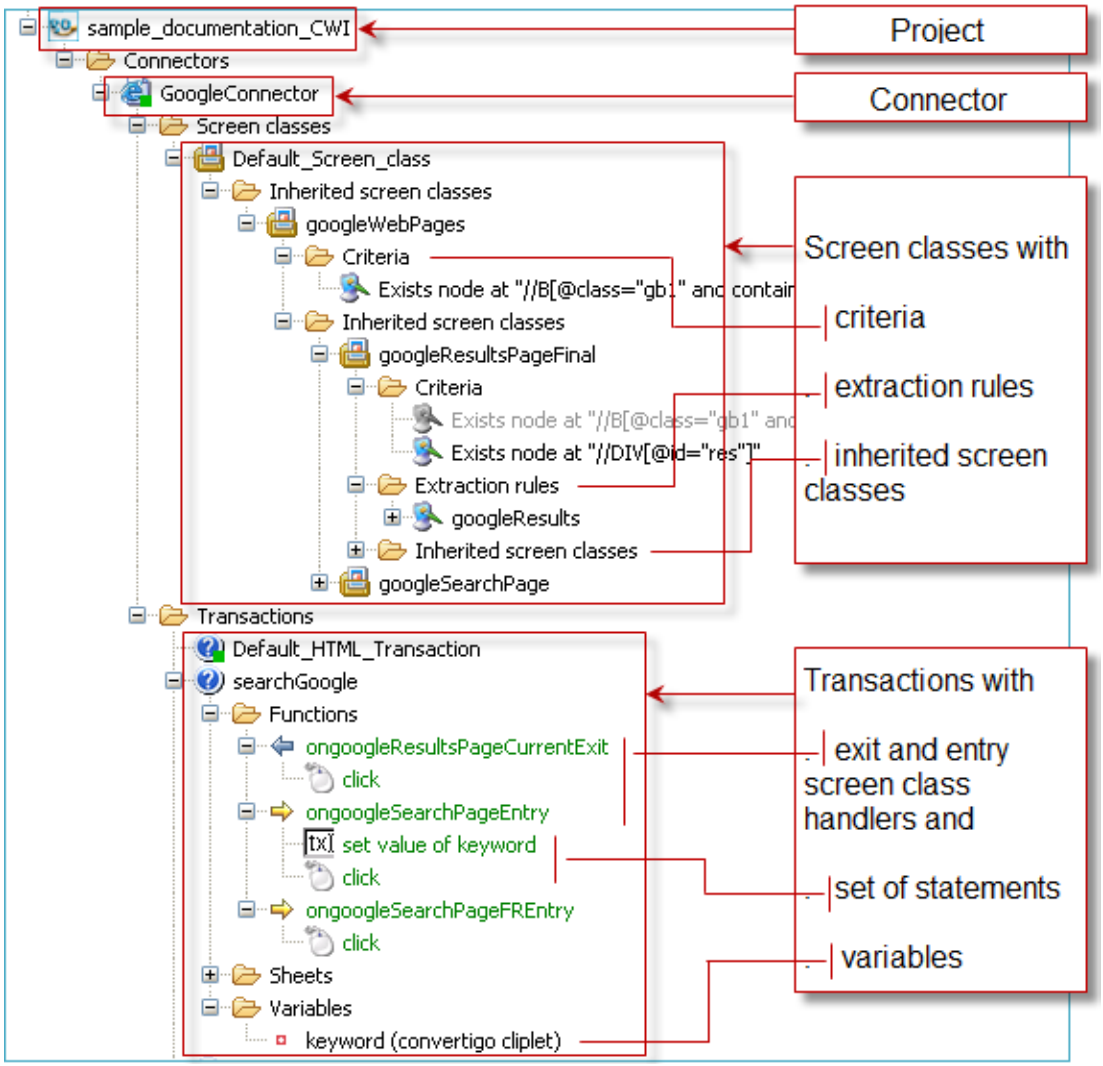


Figure 1 - 2: CWI objects

To get started with your first Web integration project, see *"My First Convertigo Web Integrator Project" on page 2-1*

1.2.3 Definitions

CONNECTOR

A connector defines the type of application or data source CWI is able to connect to.

Two types of connectors are available in CWI:

Table 1 - 2: Connector types

Connector type	Description
HTTP Connector	Enables Convertigo to connect to any HTTP flow.
HTML connector	Enables Convertigo to connect to any HTML based application.

Connector parameters are set in the **New Project** wizard which opens when creating a Web integration project (see *"Creating a Project and Setting Connector Parameters"* on page 2-6).

Once a new project has been created, the corresponding connector appears in the *Connectors* folder of the project, in the **Projects View** of the CWI Studio (*"CWI Studio"* on page 1 - 7):

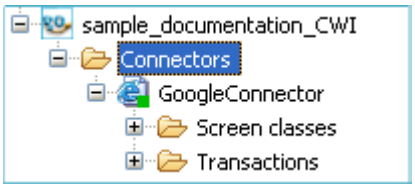


Figure 1 - 3: Connectors folder

Screen Class

Screen classes define families of Web screens (Web page, application form, etc.) with common characteristics (called *criteria*). Screen classes are:

- uniquely identified by at least one *criterion*;
- associated to *extraction rules*.

A single root screen class, called ***Default screen class***, is created by default when creating a project The default screen class is not - but can be - associated to any criterion or extraction rule. It is parent to all other screen classes.

A screen class based on a parent screen class (defined with extra criteria and extraction rules for instance) is called ***Inherited screen class***. It inherits criteria and extraction rules from its parent screen class.

Inherited screen classes appear in subfolders named *Inherited screen classes* in the **Projects View** of the CWI Studio (*"CWI Studio"* on page 1 - 7):

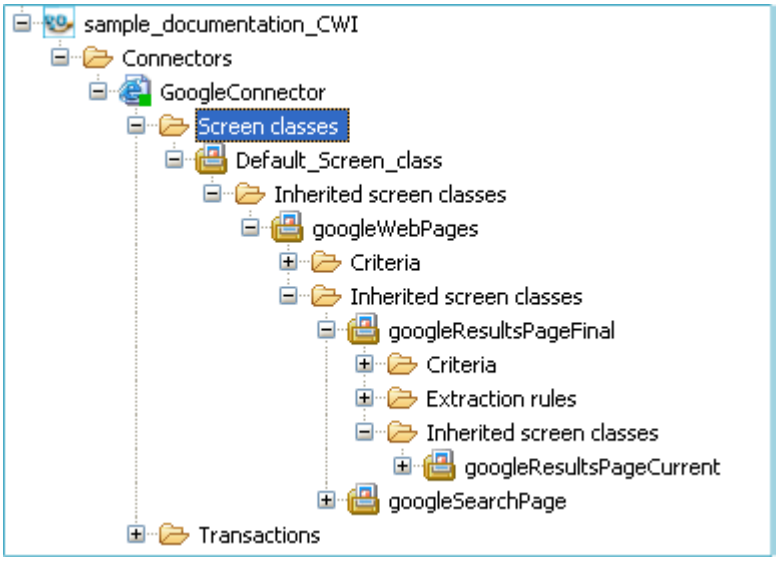


Figure 1 - 4: Screen classes and Inherited screen classes folders

Criterion

A Web screen is considered belonging to a screen class when it matches all criteria defined by the user for this screen class. If no criterion matches, the Web screen is considered

belonging to the default screen class (provided that the default screen class is not associated to any detection criterion).

Criteria are set using the ***XPath language***, which addresses parts of an XML document; an XPath can be, for example, the path to a logo, a field, a word or any other identifying element on a Web screen. If at least one element is adressed by the XPath on the HTML page, the criterion matches.

XPaths are managed in the CWI Studio using the **XPath Evaluator**, which is part of the **Connector View** of the CWI Studio (*"CWI Studio"* on page 1 - 7).

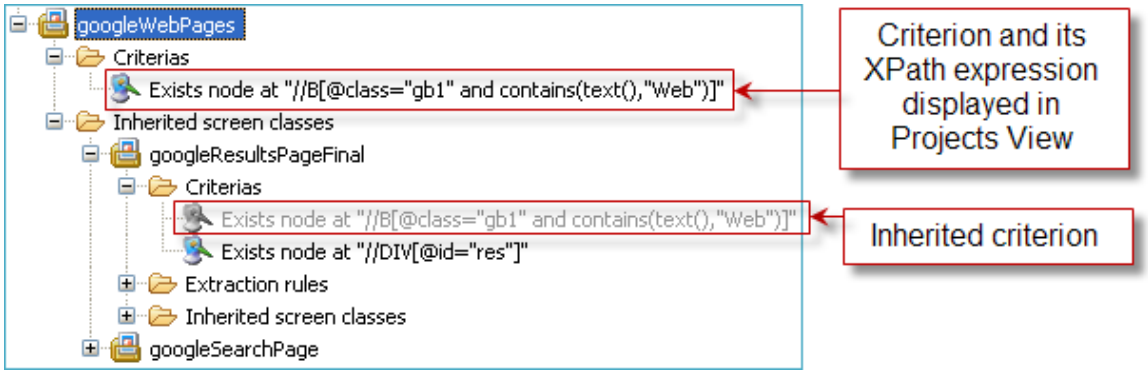


Figure 1 - 5: Criterion and inherited criterion

For more information on XPath, see the XPath tutorial from W3Schools at http://www.w3schools.com/XPath/.

EXTRACTION RULE

Extraction rules define which data must be extracted from the target application and how. They are used to generate parts of the XML output resulting from a transaction execution.

During a *transaction* process, when a screen class is detected (i.e. all criteria defined for this screen class match), all screen class-specific extraction rules are executed, including those from its inherited screen classes.

TRANSACTION

Web page navigation is performed using HTML transactions, that is a series of actions (called *statements*) performed from one Web screen to another. These actions are triggered by events associated with the detected screen class, using *screen class handlers*.

A transaction can be summed up as a process:

- taking *variables* in input;
- producing an XML document in output.

When executing the transaction, transaction variables are automatically added as variables of the JavaScript scope. Transaction variables can be given a fixed (default) value, or their value can be set as input parameter prior to executing a transaction (for an example of transaction variable setting, see *"To set a transaction variable"* on page 2-42).

Once a transaction has been defined, it appears in the *Transactions* folder of a given

connector, in the **Projects View** of the CWI Studio (*"CWI Studio"* on page 1 - 7):

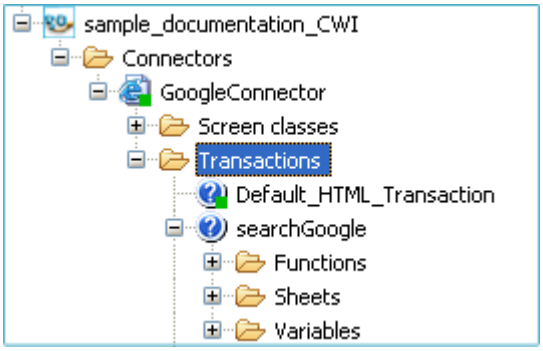


Figure 1 - 6: Transactions folder

SCREEN CLASS HANDLER

Basically, a screen class handler is meant to answer the following question : "Now that I have accessed this screen, what am I supposed to do?".

In other words, once a given screen class has been accessed and detected (depending on user-defined criteria), the corresponding screen class handler is triggered and performs user-defined actions.

In CWI, two types of screen class handler can be defined for a given screen class:

Table 1 - 3: Screen class handler types

Screen class handler	Description
on<*ScreenClass*>Entry	Triggered when CWI detects a given <***ScreenClass***>. Is identified by a  symbol on the left of the screen class handler name (see Figure 1 - 7).
on<*ScreenClass*>Exit	Triggered after extraction rules have been executed for a given <***ScreenClass***>. Is identified by a  symbol on the left of the screen class handler name (see Figure 1 - 7).

Other handlers exist, but their use falls out of the scope of this guide.

Once a screen class handler has been created, it appears in the *Functions* folder of the transaction, in the **Projects View** of the CWI Studio (*"CWI Studio"* on page 1 - 7):

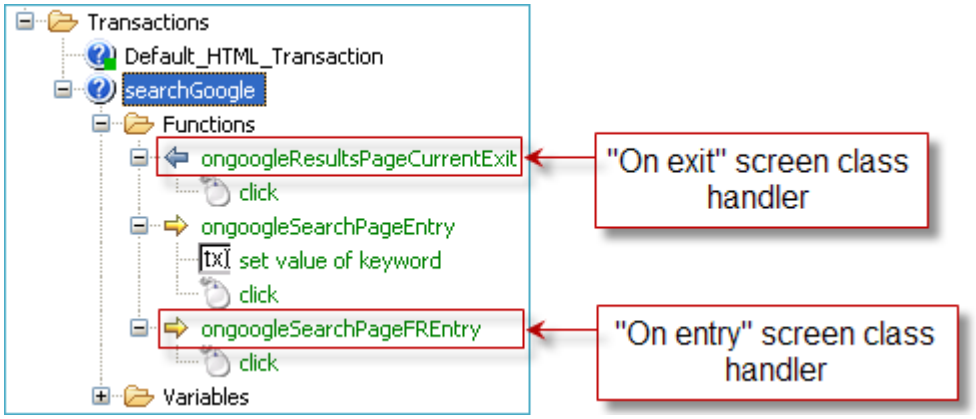


Figure 1 - 7: "On entry" and "on exit" screen class handlers

A screen class handler can contain one or several *statements*.

For example: Type in a keyword (statement #1) then click on ***Next*** (statement #2):

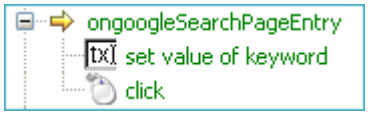


Figure 1 - 8: List of statements

STATEMENT

A statement is an action that is performed on **entry** to or on **exit** from a Web screen, provided that the screen class of this Web screen has been detected. Statements include mouse clicks, data inputs, etc.

1.3 CWI Studio

This section describes the CWI Studio, which comprises four distinct panes: the **Projects View**, the **Connector View**, the **Properties View** and the **Console**.

- General Presentation
- View Description

1.3.1 General Presentation

Based on an Eclipse platform, the CWI Studio is divided into four views that all include:

- one or several tabs, located either on the upper or on the lower part of the view;
- icons;
- three standard Eclipse buttons (**Menu** , **Minimize** and **Maximize**)

The four views are illustrated and named in the figure below:

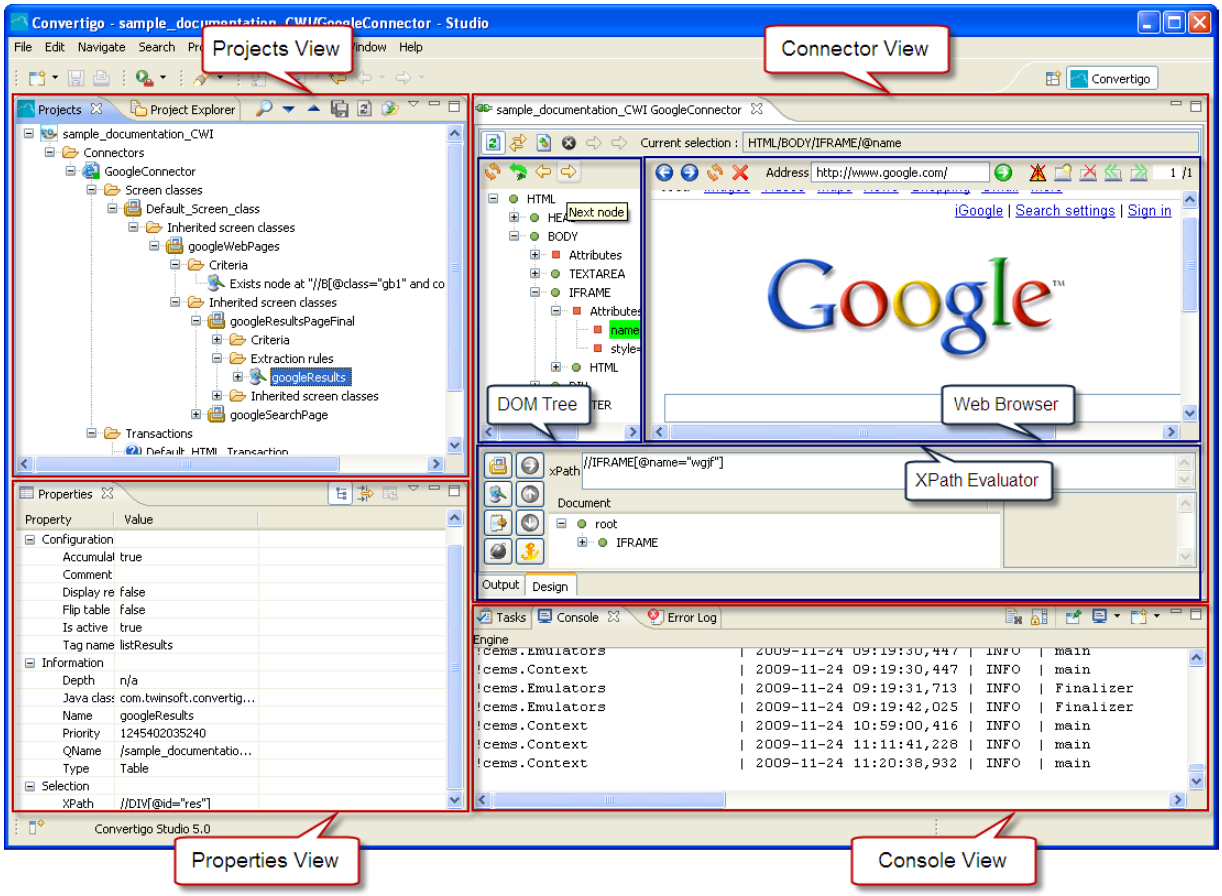


Figure 1 - 9: CWI Studio

The following table describes the views of the Convertigo Web Integrator studio:

Table 1 - 4: CWI views

View Name	Description
Projects View	Displays in a tree structure all CWI projects and their related objects: connectors, screen classes (including criteria, extraction rules and inherited screen classes) and transactions (including screen class handlers and statements).
Properties View	Displays the properties of the CWI object selected in the **Projects View**. Used to modify a given object properties.
Connector View / Editor	The **Connector View** is divided into three parts: • the **DOM Tree** - displays the Document Object Model Tree (logical structure) of the Web page accessed by CWI; • the **Web Browser** - displays the Web page accessed by CWI, depending on the connector parameters set for the project; • the **XPath Evaluator** - displays XPath-specific information such as the XPath expression of a node. Contains shortcuts (icons) for creating new child screen classes, criteria, extraction rules, statements, etc. It is automatically updated as an **Editor** whenever files (in editable format such as .xml, .css or .xsl) are edited.
Console View	Standard Eclipse console. Displays information about running tasks, errors, etc. Different consoles are available (standard output, Engine, Studio, etc.).

1.3.2 View Description

All four views contain common standard Eclipse buttons in the upper right corner of the view:

Table 1 - 5: Standard Eclipse buttons

Button	Icon	Description
Menu		Opens a drop-down menu with a content identical to the view toolbar.
Minimize		Minimizes the current view without closing it. The view is still visible in the form of an icon that can be clicked to be enlarged again.
Maximize		Maximizes the current view to full screen. Maximizing a view can also be achieved by double clicking the upper bar of the view.

The following section describes the four panes of the CWI Studio in further detail.

Projects View

The **Projects View** displays all information (objects, folders and files) associated with a project. Information appear in distinct tree structures depending on the selected tab.

In addition to project tree structures and standard Eclipse buttons (see Table 1 - 5 on page 1-9), the **Projects View** includes tabs and icons:

Table 1 - 6: Projects View tabs and icons

View Element		Description
Tabs	Projects	Convertigo view. Contains all projects and related objects. Objects are presented in a tree structure and contained in folders.
	Project Explorer	Standard Eclipse view. Contains all projects and related files. Files are represented in a tree structure.
Icons		*Find* icon. Search project tree for a specific object
		Decrease priority icon. Available only if an extraction rule is selected. Decreases its priority, thus changing extraction rules execution order for this screen class and its children classes.
		Increase priority icon. Available only if an extraction rule is selected. Increases its priority, thus changing extraction rules execution order for this screen class and its children classes.
		*Save* icon. Available only when at least one object has been modified. Saves all the project. All objects will be saved, and project xml file will be updated. **Note: Remember to save projects on a regular basis.**
		*Refresh* icon. Available only if a project is selected. Refreshes Projects View by reloading project content from the hard drive. Identical to closing and re-opening project.
		*Import* icon. Imports a new project (in CAR or XML format) in the Studio.

In the **Projects View**, objects are formatted depending on their status:

- plain text - unchanged object;
- bold - object changed and unsaved;

- red - disabled object;
- orange - not executable object (child of a disabled object);
- grey - inherited object.

The figure below shows the different types of formatting in the **Projects View**.

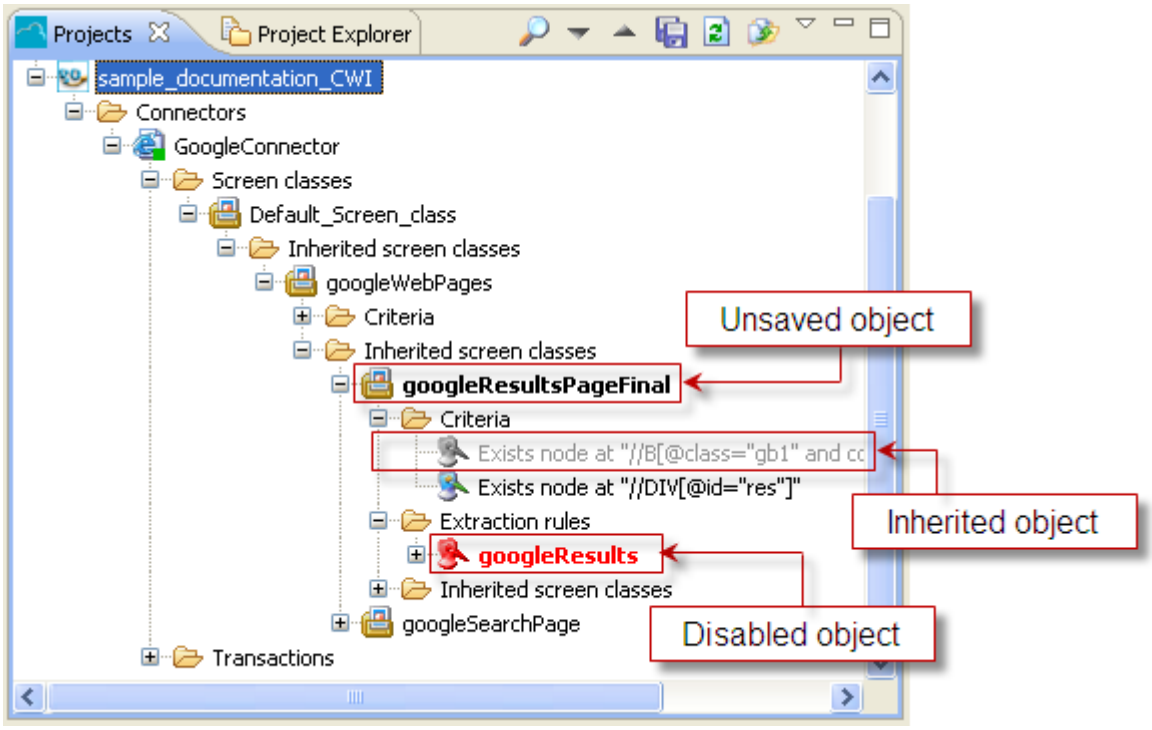


Figure 1 - 10: Formatting of unsaved, inherited and disabled objects in the Projects View

Once an object has been selected in the **Projects View**, its properties appear in the **Properties View**.

Properties View

The **Properties View** displays the properties of the object selected in the **Projects View**.

Properties depend on the type of the selected object. They are presented by categories (*Expert*, *Configuration*, *Information*, *Selection*, *Properties*, etc. - categories can be hidden by clicking on) that can be either expanded or collapsed by clicking respectively on or .

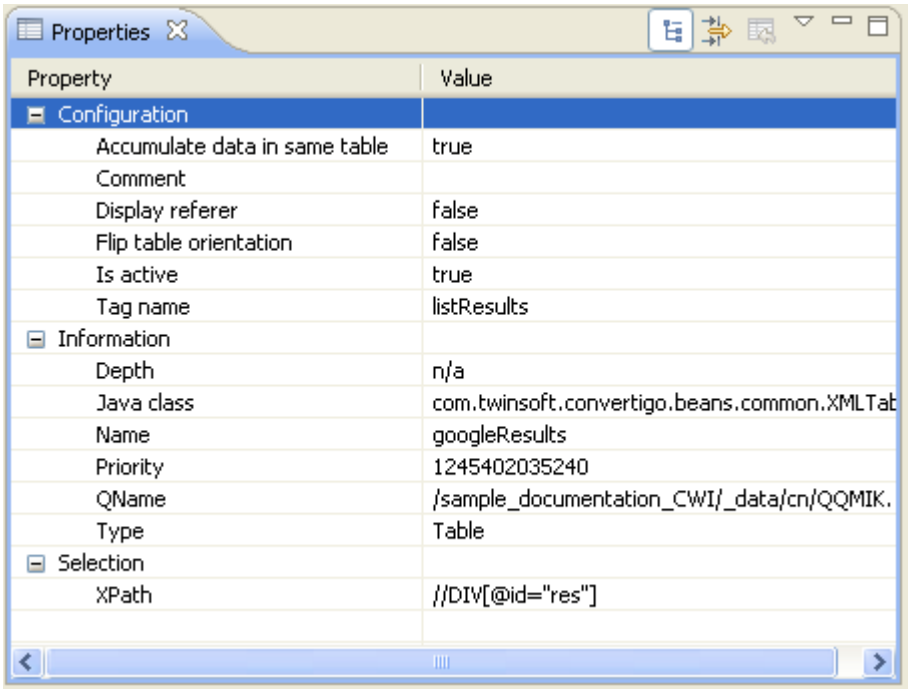


Figure 1 - 11: Properties View

In addition to object properties and standard Eclipse buttons (see Table 1 - 5 on page 1-9), the **Properties View** includes one tab (*Properties*) and icons:

Table 1 - 7: Properties View icons

Icon	Description
	*Show Categories* icon. Displays or hides property categories. When categories are hidden, properties appear in alphabetical order.
	*Show Advanced Properties* icon. Displays or hides advanced properties, if relevant. Not used for Convertigo objects properties.
	*Restore Default Value* icon. Available only when a property has been modified. Restores it to default value. Not used for Convertigo objects properties.

To edit properties

1 Left-click on the property value in the **Properties View**;

2 Depending on the property type:

- the value is highlighted with white background; edit it by typing a new value in the field:

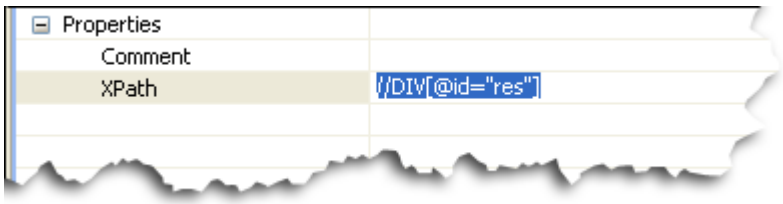


Figure 1 - 12: Text property field edition

- the value is highlighted with clear blue background; edit it by typing a new

JavaScript expression in the field:

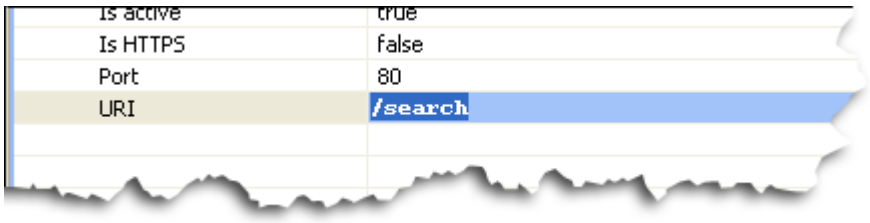


Figure 1 - 13: Javascript expression field edition

- the value is higlighted and a … symbol appears on the right of the field:

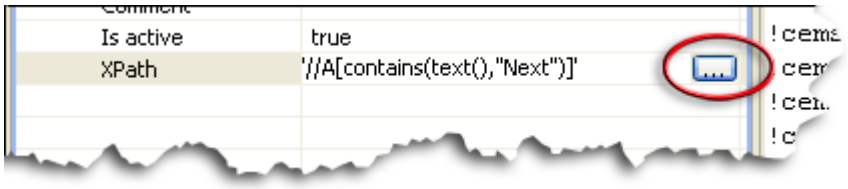


Figure 1 - 14: Text property edition via edition window

Click on …. Depending on the property type:

A. A Javascript expression window or an edition window opens:

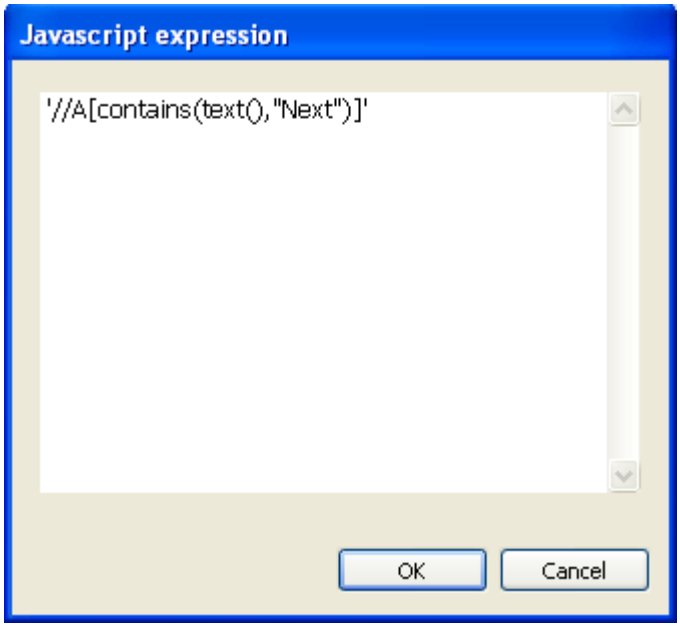


Figure 1 - 15: Javascript expression window

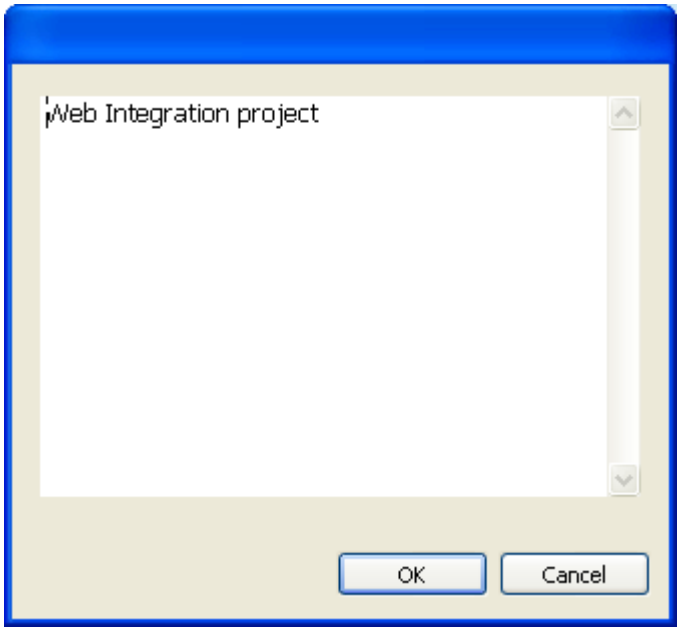


Figure 1 - 16: Edition window

1 Enter the new JavaScript expression or the text comment in the window.

2 Click on **OK**.

B. A configuration window opens (in this example, the **Trigger Editor** window for statement synchronization):

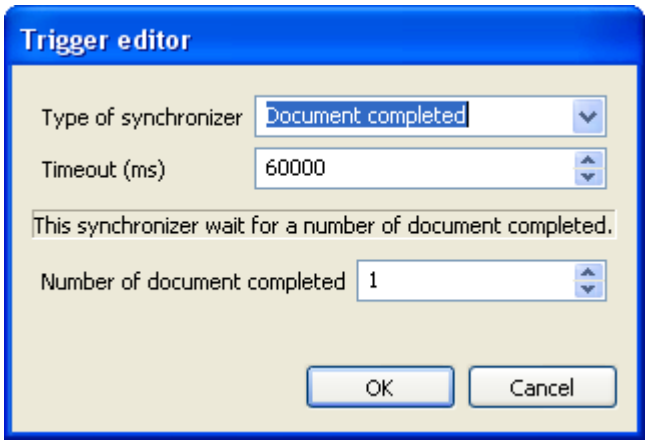


Figure 1 - 17: Configuration window

1 Set the parameters in the different fields and menus.

2 Click on **OK**.

- the value is higlighted and a symbol appears on the right of the field:

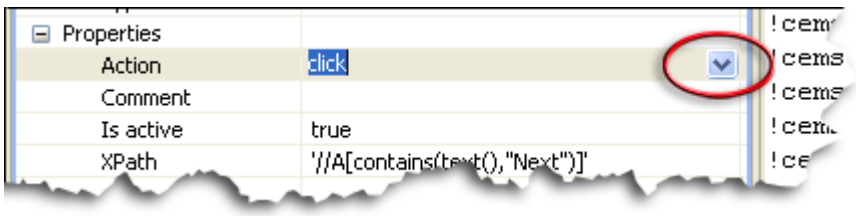


Figure 1 - 18: Text property edition via drop-down menu

1 Click on . A drop-down menu appears:

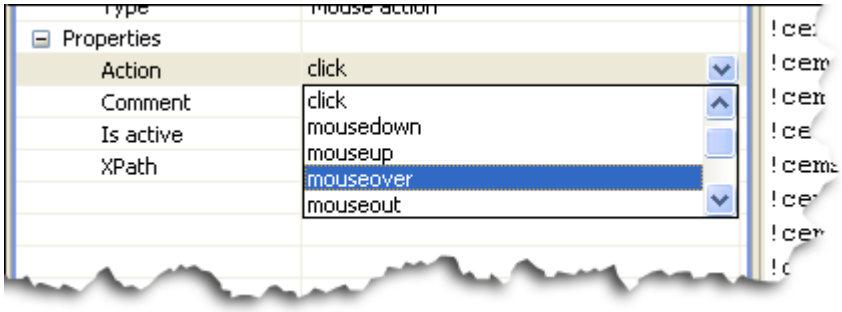


Figure 1 - 19: Selecting a value in the drop-down menu

2 Select a value in the drop-down menu.

3 Press **Enter**.

Connector View

The **Connector View** displays connector-specific information. This information depends on the type of connector set for the project. In the case of HTML connectors, the view is divided into three parts.

The table below describes these parts:

Table 1 - 8: Connector View parts

Name	Description
Dom Tree	Displays the logical structure of the Web page displayed in the **Web Browser**.
Web Browser	Displays the Web page accessed by CWI.
XPath Evaluator	Displays the XPath expression of HTML elements selected in the **Web Browser** and result nodes of the written XPath execution on the **DOM Tree**. Includes shortcuts to create new criteria, statements, screen class, etc.

As other views, the **Connector View** also includes tabs and icons:

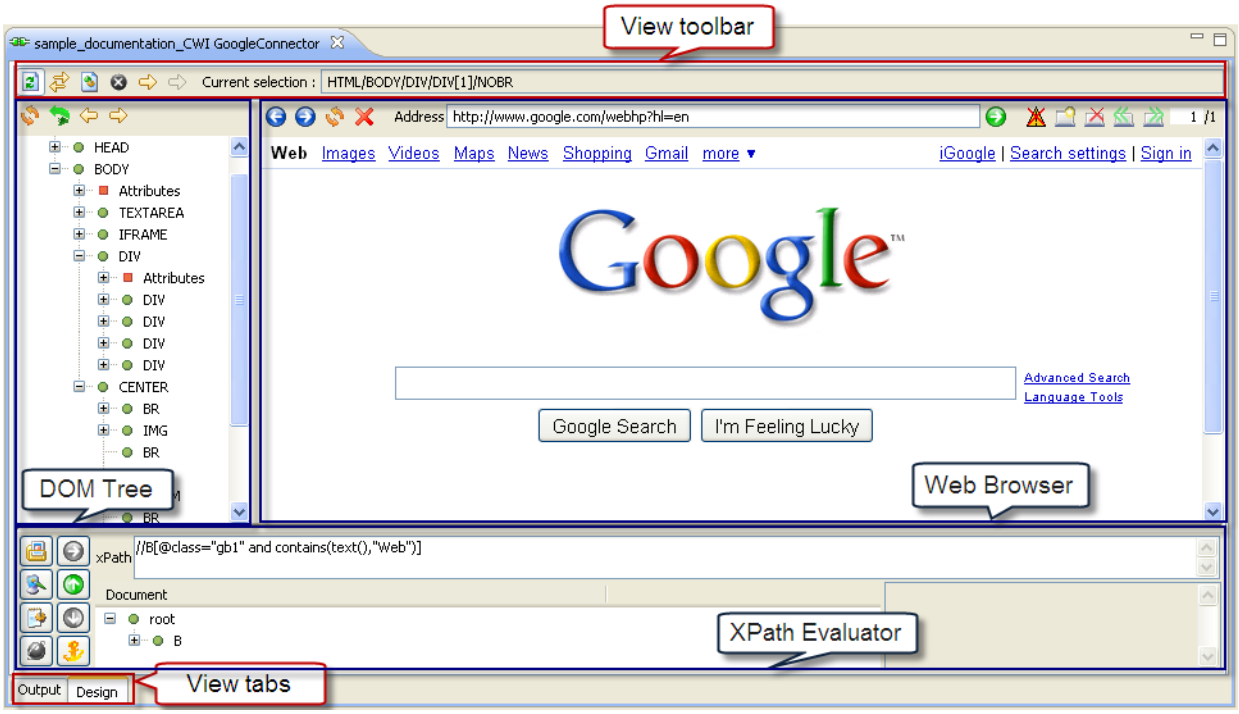


Figure 1 - 20: Connector View (Design tab selected)

The table below describes the **Connector View** icons that are available when the **Design** tab is selected (by default):

Table 1 - 9: Connector View tabs, icons and field

View Element		Description
Tab	Output	Displays the XML code generated following either a transaction (according to extraction rules) or a *Generate XML* action (see Figure 1 - 21).
	Design	Displays the **Dom Tree**, **Web Browser** and **XPath Evaluator**.
Icon		*Toggle auto refresh domTree* icon. Press this icon to activate the auto refresh domTree function, which automatically refreshes the **DOM Tree** when a new Web page is displayed in the Web Browser.
		*Show current screen class* icon. Highlights in light grey in the **Projects View** the screen class detected for the Web page currently displayed in the **Web Browser**.
		*Generate XML* icon. Generates the XML code of the Web page currently displayed in the **Web Browser** by executing the related extraction rules. The XML code is displayed under the **Output** tab of the **Connector View**.
		*Stop transaction* icon. Stops the current transaction (while a transaction is in process).
		*Learn* icon. Available only when a transaction is selected. Activates the *Learn* mode - any action manually performed in the HTML **Connector View** is recorded and HTTP statements are automatically generated in corresponding screen class entry handler. For advanced users only.

Table 1 - 9: Connector View tabs, icons and field (...)

View Element		Description
		*Accumulate learning mode* icon. Available only when *Learn* mode is on. Accumulate data on visited Web screens. Screen class exit handlers are automatically created in the transaction. For advanced users only.
Field	Current selection	Displays the path to the node selected in the DOM Tree (left-click) or to the HTML element selected in the Web Browser (right-click).

When the **Output** tab is selected, the view displays XML code:

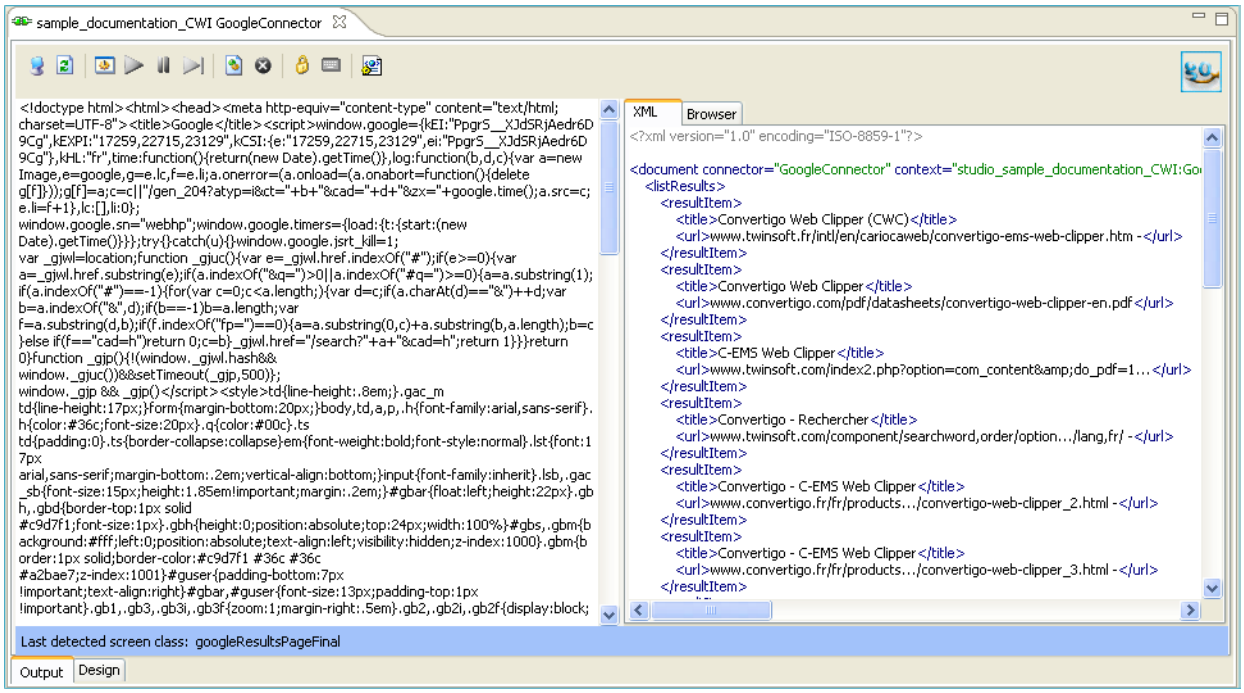


Figure 1 - 21: Connector View (Output tab selected)

DOM TREE

The **DOM Tree** models an HTML (or XML) document as a tree structure called *node-tree*. It contains all nodes (parents, children and siblings) of the HTML document it models (which is displayed in the **Web Browser** in the CWI Studio):

- root nodes;
- element nodes;
- text nodes;
- attribute nodes;
- namespace nodes;
- processing instruction nodes;
- comment nodes.

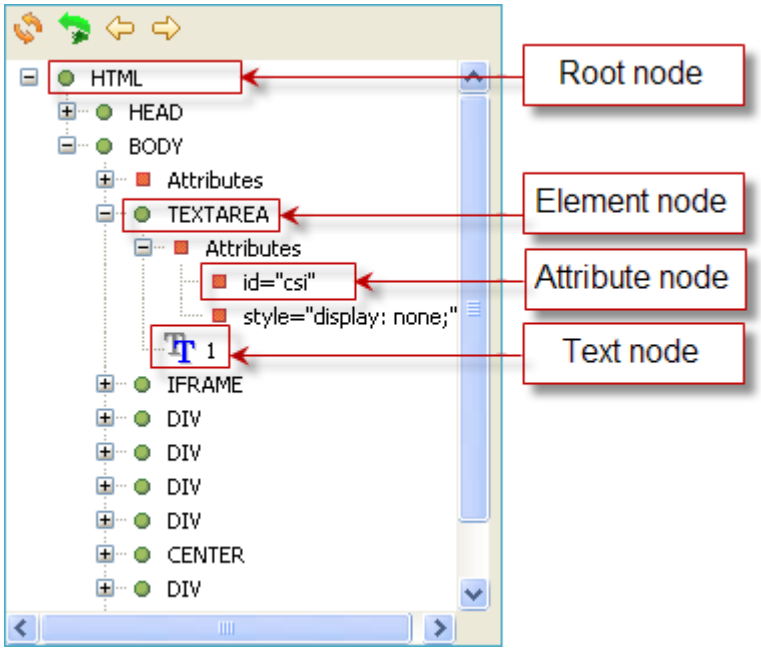


Figure 1 - 22: DOM Tree

The table below describes the **Dom Tree** icons:

Table 1 - 10: Dom Tree icons

Icon	Description
	*SyncTree* icon. Synchronizes the DOM Tree with the HTML page currently displayed in the **Web Browser**.
	*Parent node* icon. Selects and highlights in green the parent node of the node currently selected in the **DOM Tree**. Also outlines in green the corresponding HTML element in the **Web Browser**.
	*Previous node* icon. Selects and highlights in green the node appearing before the node currently selected in the **DOM Tree**. Also outlines in green the corresponding HTML element in the **Web Browser**.
	*Next node* icon. Selects and highlights in green the node appearing after the node currently selected in the **DOM Tree**. Also outlines in green the corresponding HTML element in the **Web Browser**.

Web Browser

The **Web Browser** displays the Web page accessed by CWI. Its logical structure is displayed in the DOM Tree on the left of the browser.

The **Web Browser** automatically displays the HTML page of the HTTP server defined as **Target Server** in the connector parameters (see *"Creating a Project and Setting Connector Parameters"* on page 2-6).

All HTML elements (image, text, field, etc.) of Web pages displayed in the **Web Browser** can be selected with a right-click. Once selected, they appear outlined in green in the **Web Browser**, and their corresponding element node is highlighted in green in the **DOM Tree**:

Figure 1 - 23: HTML element selected in the Web Browser

The XPath expression of selected elements can be generated either by right-clicking the required element node in the DOM Tree and selecting **Generate selection XPath (Enter)** or by selecting it with a left-click and pressing **Enter**. The XPath expression then appears in the **XPath Evaluator**.

The **Web Browser** includes a toolbar with:

- standard Browser icons - **Back**, **Forward**, **Refresh**, **Stop**;
- an address bar;
- icons to manage Web page tabs - **New**, **Close, Next, Previous**. The **Allow alert box** icon allows to display  or block  JavaScript pop-ups (blocked by default in CWI).

XPath Evaluator

The purpose of the **XPath Evaluator** is to display the XPath expression of HTML elements previously selected (with a right-click) in the **Web Browser**. The **Document** field displays the results from running the XPath expression specified in the **xPath** field on the **DOM Tree**.

The **XPath Evaluator** also contains icons for creating new CWI objects (statements, criteria, screen classes, etc.) from the XPath currently displayed in the **xPath** field.

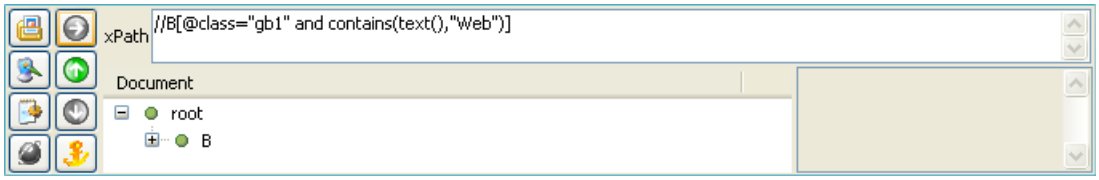
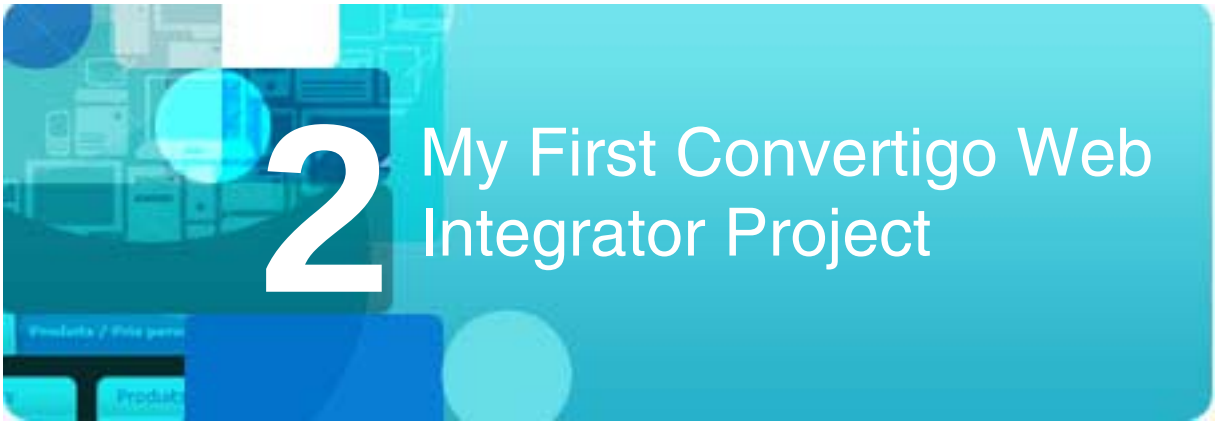


Figure 1 - 24: XPath Evaluator

The table below describes the fields and icons of the **XPath Evaluator**:

Table 1 - 11: XPath Evaluator elements

XPath Evaluator Elements		Description
Field	xPath	Displays the XPath expression generated from the **Dom Tree**. XPath expressions can also be typed in directly and evaluated on the **DOM Tree**
	Document	Displays the results from running the XPath expression specified in the *xPath* field on the **DOM Tree**.
Icon		*Create new child screen class from current XPath* icon. Launches the **New Screen Class** wizard.
		*Create new criterion from current XPath* icon. Launches the **New Criterion** wizard.
		*Create new extraction rule from current XPath* icon. Launches the **New Extraction Rule** wizard.
		*Create new statement from current XPath* icon. Launches the **New Statement** wizard. Available when a suitable handler or container is selected in the **Projects View** only.
		*Evaluate XPath* icon. Evaluates the XPath expression specified in the *xPath* field on the **DOM Tree**. The result is displayed in the *Document* field.
		*Backward XPath History* icon. Displays in the *xPath* field the previous XPath stored in the XPath history.
		*Forward XPath History* icon. Displays in the *xPath* field the next XPath stored in the XPath history.
Icon		*Set Anchor* icon. Applicable after an XPath has been generated for a given node. Fixes this XPath and highlights it in yellow. Used to develop complex XPath from an *anchored* XPath.



2 My First Convertigo Web Integrator Project

This chapter gives instructions on how to set up a simple CWI project.

- Web Integration Project
- Setting Up the Project

2.1 Web Integration Project

This section describes the sample Web Integrating project and how to open the completed sample project from the Studio:

- Project Description
- Opening the Sample Project from the Studio

2.1.1 Project Description

The purpose of this Web integration project (called *sample_doc_CWI*) is to list in XML format the Web page titles and URLs returned by the Google search engine after sending a search request.

The process can be summed up as follows:

1 Connect to the Google Web site at `www.google.com`.

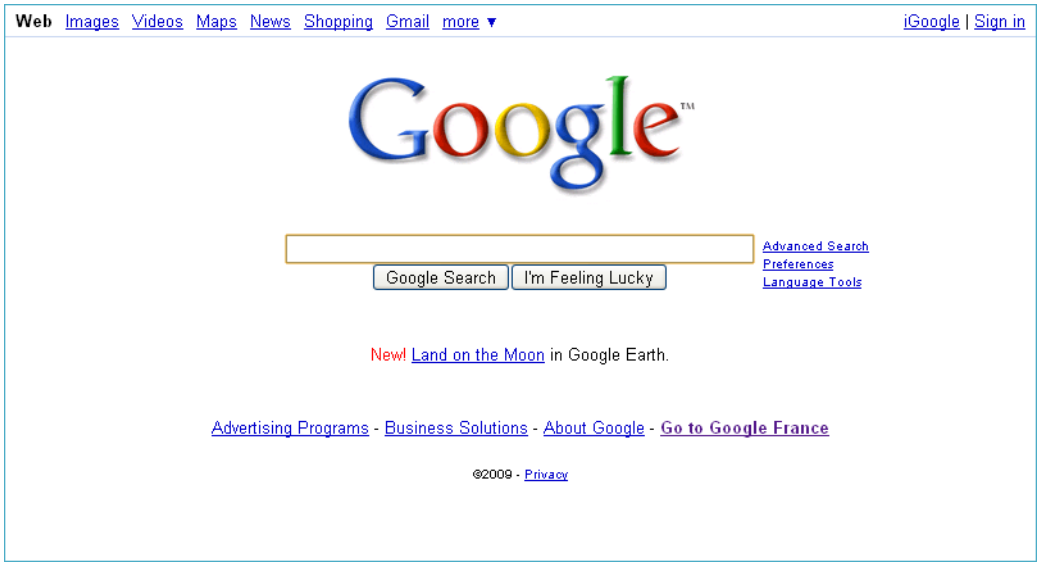


Figure 2 - 1: Connection to Google HTTP server

When accessing the `www.google.com` Website, Google servers provide Internet users with a "localized" version of the Google search engine. This adds an extra step to the project, since CWI must then be redirected to the standard Google home page (see "Case of a Country-Specific Google Search Page - Definition of the `googleSearchPageFR` Screen Class" on page 2-21).

2 Key in search keywords in the Google search field (for example `convertigo cliplet`).

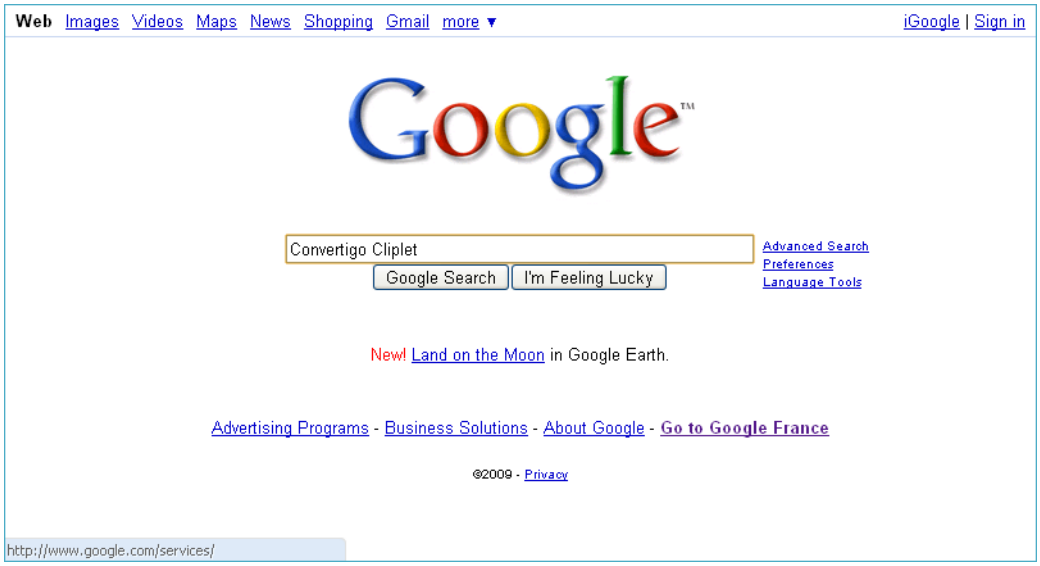


Figure 2 - 2: Input of a search keyword in Google search field

3 Click on the **Google Search** button.

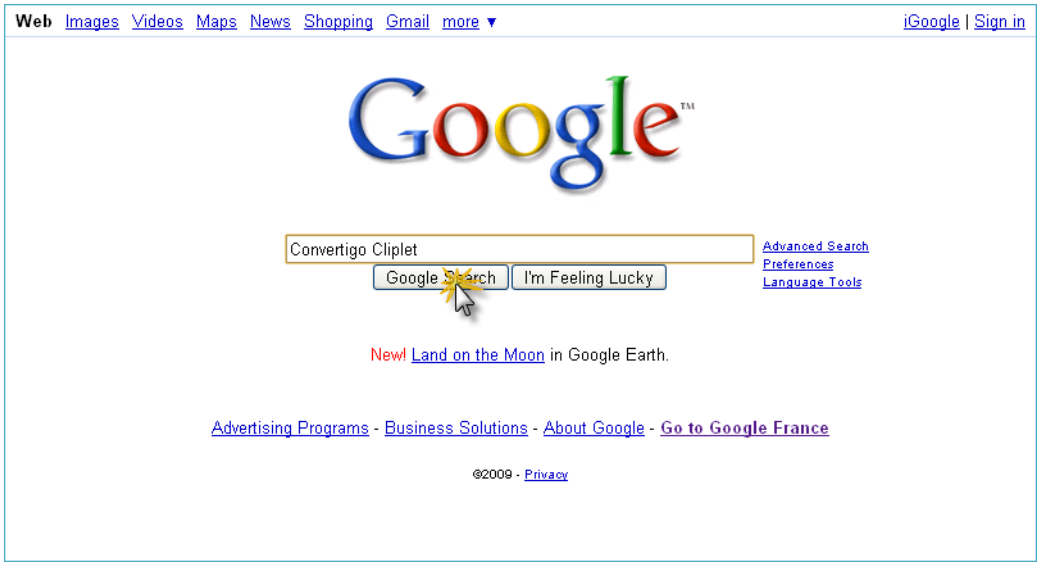


Figure 2 - 3: Click on Google Search button

4 Extract all Web page titles and URLs (according to *extraction rules*) into an XML list of results.

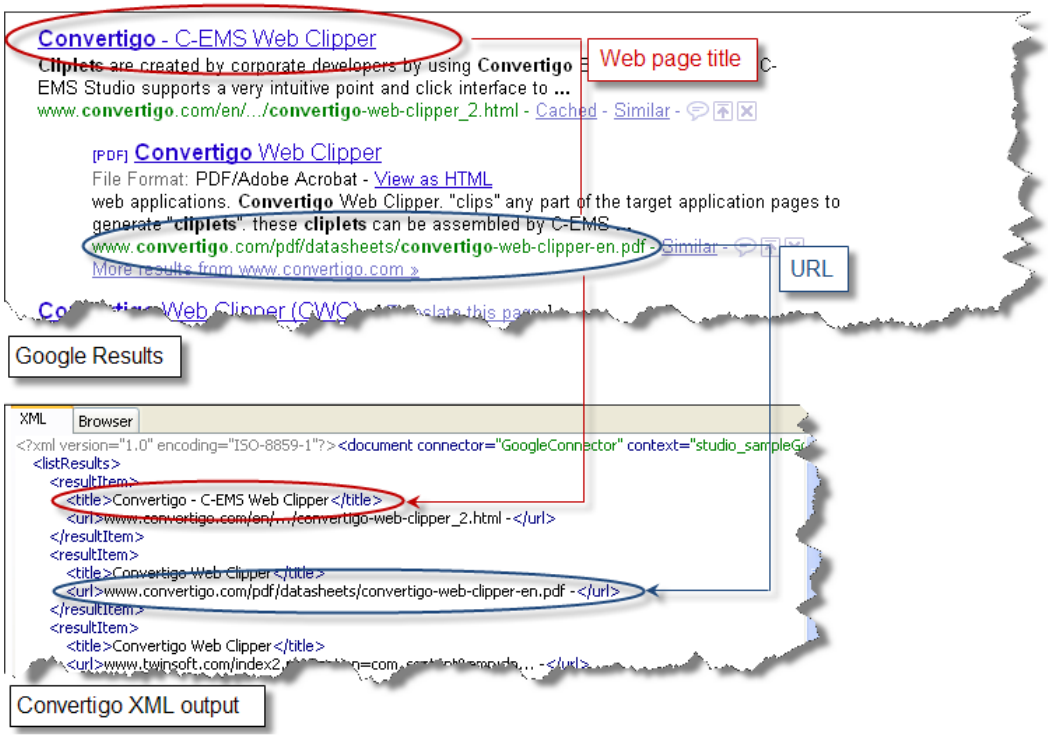


Figure 2 - 4: Extraction of Web page titles and URLs in XML format

5 Click on the **Next** link.

Figure 2 - 5: Click on the Next button

6 Repeat step 4 as long as a **Next** link is present on Google result pages.

7 Stop process when accessing a Google result page with no **Next** link:

Figure 2 - 6: Process stops on Google page with no Next button

2.1.2 Opening the Sample Project from the Studio

The completed sample project is stored in the application installation folder.

The following procedure describes how to access it from the Studio using the **New Project** wizard.

To open the sample project from the Studio

1 In the **Studio** toolbar, click on ***New > Project***:

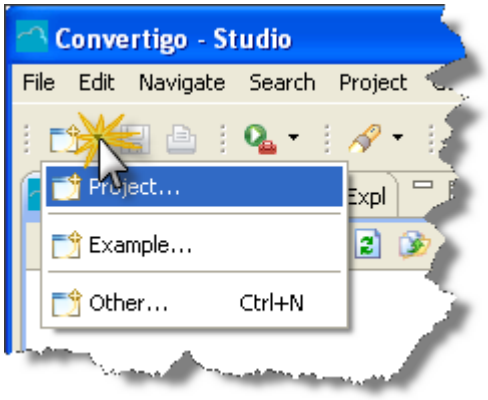


Figure 2 - 7: Launching the New Project wizard

A **New Project** wizard opens.

2 Expand **Convertigo Projects**, then **Documentation Samples**, and select **Web Integrator**:

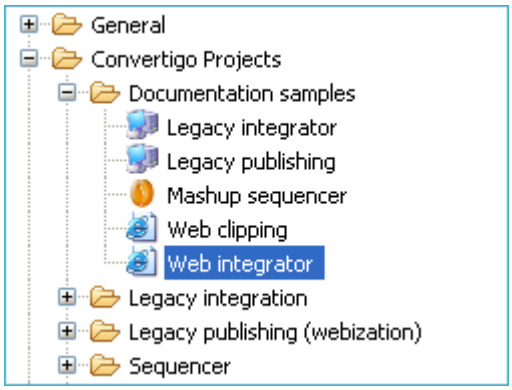


Figure 2 - 8: Selecting the CWI sample project

3 Click on **Next**, then **Finish**.

The sample project opens in the **Projects View**:

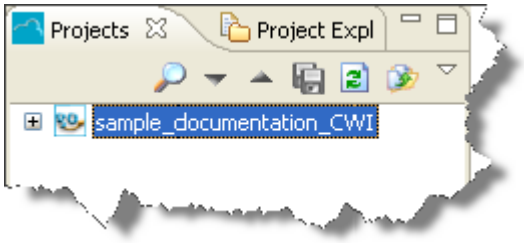


Figure 2 - 9: Sample project in Projects View

You can now start setting up your own CWI project, `sample_doc_CWI`.

2.2 Setting Up the Project

The following sections explain step by step how to set up your first Web integration project:

- Creating a Project and Setting Connector Parameters
- Defining Screen Classes

- Defining a Transaction
- Executing a Transaction

2.2.1 Creating a Project and Setting Connector Parameters

The first steps consist in creating a project and setting the connector parameters.

In this sample project:

- the project is called `sample_doc_CWI`;
- the connector is an HTML connector called `GoogleConnector` accessing the `www.google.com` Web site.

To create a project and set a connector

1 Launch the **Convertigo Studio**.

2 Select ***File > New > Project*** or click on  in the toolbar then select *Project.*

A **New Project** wizard opens:

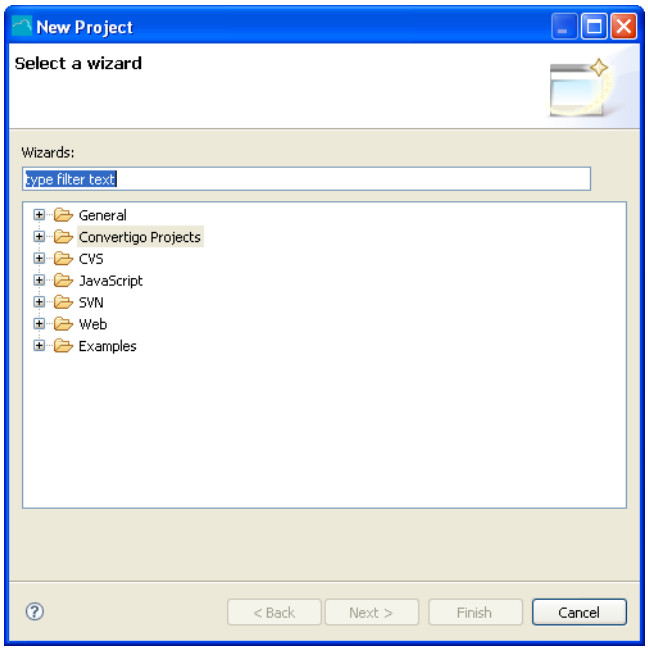


Figure 2 - 10: New Project wizard

3 Expand **Convertigo Projects**, then **Web Integration** and select **HTML Web Site**:

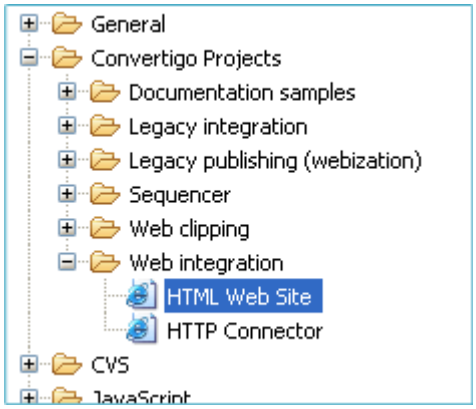


Figure 2 - 11: Selecting a project type

*In this example, **HTML Web Site** is selected because the application to which CWI connects is an HTML application.*

4 Click on **Next**:

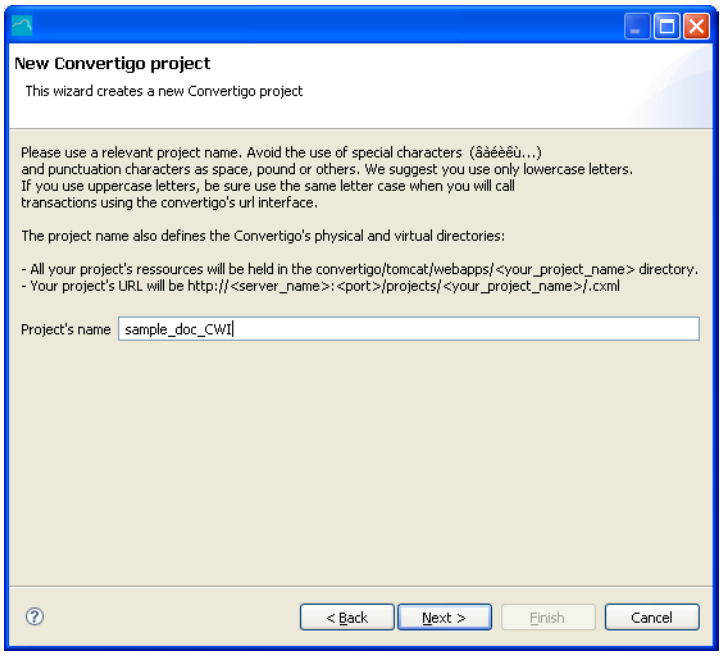


Figure 2 - 12: Entering a project name

5 In the **Project's name** field, type in the project name (for example `sample_doc_CWI`).

6 Click on **Next**:

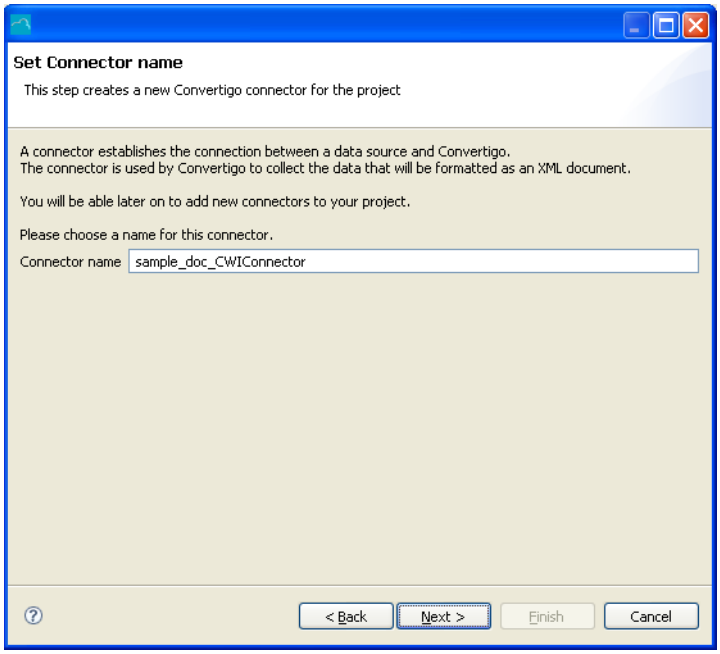


Figure 2 - 13: Entering a connector name

The **Connector name** field is filled by default with the connector name `sample_doc_CWIConnector`. You can choose another name (for example `GoogleConnector`).

7 Click on **Next**:

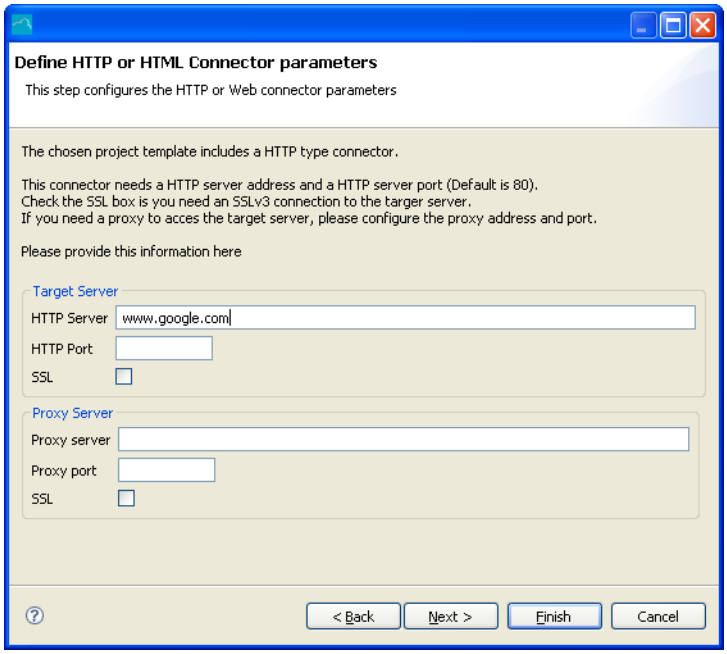


Figure 2 - 14: Setting HTTP or HTML connector parameters

8 Enter the required information in the **Target Server** section:

- in the **HTTP server** field, type in the target Web site URL address (for example `www.google.com`);
- in the **HTTP Port** field, type in the HTTP port if required (left blank here);
- check the **SSL** checkbox to connect to a secured HTTP server (HTTPS server).

9 If you're using a proxy server to access the Web, enter the required information in the **Proxy Server** section (**Proxy Server** address, **Proxy Port** and **SSL**).

10 Click on **Next**.

The **New project summary** window opens:

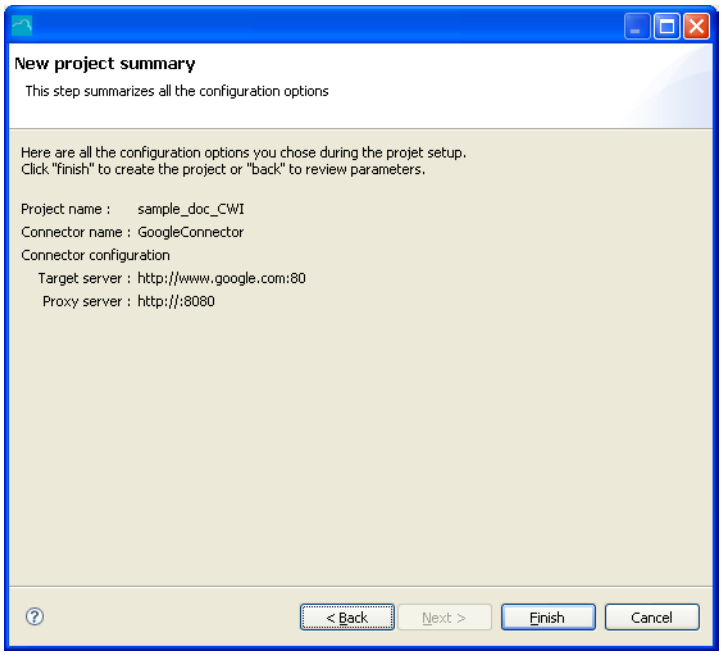


Figure 2 - 15: New project summary window

11 Check that all settings are correct, then click on **Finish**. The project now appears in the **Projects View**:

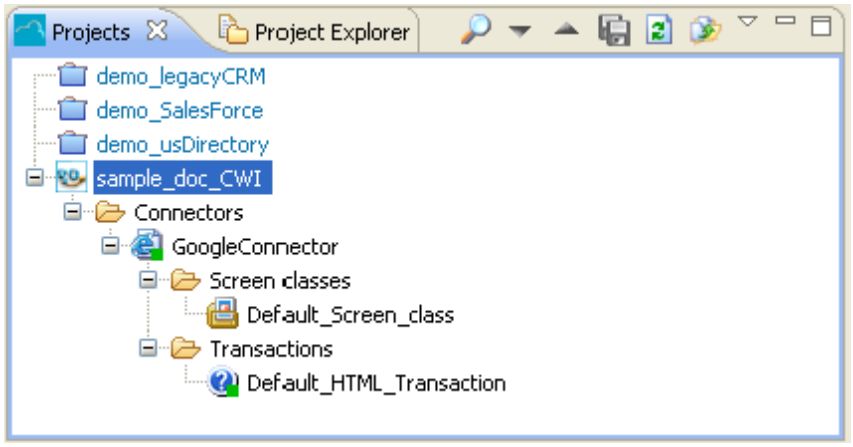


Figure 2 - 16: sampleGoogle project appearing in the Projects View

As we can see, one screen class and one transaction have been created by default in their respective folders (*Screen Classes* and *Transactions*).

The HTML page of the HTTP server specified as **Target Server** opens in the **Web Browser** of the **Connector View**, with its **DOM Tree** to the left:

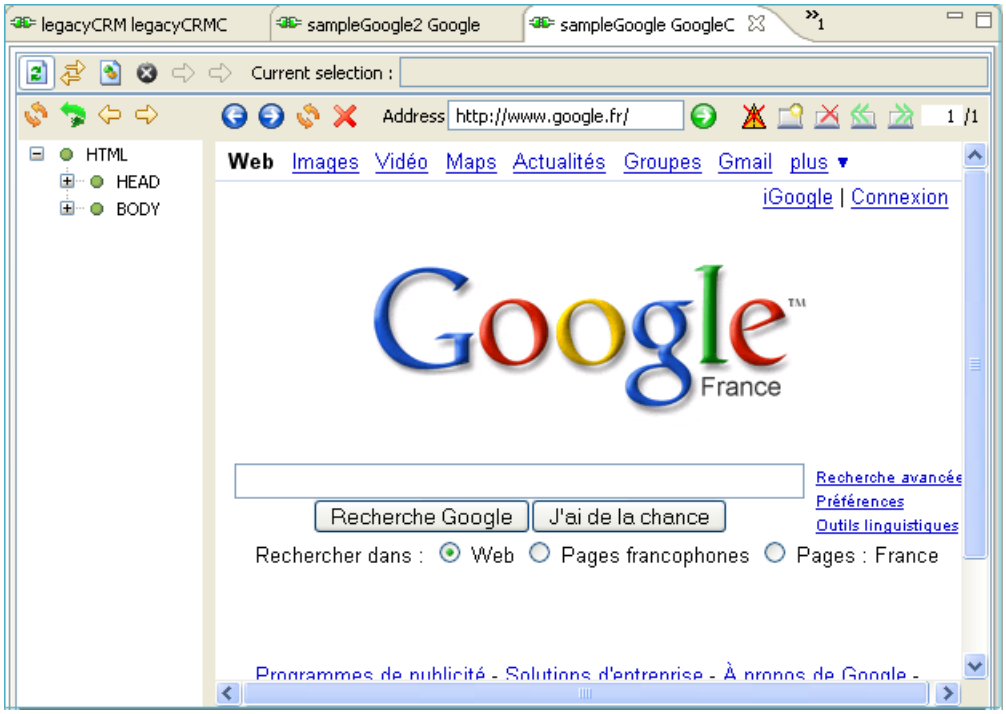


Figure 2 - 17: DOM Tree and Web Browser

This is the starting point of the project.

The following steps will consist in defining a set of screen classes and in setting their *detection criteria* (in other words, HTML elements - text, links, logos, etc. - defining a Web screen in a unique manner).

When CWI accesses a page, all criteria are checked; if all criteria defined for a screen class match page elements, then CWI associates the page to this screen class. It is then able to trigger a number of statements (*"Defining a Transaction"* on page 2 - 40).

2.2.2 Defining Screen Classes

To define a screen class, you must first find which element of the accessed Web page can be considered sufficiently relevant to serve as a detection criterion. Using a screen element as a detection criterion for a screen class means:

1 *Selecting* the element on the screen (right-click).

2 *Finding* its most accurate nodes in the DOM Tree.

3 *Generating* its XPath.

4 *Creating* the corresponding screen class from the generated XPath expression.

Root Screen Class

In our example project, the first and most general screen class that we want to define as **root** screen class (called `googleWebPages` in this project) is the screen class representing a general Google Web page.

Web pages only (not images, videos, maps, etc.) are to be returned throughout our search. This means that the *Web* item must be present on the upper left corner of the Google page,

and that this item must be *plain text* (as opposed to *hypertext*) (see Figure 2 - 18):

Figure 2 - 18: Google general search page

This item will serve as detection criterion for the **root** screen class.

The following procedure explains how to:

1 select a detection criterion for a screen class (here, the parent screen class `googleWebPages`);

2 generate the corresponding XPath;

3 create the screen class from the generated XPath expression.

To find a criterion and create a screen class

1 Right-click on the word "Web" in the upper left corner of the Google search page.

The element is outlined in green in the **Web Browser** and its corresponding element is highlighted in green in the **DOM Tree**:

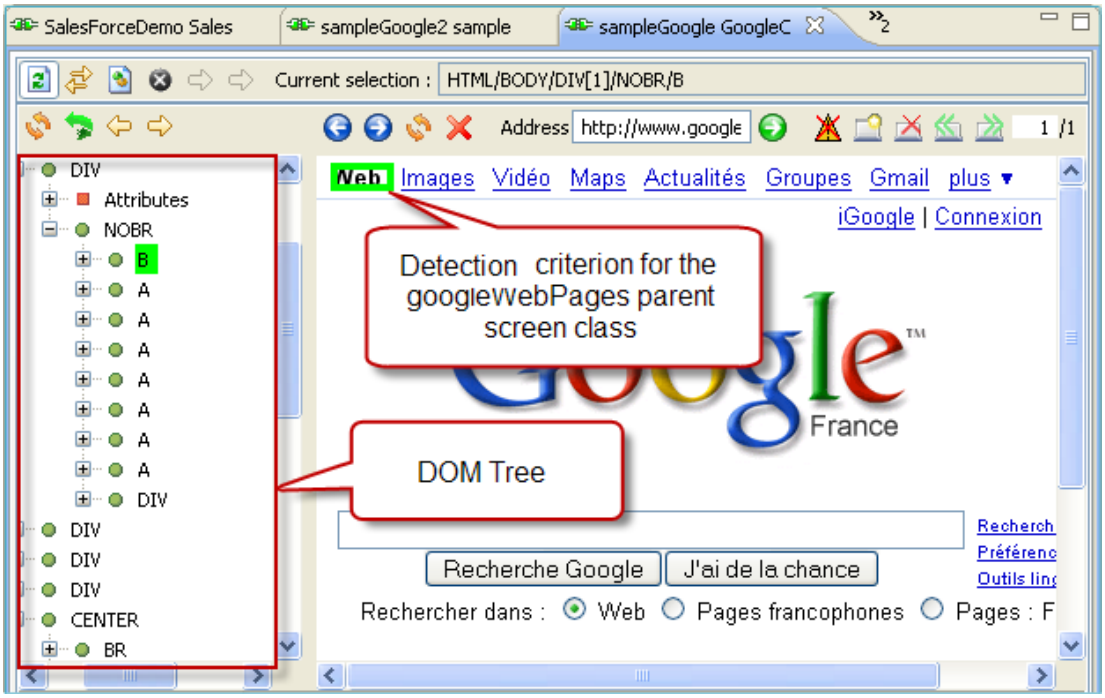


Figure 2 - 19: Detection criterion of the googleWebPages parent screen class

2 Expand the `B` element in the **Dom Tree**:

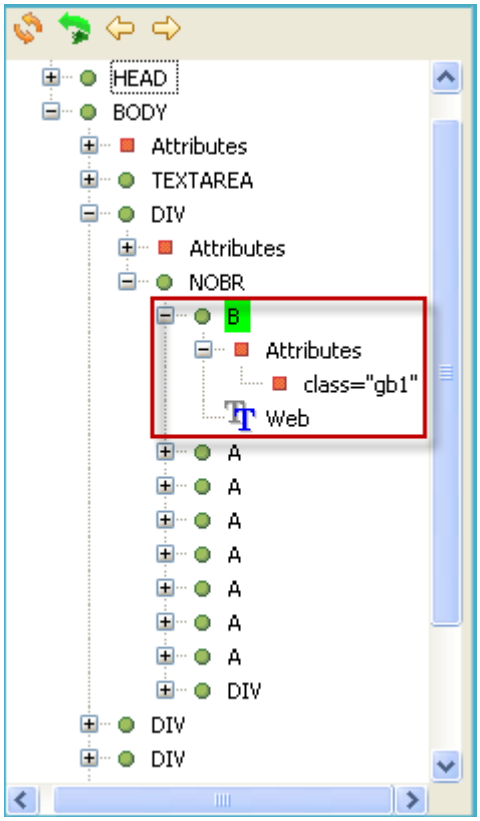


Figure 2 - 20: Expanding an element to find relevant nodes and attributes in the DOM Tree

Two nodes are associated with the `B` element: an attribute node (`class="gb1"`), which represents the element class, and a text node (`Web`), which represents the element content.

We will select both and generate the XPath from the selection.

3 While keeping the `Shift` button pressed, select `class="gb1"` and `Web` in the **DOM Tree** with a left-click.

4 Press **Enter** or right-click on the selection and select **Generate selection XPath (Enter)**.

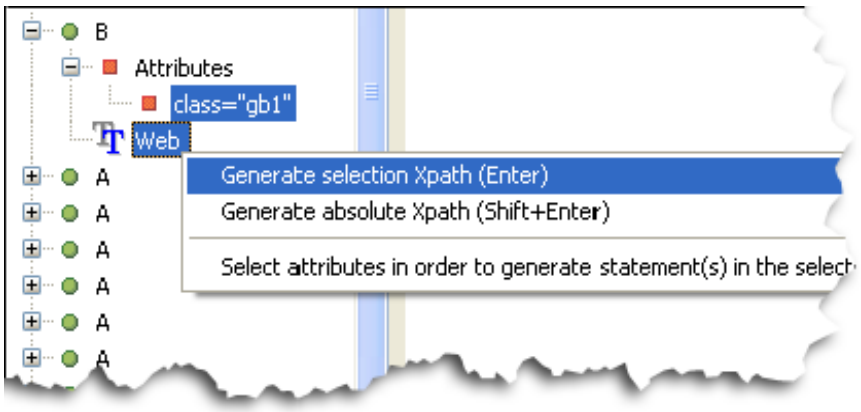


Figure 2 - 21: Generating XPath from class and text attributes

An XPath expression corresponding to the selected HTML element (i.e. "Web" item) and

based on the two nodes selected as detection criteria for the `googleWebPages` screen class appears in the **XPath Evaluator**:

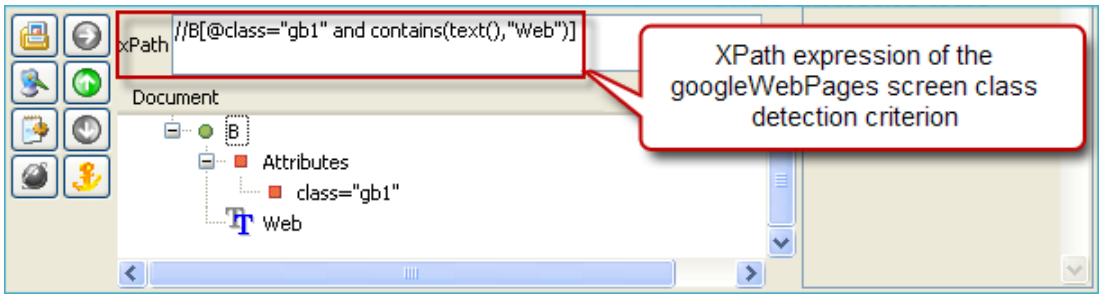


Figure 2 - 22: XPath expression of the detection criterion of the googleWebPages screen class

The results from running the XPath expression on the DOM appears in the **Document** window.

We will now create, based on this XPath, the corresponding screen class called `googleWebPages`:

5 In the **Projects View**, select the screen class that we want as *parent screen class* for the new screen class (`Default_Screen_Class`).

6 In the **XPath Evaluator**, click on the **Create new child screen class from current XPath** icon  .

A **New Screen Class** wizard opens:

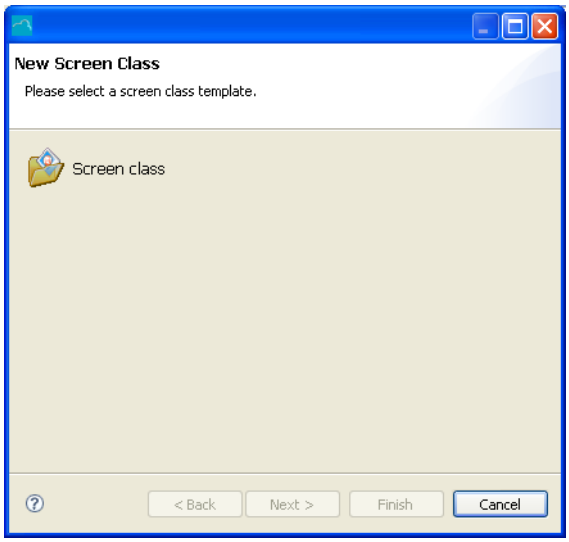


Figure 2 - 23: New Screen Class wizard

7 Click on Screen class, then on **Next**:

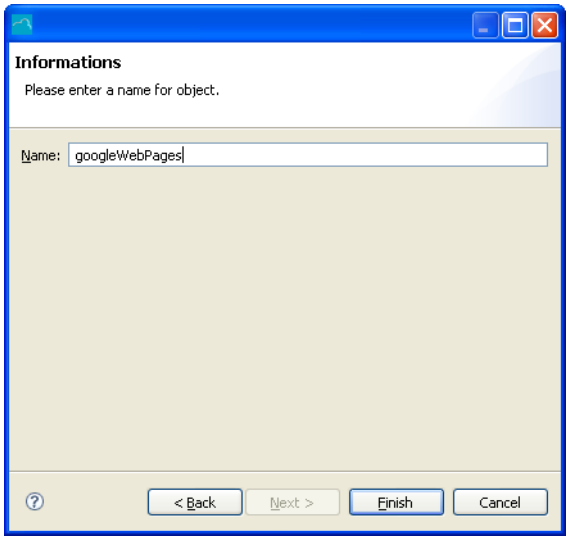


Figure 2 - 24: Giving a name to the new screen class

8 Type in the name of the new screen class (for example `googleWebPages`).

9 Click on **Finish.**

The screen class now appears in the **Projects View** as an *inherited* screen class of the `Default_Screen_class`:

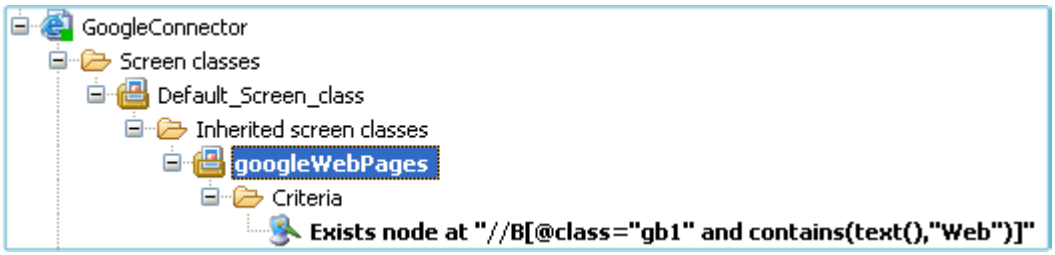


Figure 2 - 25: New screen class appearing in the Projects View

The criterion previously defined for the screen class is automatically generated and appears in the related Criteria folder.

10 Save your project by clicking on  or by pressing `Ctrl + S`.

Remember to save your project on a regular basis.

To check if detection criteria are correct for this screen class

1 Assuming that the **Web Browser** currently displays a Google *search* page, click on the **Show current screen class** icon  in the **Connector View** toolbar.

In the **Projects View**, the `googleWebPages` screen class is automatically highlighted, showing that detection criteria identifying this screen class do all match on the accessed Web page.

2 Type in a keyword (for example `convertigo cliplet`).

3 Click on the **Google Search** button.

Results are displayed in a Google *result* page.

4 In the **Connector View** toolbar, click on the **Show current screen class** icon .

As in the first step, the `googleWebPages` screen class is automatically highlighted in the **Projects View**.

We can infere from this test that the detection criterion identifying Google Web pages is well set. Indeed, each type of Google Web page (*result* and *search* pages) which will be accessed throughout the transaction is detected by CWI as belonging to the `googleWebPages` screen class.

Additional Screen Classes

The following step consists in creating two additional scren classes:

- one corresponding to the Google search page, called `googleSearchPage`;
- one corresponding to Google result pages, called `googleResultsPage`.

Those two additional screen classes are **children** screen classes of the `googleWebPages`: they ***are*** Google Web pages, but they also present specificities (one is a *result* page, the other is a *search* page).

They automatically inherits the `googleWebPages` detection criteria. Additional detection criteria are then added to their definition to differentiate them.

For projects set in countries for which a country-specific Google homepage exists, a third screen class must be defined : `googleSearchPageFR` (see "Case of a Country-Specific Google Search Page - Definition of the `googleSearchPageFR` Screen Class" on page 2-21). This screen class is detected using the "Google.com in English" link of country-specific Google homepages. It is used to redirect CWI back to the English Google search page.

To create additional screen classes, the procedure is identical to the one used to create the `googleWebPage` screen class:

1 *Selection* of a detection criterion.

2 *Generation* of XPath.

3 *Creation* of a new child screen class.

GoogleSearchPage screen class

To create the googleSearchPage screen class

1 Right-click on the Google logo in the Google search page displayed in the **Web Browser**:

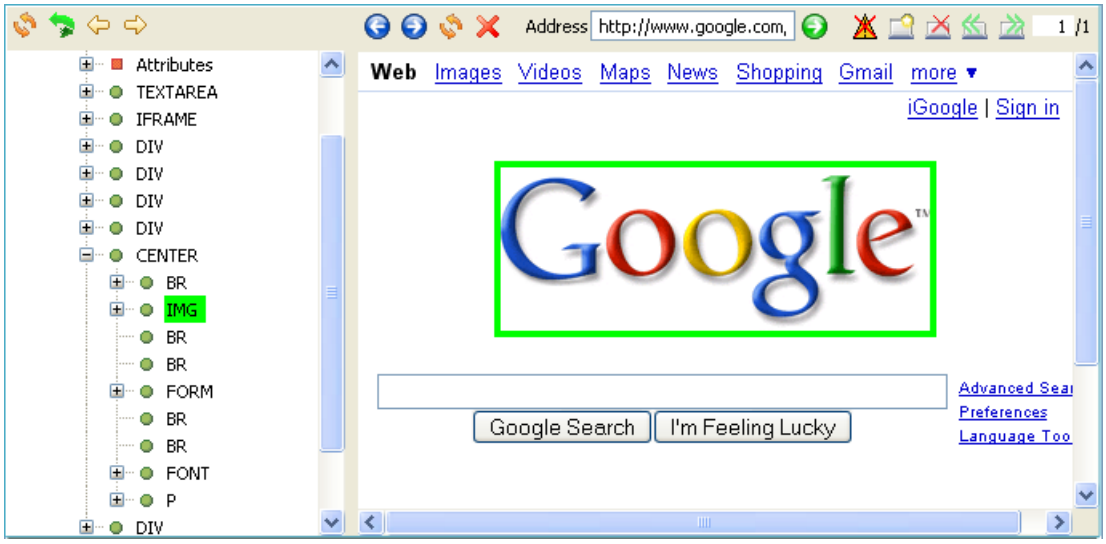


Figure 2 - 26: Selection of a detection criterion for the googleSearchPage screen class

This detection criterion has been selected because the Google search page does include a Google logo, whereas result pages do not.

2 Expand the **DOM Tree** to select the most relevant node for this HTML element:

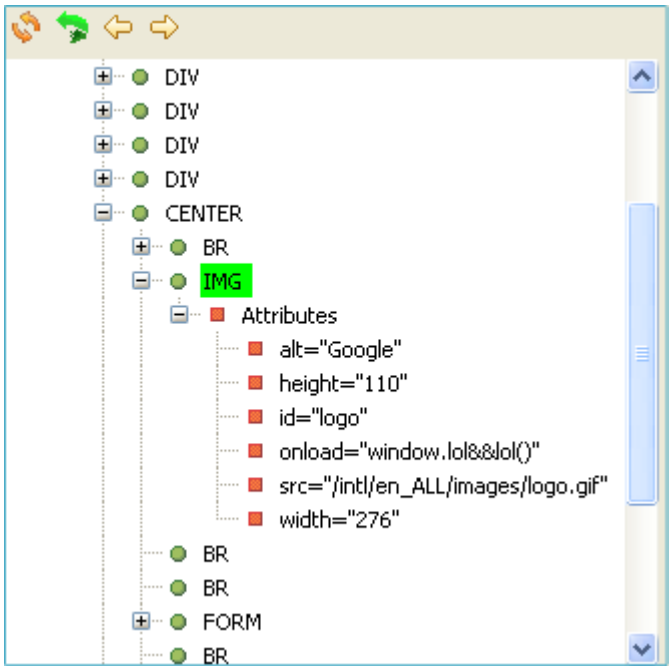


Figure 2 - 27: Attribute nodes of the HTML element selected as detection criterion for the googleSearchPages screen class

An `id` attribute node appears in the tree. This attribute always define an HTML element in a unique manner, so this is the best candidate for generating the XPath corresponding to the `IMG` element.

When present, the `NAME` attribute is also a good candidate. On the contrary, avoid using attribute nodes such as SRC and HREF, which are never good candidates for generating XPath corresponding to detection criteria (their value often changes).

3 Right-click the `id="logo"` attribute node and select **Generate selection XPath (Enter)** or select the attribute node with a left-click and press **Enter**.

*You can also right-click the parent `IMG` element and select **Generate selection XPath (Enter)** or select the `IMG` element with a left-click and press **Enter**: the XPath will intelligently be generated with the `id` attribute, since it exists.*

The XPath expression of the selected node appears in the **XPath Evaluator**.

4 Select the parent screen class, `googleWebPages`.

5 In the **XPath Evaluator**, click on the **Create new child screen class from current XPath** icon  .

The **New Screen Class** wizard opens.

6 Click on Screen class, then on **Next**.

7 Type in the name of the new screen class (for example `googleSearchPage`).

8 Click on **Finish.**

The screen class now appears in the **Projects View** as an *inherited* screen class of the `googleWebPages` screen class:

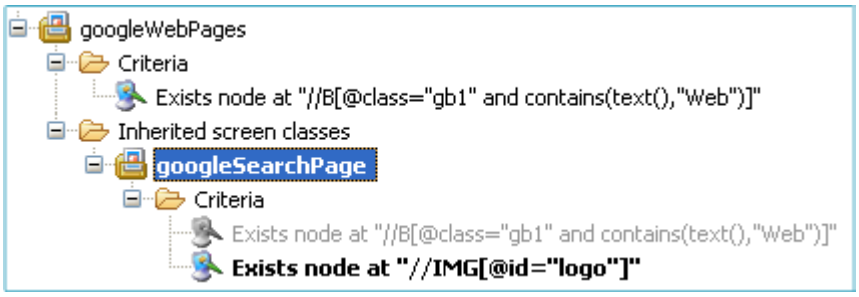


Figure 2 - 28: googleSearchPage screen class in Inherited screen classes folder

The criterion previously defined for this screen class is automatically generated and appears in the related Criteria folder. Criterion inherited from the parent screen class appears greyed.

9 Save your project by clicking on  or by pressing `Ctrl + S`.

Remember to save your project on a regular basis.

The next step consists in creating the `googleResultsPage` screen class identifying Google result pages.

GOOGLERESULTSPAGE SCREEN CLASS

We will now launch a Google search with the keywords `convertigo cliplet` and define a screen class for result pages.

To check that there will not be any conflict between the detection criteria of the different screen classes, we can launch the search in the **Web Browser** and evaluate the XPath previously defined using the **XPath Evaluator**.

To check that the criterion is a unique identifier for a screen class

1. Type in `convertigo cliplet` in the Google search field of the **Web Browser**.
2. Once results have been displayed in the browser, type in the previous XPath (`//IMG[@id="logo"]`) in the **xPath** field of the **XPath Evaluator**.
3. Click on  in the **XPath Evaluator**.

   The result of the evaluation is displayed in the **Document** field of the **XPath Evaluator**:

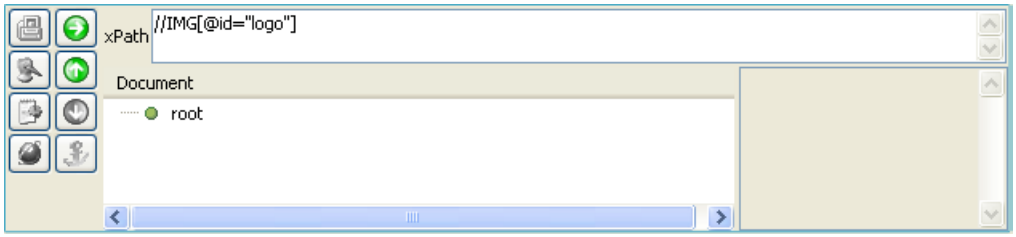


Figure 2 - 29: googleSearchPage XPath evaluation on a Google result page

No `IMG` element with an `id="logo"` attribute was found in the document tree model of the page currently displayed in the **Web Browser**. The criterion selected for the `googleSearchPage` screen class is therefore a unique differentiator for this screen class.

To create the googleResultsPage screen class

1. In the **Web Browser**, right-click on the right of the first result:

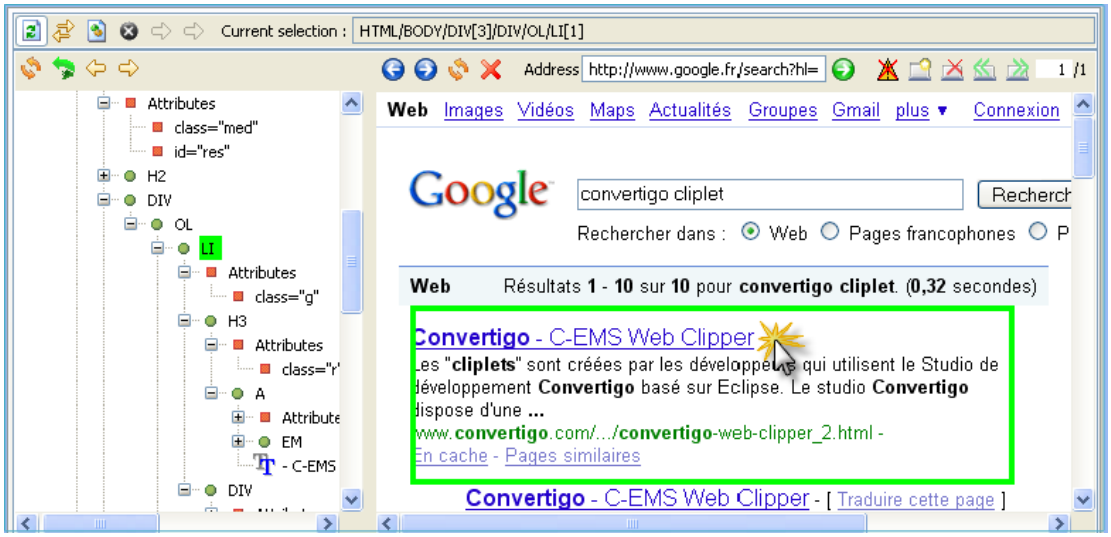


Figure 2 - 30: Selection of a detection criterion for the googleResultsPage screen class

Searching for a detection criteria is a sampling process that requires selecting different elements on the page to select the best suited for detecting a screen class.

The `LI` container is highlighted in the **DOM Tree**. This container contains all nodes modeling the first result returned by the Google search engine. It does not include any attribute that could possibly serve as strong differentiator for the screen class. We must now look in parent nodes to find one.

2 To do so, click on  to select the parent node.

An `OL` container is outlined in green.

This element is useless for detection because it does not contain any attribute or text content that could serve to generate an accurate XPath for the selected HTML element.

3 Click on  .

A `DIV` container is outlined in green. For the same reasons as previously mentioned, this node cannot be used to generate an accurate XPath.

4 Click on  .

Another DIV container is highlighted in green:

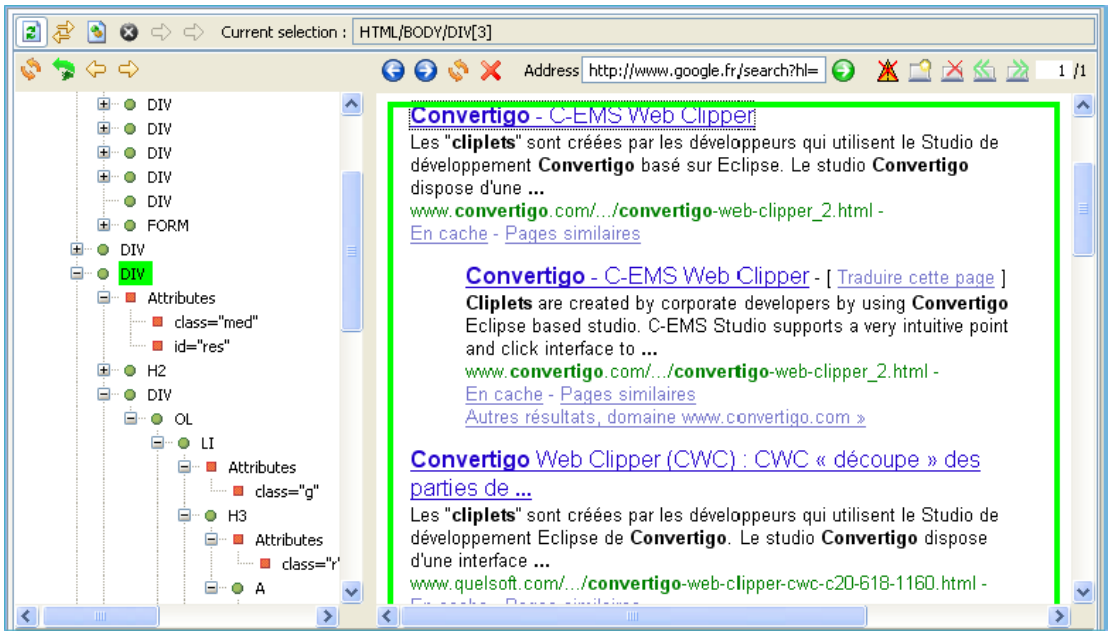


Figure 2 - 31: Searching for a better detection criterion

This node contains an `id` attribute, which can be used as unique attribute for generating an element's XPath, as mentioned in the definition of the previous screen class.

5 Right-click the `id="res"` attribute node and select **Generate selection XPath (Enter)** or select the attribute node with a left-click and press **Enter**:

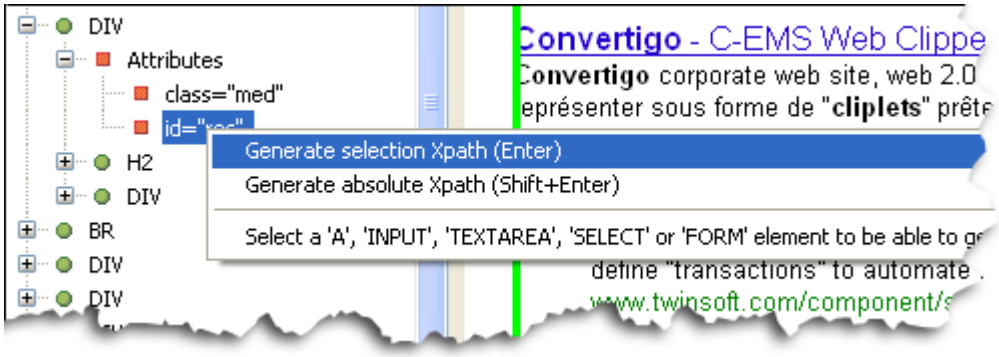


Figure 2 - 32: Generation of XPath for the googleResultsPage screen class

The XPath expression of the selected node appears in the **XPath Evaluator**.

*You can also right-click the parent `DIV` element and select **Generate selection XPath (Enter)** or select the `IMG` element with a left-click and press **Enter**: the XPath will intelligently be generated with the `id` attribute, since it exists.*

6 Select the parent screen class, `googleWebPages`.

7 In the **XPath Evaluator**, click on the **Create new child screen class from current XPath** icon  .

The **New Screen Class** wizard opens.

8 Click on Screen class, then on **Next**.

9 Type in the name of the new screen class (for example `googleResultsPage`).

10 Click on **Finish.**

The screen class now appears in the **Projects View** as an *inherited* screen class of the `googleWebPages` screen class:

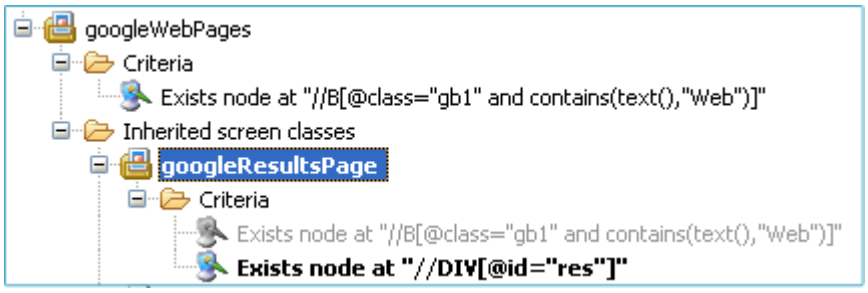


Figure 2 - 33: googleResultsPage screen class in Inherited screen classes folder

The criterion previously defined for the screen class is automatically generated and appears in the related Criteria folder. Criterion inherited from the parent screen class appears greyed.

The main screen classes have been created.

As we develop transactions, additional screen classes will be needed in the project.

As mentioned before, Google servers automatically redirect Internet users to country-specific Google search pages. In this case, you need to create a country-specific screen class, which is detected when accessing the country-specific Google search page.

The following sub-section describes how to create such screen class.

The following extra screen class is needed only if you access the `www.google.com` Web site from outside the USA and need CWI to be redirected from your country-specific Google page to the Google.com page in English.

Case of a Country-Specific Google Search Page - Definition of the `googleSearchPageFR` Screen Class

When CWI connects to the `www.google.com` Web site, if a Google country-specific page exists, it automatically opens in the browser.

Country-specific Google homepages can be defined as standard Google search pages with a *redirecting* hypertext link in the lower right corner of pages. This link can be:

- a **Google.com in English** link in non-anglophone country specific pages:

Figure 2 - 34: Example of country-specific non-anglophone Google search page (France)

- a **Go to Google.com** link in anglophone country-specific pages:

Figure 2 - 35: Example of country-specific anglophone Google search page (UK)

To detect country-specific pages, we will define a country-specific screen class (called `googleSearchPageFR` in our project) having as detection criteria the redirecting link as well as criteria already defined for the `googleSearchPage` screen class.

The country-specific screen class can be defined as follows:

- it is a *child* screen class of the `googleSearchPage` screen class and, as such, inherits its criteria:
  - "Web" link in upper left corner of the Google page;
  - Google logo.
- it is characterized by the presence of a redirecting link (**Google.com in English** or **Go to Google.com**) in the lower right corner of the page.

To create a country-specific (googleSearchPageFR) screen class

1. In the country-specific Google search page displayed in the **Web Browser**, right-click on the redirecting link (**Google.com in English** or **Go to Google.com**).

   The link is outlined in green in the **Web Browser** and its corresponding element is highlighted in green in the **DOM Tree**:

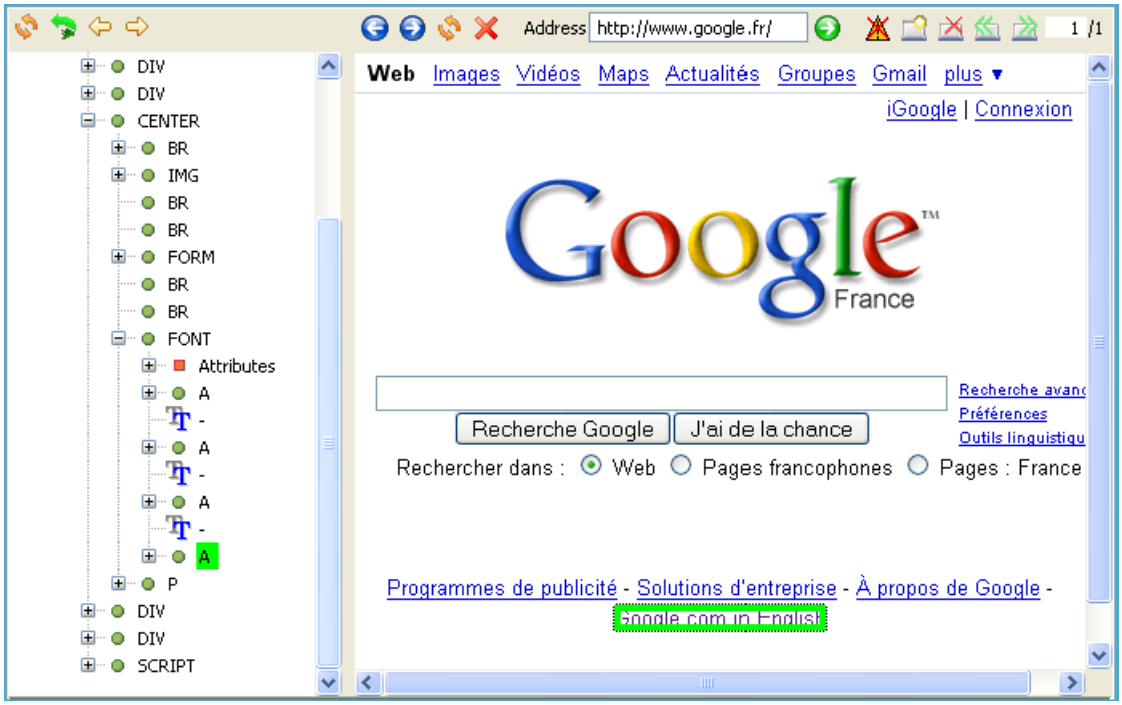


Figure 2 - 36: Selection of a detection criterion for the country-specific screen class

We will expand the A element node to see if it contains interesting attributes to generate the XPath corresponding to the link.

2 Expand the A element in the **DOM Tree** by clicking on ⊞:

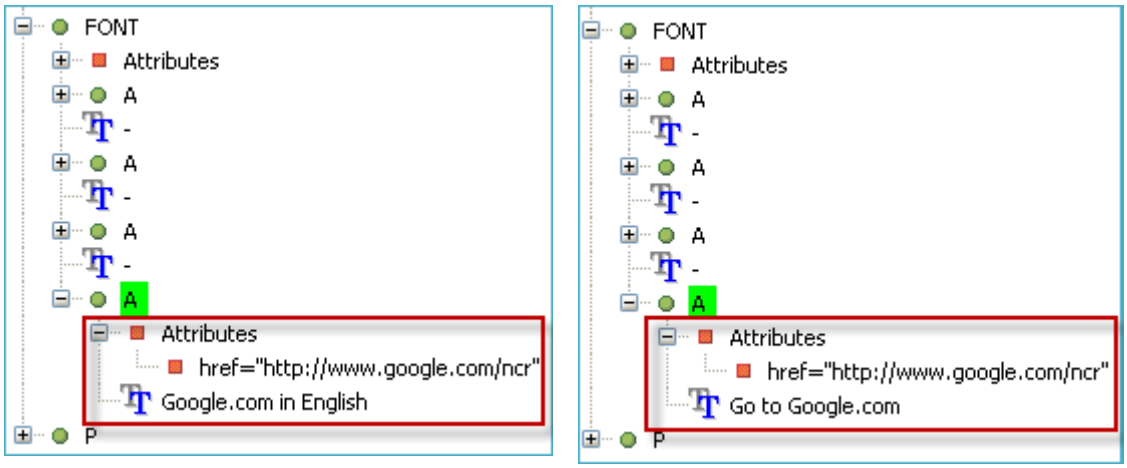


Figure 2 - 37: Expanding an element to find relevant attributes in the DOM Tree for the country-specific screen class

Two nodes are associated with the A element: an `href` attribute node, which contains the URL address of the hypertext link, and a text node (`Google.com in English` or `Go to Google.com`), which represents the element text content.

The `href` attribute is not interesting as regards XPath generation because its value may often change. We will select only the text content and generate the XPath from it.

3 Right-click the text node Google.com in English or Go to Google.com and select **Generate selection XPath (Enter)** or select it with a left-click and press **Enter**.

The XPath expression of the selected node appears in the **XPath Evaluator**:

Figure 2 - 38: XPath expression of country-specific redirecting link

4 Select the parent screen class, `googleSearchPage`.

5 In the **XPath Evaluator**, click on the **Create new child screen class from current XPath** icon .

The **New Screen Class** opens.

6 Click on **Screen class**, then on **Next**.

7 Type in the name of the new screen class (for example `googleSearchPageFR`).

8 Click on **Finish.**

The screen class now appears in the **Projects View** as an *inherited* screen class of the `googleSearchPage` screen class:

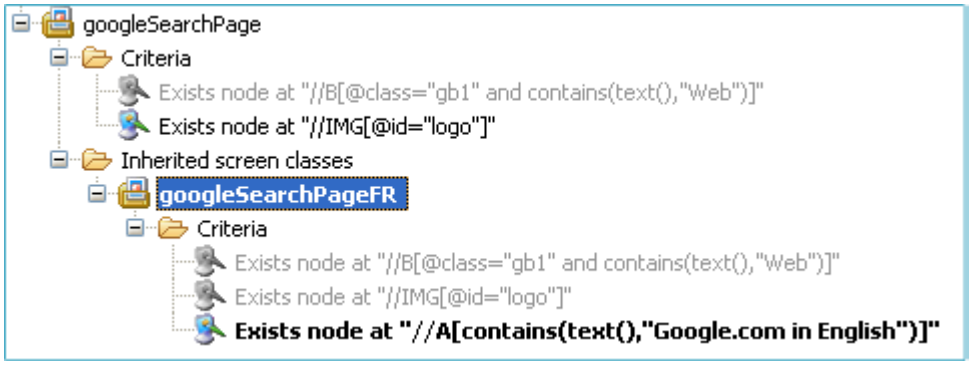


Figure 2 - 39: googleSearchPageFR screen class in Projects View

The criterion previously defined for the screen class is automatically generated and appears in the related **Criteria** folder. Criteria inherited from the parent screen class appear greyed.

9 Save your project by clicking on or by pressing `Ctrl + S`.

The next steps now consist in:

1 *Creating* the *extraction rule* associated with the `googleResultsPage` screen class.

2 *Defining* a *transaction*.

2.2.3 Creating an Extraction Rule

This step shows how to create a new extraction rule associated with a given screen class.

The logical process for creating an extraction rule is the following:

1 *Generate* the root XPath of the extraction rule in the **XPath Evaluator -** HTML elements (data) to be extracted will be localized using relative XPaths based on this root XPath. We will choose as root XPath the `googleResultsPage` criterion's XPath, `(//DIV[@id="res"])`, which addresses the results container in the Web page.

2 *Create* a new extraction rule by launching the **New Extraction Rule** wizard and choose an extraction rule template.
In this sample project, the extraction rule template is *Table*. This is the best-suited form for creating a list (called `listResults`) of Web page titles and URLs. This table can be defined as follows:

Table 2 - 1: Table extraction rule - line and column description

Table element	Name	Description
Line	`resultItem`	Each table row corresponds to a Google result.
Column	`title` and `url`	Two columns per row - corresponding to Web page titles and URLs

3 set extraction rule properties in the **Properties View**.
In this project:

- set row name and row XPath (**Description** property in the **Properties View**).
- set column names and column XPaths (**Description** property in the **Properties View**).

*You can also choose to start by launching the **New Extraction Rule** wizard after having right-clicked on the relevant screen class. In this case, you will have to set the root XPath property in the **Properties View**.*

To create an extraction rule

1 Type in the root XPath `(//DIV[@id="res"])` in the **xPath** field of the **XPath Evaluator**

*You can also generate the root XPath from the **DOM Tree** ("To create the googleResultsPage screen class" on page 2 - 18*, steps 1 to 4*).*

2 Click on the **Create new extraction rule from current XPath icon**  in the **XPath Evaluator**.

A **New Extraction Rule** wizard opens:

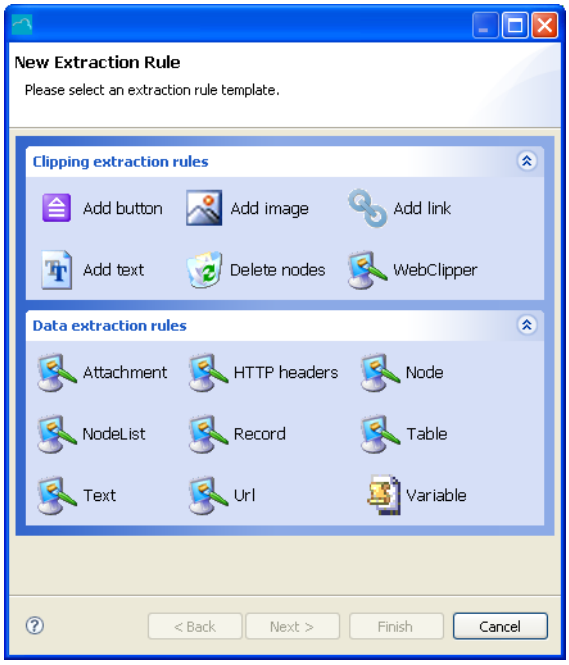


Figure 2 - 40: New Extraction Rule wizard

3 Click on **Table**.

4 Click on **Next**:

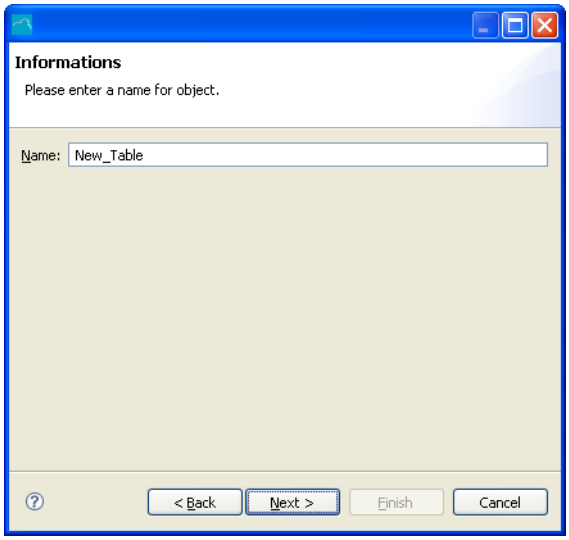


Figure 2 - 41: Giving a name to the new extraction rule

5 In the **Name** field, enter a name (for example `googleResults`).

6 Click on **Next**:

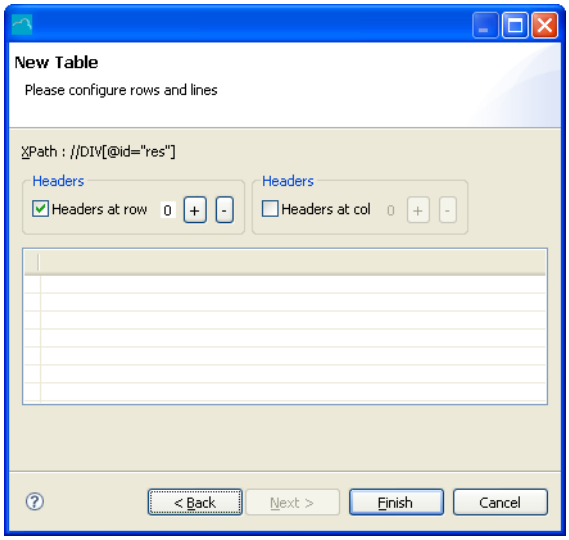


Figure 2 - 42: HTML tables definition

This window is a help to setting properties. It recalls the root XPath that has previously been set and displays parameters of HTML tables. It is used only if the XPath specified prior to launching the **New Extraction Rule** wizard corresponds to a HTML table. This is not the case in our project.

7 Click on **Finish**.

The new extraction rule appears in the related **Extraction rules** folder:

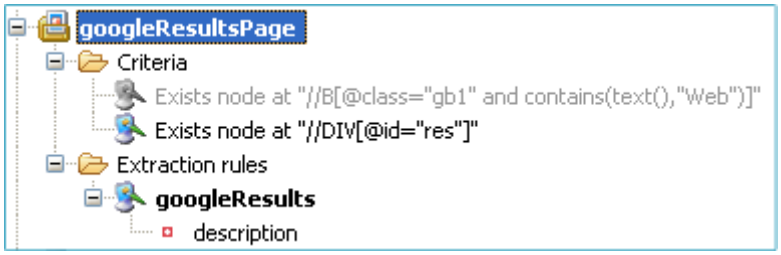


Figure 2 - 43: googleResults extraction rule in Extraction rules folder

8 Select the extraction rule, its properties are displayed in the **Properties View**:

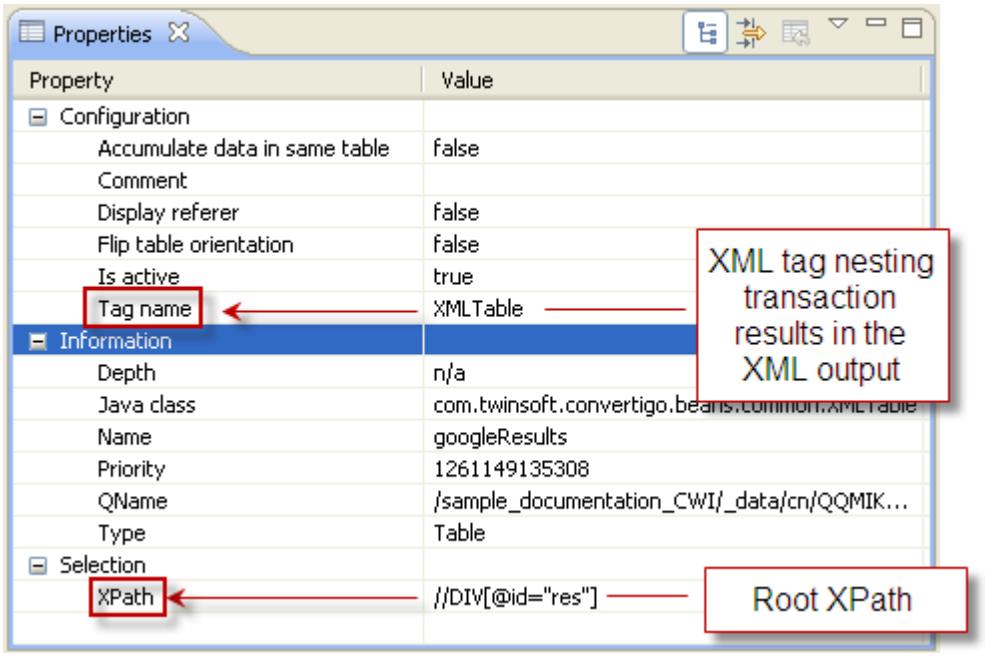


Figure 2 - 44: Extraction rule properties to be set

We must now set the following extraction rule parameters:

Table 2 - 2: Extraction rule properties

Property	Description
Tag name	Name of the XML table structure in the XML output. Defines the tag name that will be created in the XML output after extraction. Value in this project: `listResults`.
Description	Description of the properties of the XML table rows and columns: name, XPath, application of the rule on children elements.
XPath	XPath corresponding to the HTML elements (Web page title, URL in this project) to be extracted.

9 Set the **Tag name** property to `listResults`.

10 If the **XPath** property is empty, set it to `//DIV[@id="res"]`.

*This is the case if the **New Extraction Rule** wizard has been launched by right-clicking on the relevant screen class and selecting **New > Extraction rule**.*

We will now set the table properties. The first step is to specify the *row* properties: name (`resultItem`) and XPath, knowing that the XPath must correspond to Google results (one row = one Google result).

To set the row properties of the table extraction rule

1 When in a Google result page, right-click on the right of the first result.

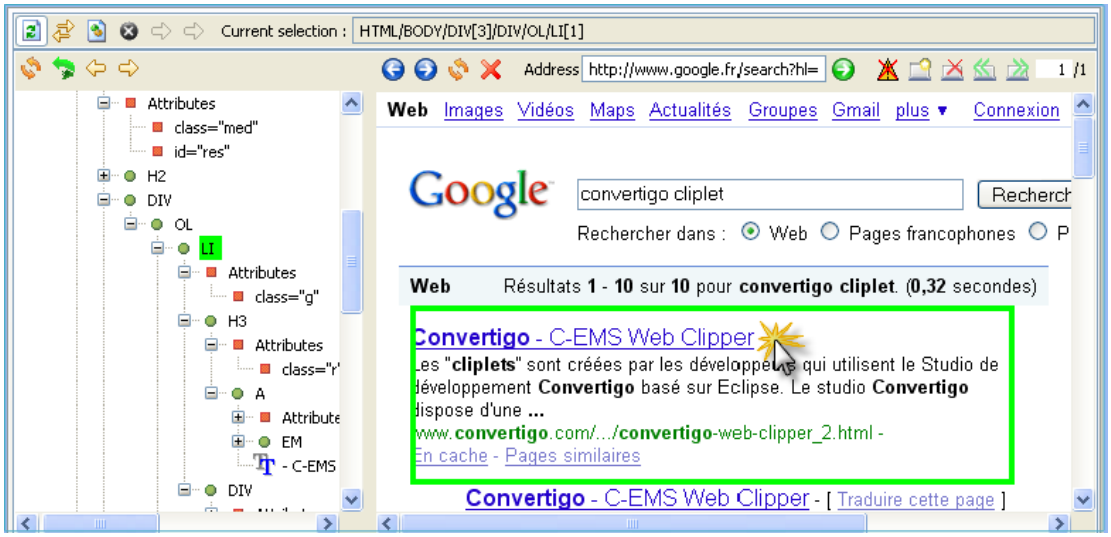


Figure 2 - 45: Selection of an XPath for Google result items

An `LI` element is highlighted in green in the **DOM Tree**.

This element contains the nodes of Google result items, and consequently the nodes of Web page titles and URLs that we want to extract.

Therefore, the `LI` node is a good candidate for generating the XPath corresponding to Google result items (i.e. for generating the XPath that must be set as the table row XPath).

So we will now:

- *evaluate* the root XPath;
- *browse* the resulting **Document** tree structure to find the element corresponding to Google results (`LI` element);
- *generate* its XPath.

2 Type in the root XPath `//DIV[@id="res"]` in the **xPath** field of the **XPath Evaluator**.

3 Press **Enter** or click on the **Evaluate** icon  .

The resulting **Document** tree displays the corresponding tree structure:

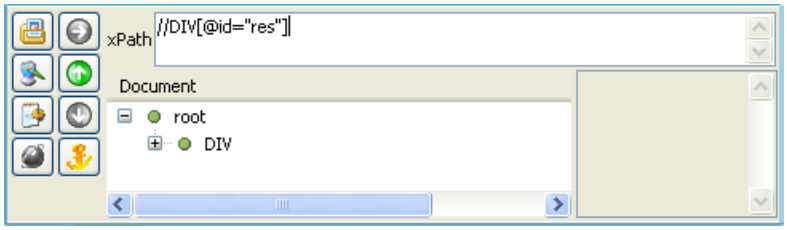


Figure 2 - 46: Root XPath expression and tree

4 Expand the **Document** tree to find an `LI` element:

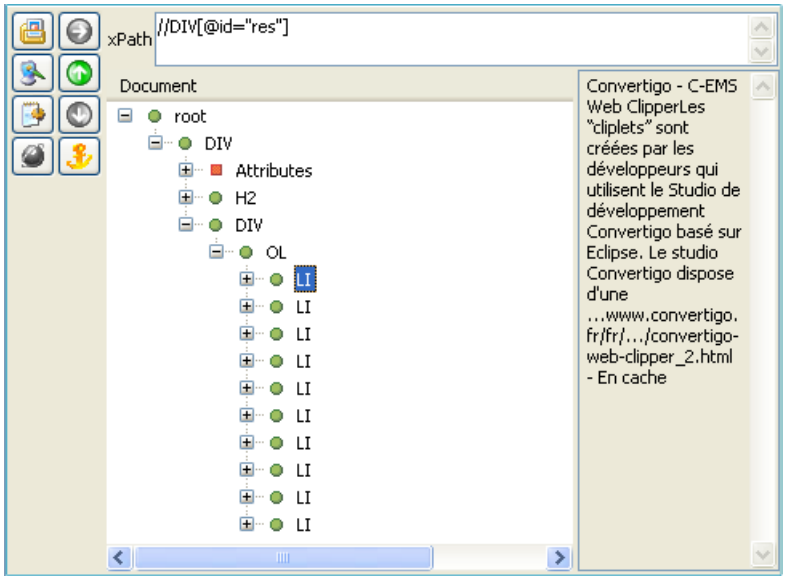


Figure 2 - 47: Root XPath expression and expanded tree

*To check that `LI` elements do correspond to Google result items, right-click any `LI` node in the **Document** field of the **XPath Evaluator** and select **Show in browser**. The corresponding Google result is outlined in green in the **Web Browser**.*

5 Right-click on an `LI` element and select **Generate selection XPath (Enter)** or select the element with a left-click and press **Enter**:

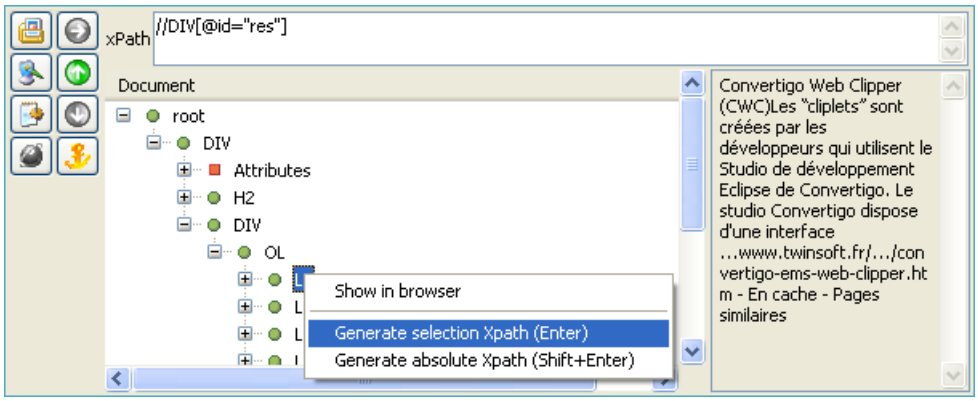


Figure 2 - 48: Generating the table row XPath corresponding to Google results

The xPath field is updated and displays the relative XPath expression of Google results:

Figure 2 - 49: Google results XPath based upon root XPath

We will now set this XPath using the extraction rule `description` sub-object.

6 In the **Projects View**, right-click on the extraction rule `description`.

A contextual menu appears:

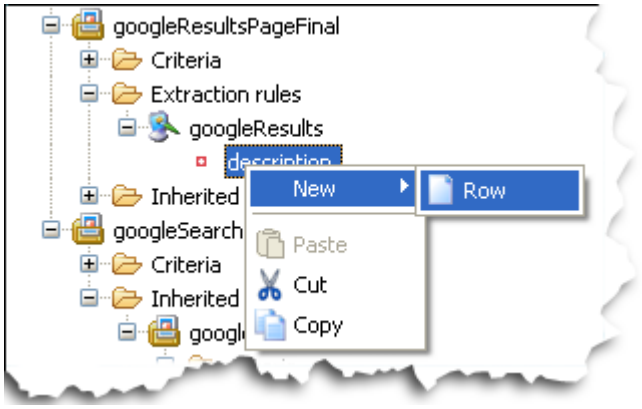


Figure 2 - 50: Creating a new row

7 Select ***New > Row***.

8 A new `row` sub-object appears as child of the `description` sub-object:

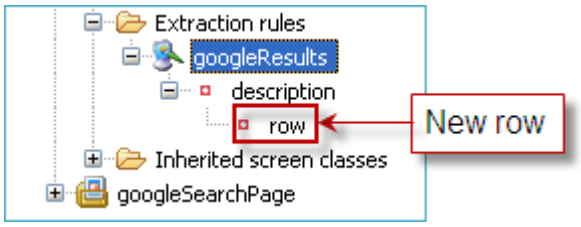


Figure 2 - 51: New row

9 Select the `row` sub-object with a left-click.

The **Properties View** is automatically updated:

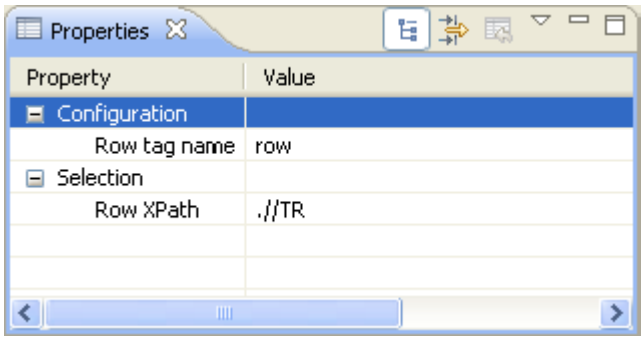


Figure 2 - 52: Row properties

10 In the **Properties View**, click in the **Value** column of the **Row tag name** property.

The default value (`row`) is highlighted.

11 Enter the required row tag name (`resultItem`).

12 Press `Enter`.

In the **Projects View**, the `row` sub-object is automatically renamed.

13 In the **Properties View**, click in the **Value** column of the **Row XPath** property.

The default value (`.//TR`) is highlighted.

14 Enter the required XPath (`.//LI`).

This is the *relative* XPath corresponding to Google result items: the "dot" appearing before the double *slash* stands for the root XPath specified in the **XPath** property of the extraction rule. This means: "all `LI` nodes included in the parent node identified by the root XPath".

15 Press `Enter`.

16 Save your project by clicking on  or by pressing `Ctrl + S`.

The `resulItem` row is properly set.

We will now set the columns, `title` and `url`.

17 In the **Projects View**, right-click on the `resulItem` sub-object.

A contextual menu appears:

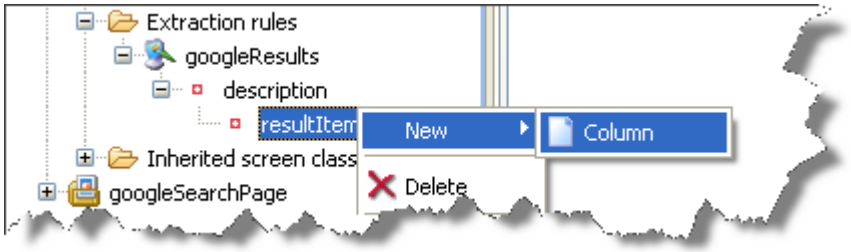


Figure 2 - 53: Creating a new column

18 Select ***New > Column***.

A new `column` sub-object appears as child of the `resultItem` sub-object:

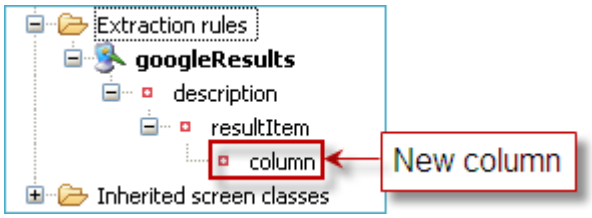


Figure 2 - 54: New column

19 Select the `column` sub-object with a left-click.

The **Properties View** is automatically updated:

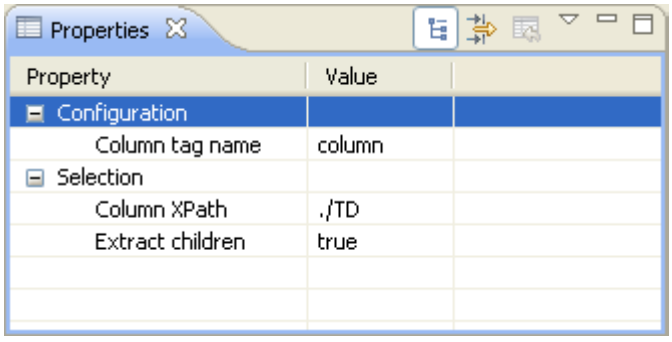


Figure 2 - 55: Column properties

20 In the **Properties View**, click in the **Value** column of the **Column tag name** property.

The default value (`row`) is highlighted.

21 Enter the required row tag name (`title`).

22 Press `Enter`.

In the **Projects View**, the `column` sub-object is automatically renamed.

23 Repeat points 17 to 22 to create the second column: `url`.

Table columns are now created. They appear in the **Projects View**:

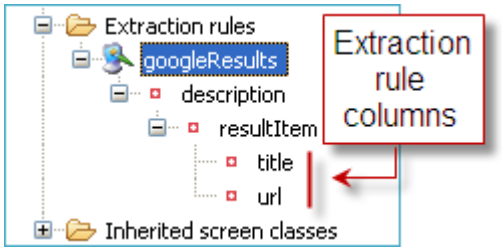


Figure 2 - 56: Extraction rule columns in Projects Folder

24 Save your project by clicking on  or by pressing `Ctrl + S`.

Their XPaths (**Column XPath** property) are set by default to `./TD`, which only applies to HTML table extraction. It is not an appropriate XPath in our project.

The next steps consist in finding appropriate XPaths for Web page titles and URLs and in setting them as values of the **Column XPath** property for the two previously created columns..

To set the column properties of the table extraction rule

1 In the **DOM Tree**, select a `LI` node corresponding to a Google result item.

2 Expand the node by clicking on  .

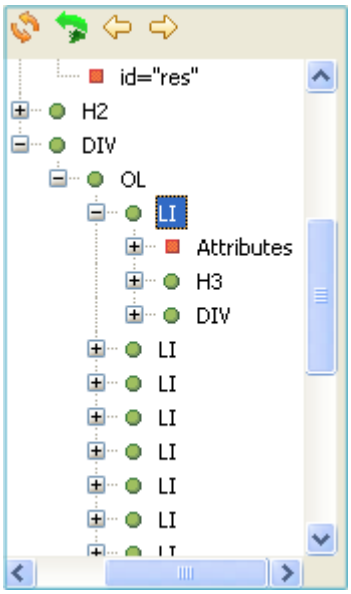


Figure 2 - 57: Expanding the LI element to find an XPath corresponding to Web page titles

We are looking for an XPath corresponding to Web page titles. The `LI` node contains an `H3` element (standard `Heading3` HTML node). This is a relevant element for

generating the required XPath.

3 Select H3 in the **Dom Tree**.

As we can see in the **Web Browser**, the title of a Google result item is outlined in green:

Figure 2 - 58: H3 node corresponding to a Web page title

The H3 element is the container of the text we want to extract (Web page titles).

We will now:

- *evaluate* the row XPath;
- *browse* the resulting **Document** tree structure to find the element corresponding to Web page titles (H3 element);
- *generate* its XPath.

4 Type in the row XPath in the **xPath** field of the **XPath Evaluator**.

5 Press **Enter** or click on the **Evaluate** icon  .

The resulting **Document** tree displays the corresponding tree structure:

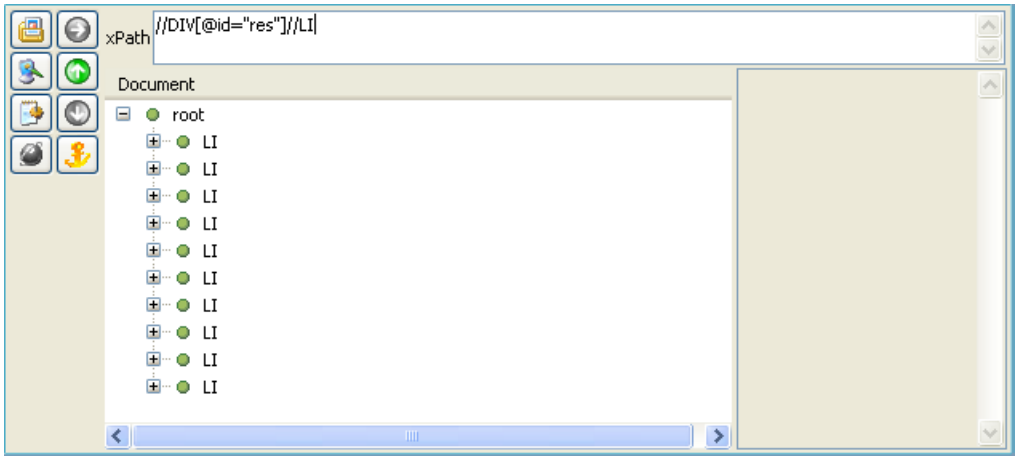


Figure 2 - 59: Row XPath expression and tree

6 Expand the **Document** tree to find an H3 element

*To check that H3 elements do correspond to Web page titles, right-click any H3 node in the **Document** field of the **XPath Evaluator** and select **Show in browser**. The corresponding Web page title is outlined in green in the **Web Browser**. All Web page titles are selected by this XPath.*

7 Right-click on an `H3` element and select **Generate selection XPath (Enter)** or select the element with a left-click and press **Enter**:

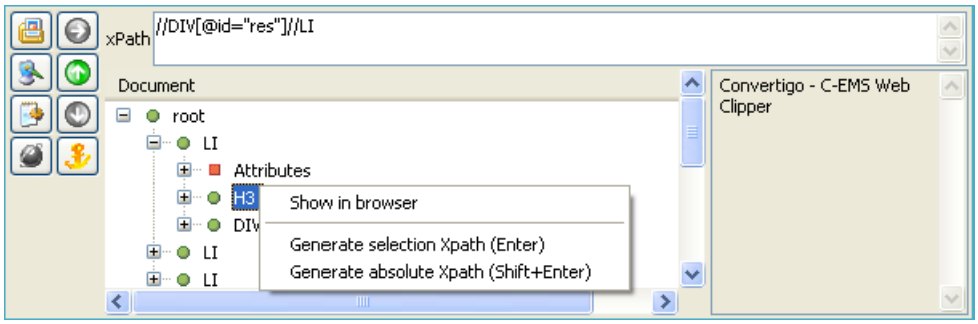


Figure 2 - 60: Generating the XPath expression of Web page titles

The **xPath** field is updated and displays the relative XPath expression of Web page titles:

Figure 2 - 61: Web page titles XPath based upon row XPath

We will now set this XPath as value of the **Column XPath** property for the `title` column.

8 In the **Projects View**, select the `title` column with a left-click.

The **Properties View** is automatically updated.

9 In the **Properties View**, click in the **Value** column of the **Column XPath** property.

The default value (`./TD`) is highlighted.

10 Type in the generated XPath by prefixing it with a "dot": `.//H3`.

11 Press `Enter`.

12 Save your project by clicking on  or by pressing `Ctrl + S`.

The `title` column is now properly set.

We will now repeat the same procedure to find an appropriate XPath for URLs.

13 In the **Web Browser**, right-click on the URL of the first Google result:

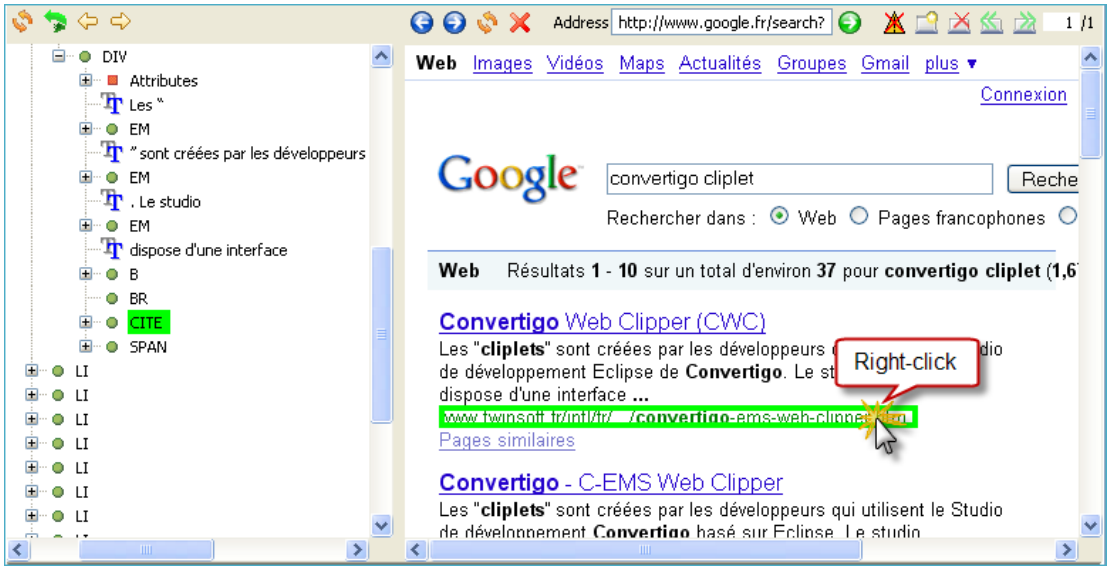


Figure 2 - 62: Selection of a node for generating the XPath of URLs

A `CITE` element is highlighted in green in the **DOM Tree**. It is the container of the text we want to extract (URL).

We will now:

- *evaluate* the row XPath.
- *browse* the resulting **Document** tree structure to find the element corresponding to URLs (`CITE` element);
- *generate* its XPath.

14 Type in the row XPath in the **xPath** field of the **XPath Evaluator**.

15 Press **Enter** or click on the **Evaluate** icon  .

The resulting **Document** tree displays the corresponding tree structure:

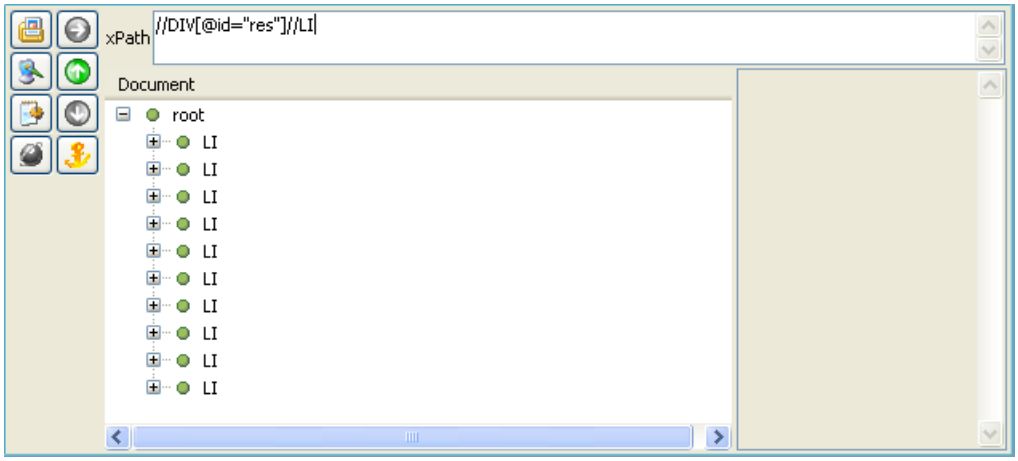


Figure 2 - 63: Row XPath expression and tree

16 Expand the **Document** tree to find a `CITE` element.

*To check that `CITE` elements do correspond to URLs, right-click any `CITE` node in the **Document** field of the **XPath Evaluator** and select **Show in browser**. The corresponding URL is outlined in green in the **Web Browser**. All URLs are selected by this XPath.*

17 Right-click on a `CITE` element and select **Generate selection XPath (Enter)** or select the element with a left-click and press **Enter**:

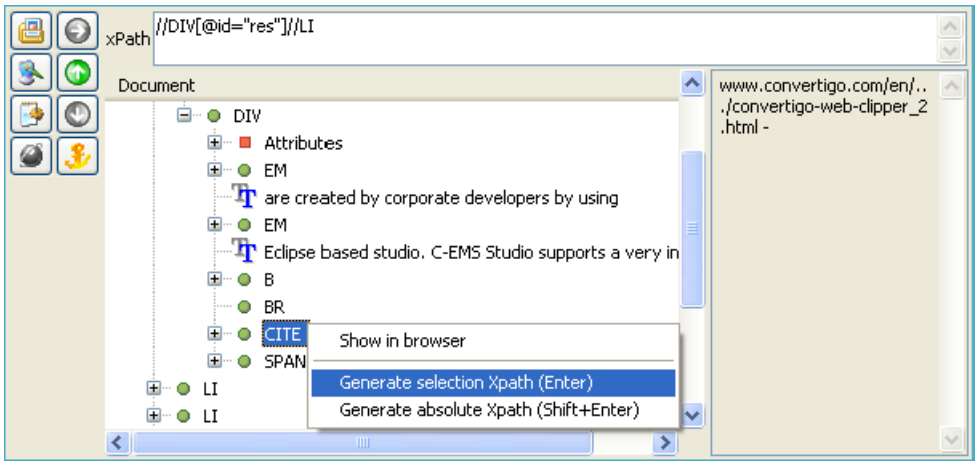


Figure 2 - 64: Generating the XPath expression of URLs

The **xPath** field is updated and displays the relative XPath expression of URLs:

Figure 2 - 65: URL XPath based upon row XPath

We will now set this XPath as value of the **Column XPath** property for the `url` column.

18 In the **Projects View**, select the `url` column with a left-click.

The **Properties View** is automatically updated.

19 In the **Properties View**, click in the **Value** column of the **Column XPath** property.

The default value (`./TD`) is highlighted.

20 Type in the generated XPath by prefixing it with a "dot": `.//CITE`.

21 Press `Enter`.

22 Save your project by clicking on  or by pressing `Ctrl + S`.

The `googleResults` extraction rule is now properly set.

You can now check that the newly created extraction rule is correct and creates a list of results in XML format with the required XML tag names.

To check that your extraction rule is correct

1 Assuming that the **Web Browser** displays a Google results page, click on the **Generate XML** icon  :

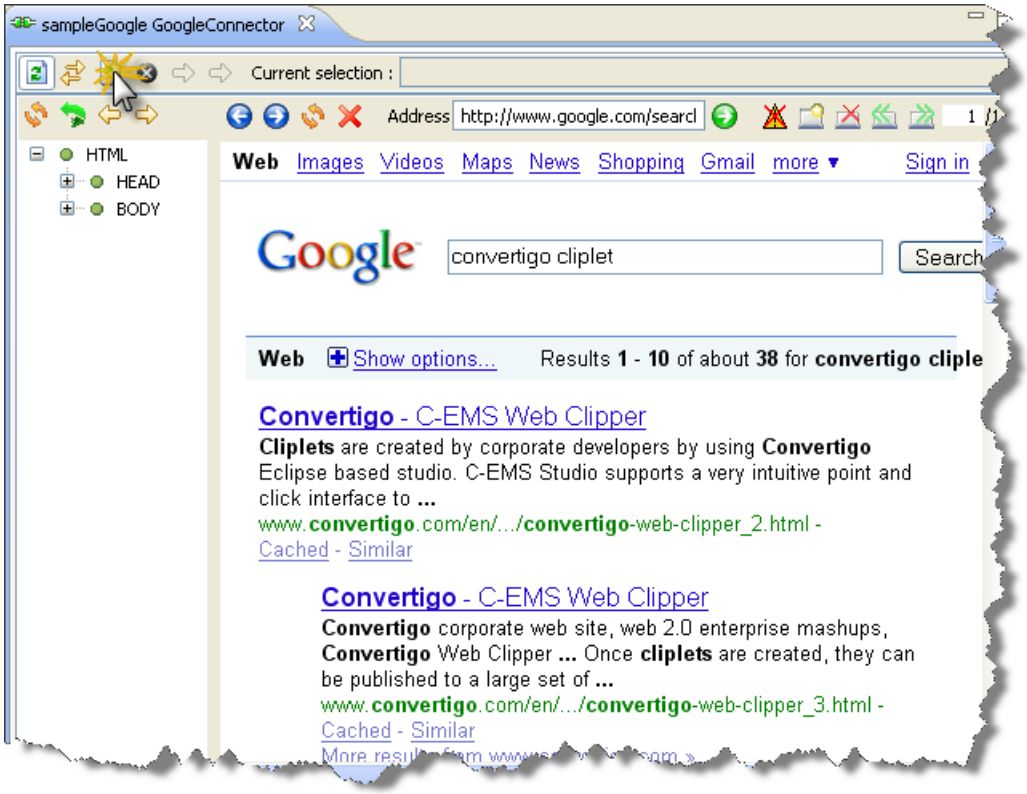


Figure 2 - 66: Generation of XML document

2 Click on the **Output** tab at the bottom of the **Connector View**.

Extracted data appears in XML format:

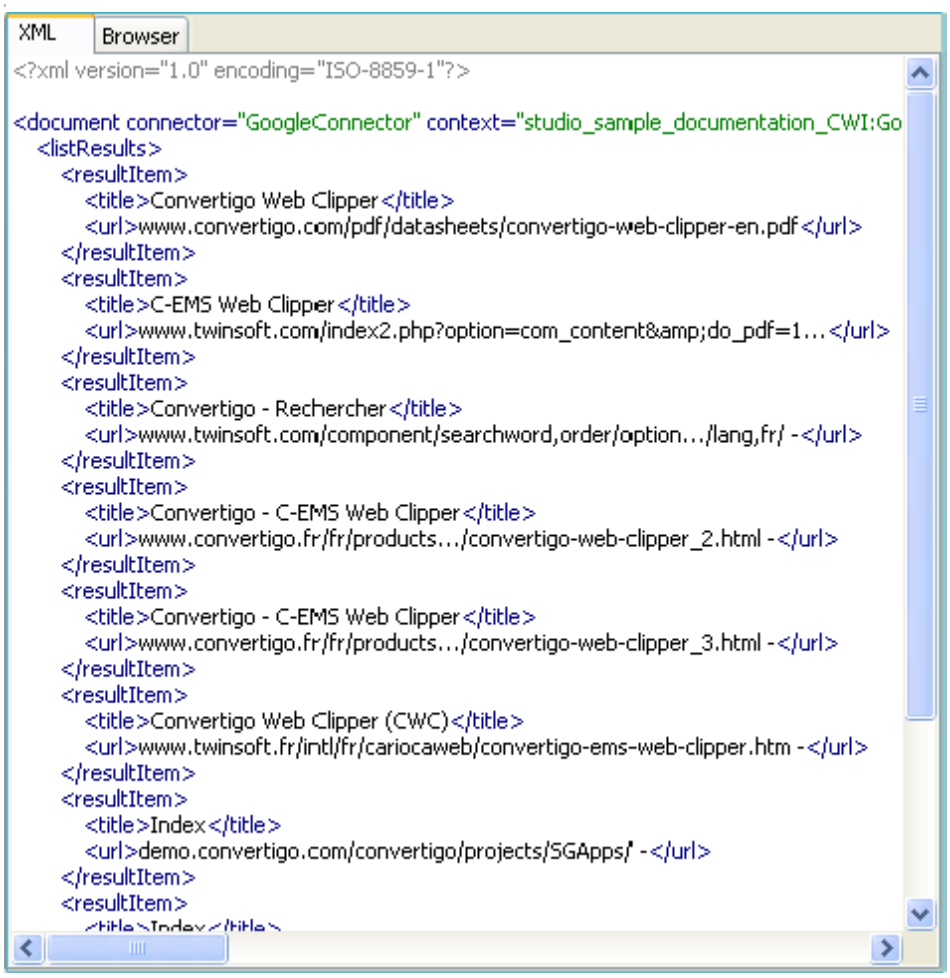


Figure 2 - 67: Result of the XML generation displayed under the Output tab

All of the XML tag names previously set when creating the extraction rule appear in the XML document:

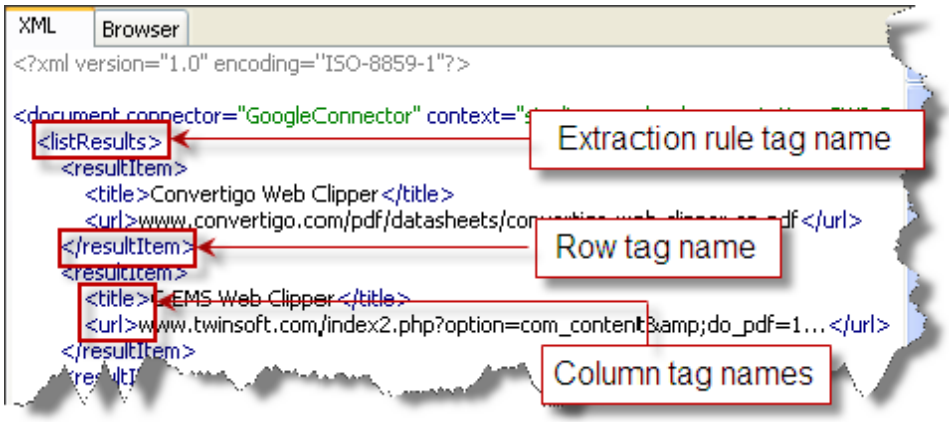


Figure 2 - 68: Structure of the XML output

Now that screen classes and extraction rule(s) have been defined, we will create a *transaction* (the process that automates navigation and extraction throughout Web pages) based on:

- *screen class handlers* - components of the transaction triggered on detection of screen classes;
- *statements* - actions performed on the Web page when a screen class handler is triggered.

The next section shows how to define transactions, screen class handlers and statements.

2.2.4 Defining a Transaction

As mentioned in *"Transaction"* on page 1 - 5, a transaction can be summed up as a process:

- taking *variables* in input;
- producing an XML document in output.

Only one variable is defined in the transaction of this sample project: the Google search keyword.

The XML output is produced on execution of the `googleResults` extraction rule on several pages. It is quite similar to the one produced by the **Generate XML** command (see Figure 2 - 67).

The first steps are the following:

1 *Create* the transaction.

2 *Create* a screen class handler triggered on detection of the `googleSearchPage` screen class.

The first screen class handler to be created is the one that is triggered on entry to the first page CWI connects to (depending on URL parameters set for the connector): the Google search page. That is why the first screen class handler is associated to the `googleSearchPage` screen class.

3 *Associate* two statements with this screen class handler:

- first statement = "input keyword";
- second statement = "click on the Google **Search** button".

To create a transaction

1 In the **Projects View**, right-click on the connector (`GoogleConnector` in our project) or on the **Transactions** folder.

2 Select ***New > Transaction***.

A **New Transaction** wizard opens:

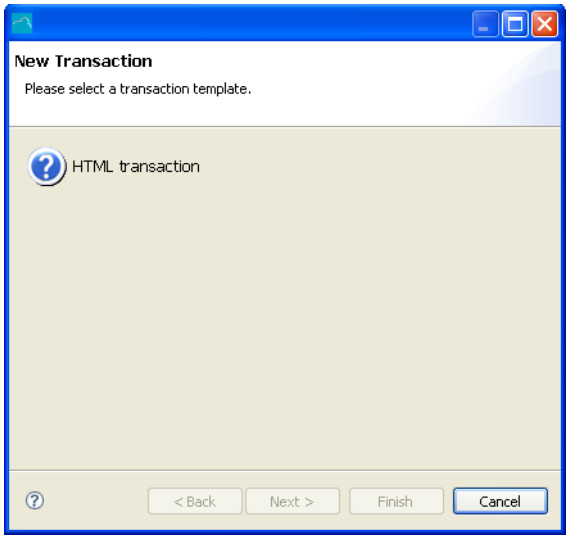


Figure 2 - 69: New Transaction wizard

3 Select **HTML transaction**.

4 Click on **Next**:

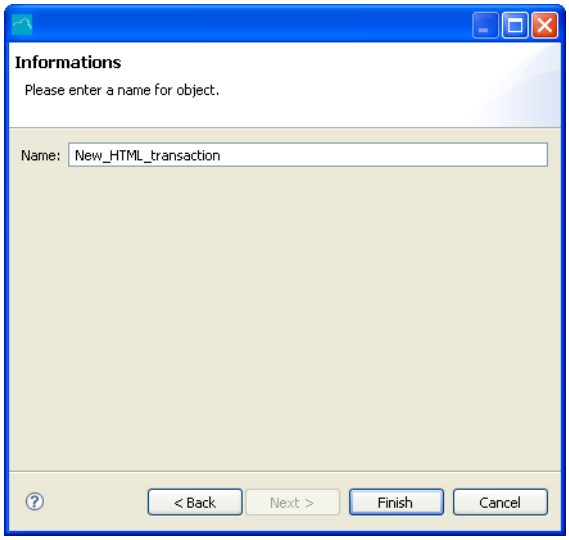


Figure 2 - 70: Entering a new transaction name

5 Enter the transaction name (for example `searchGoogle`).

6 Click on **Finish**.

The new transaction appears in the **Transactions** folder of the **Projects View**:

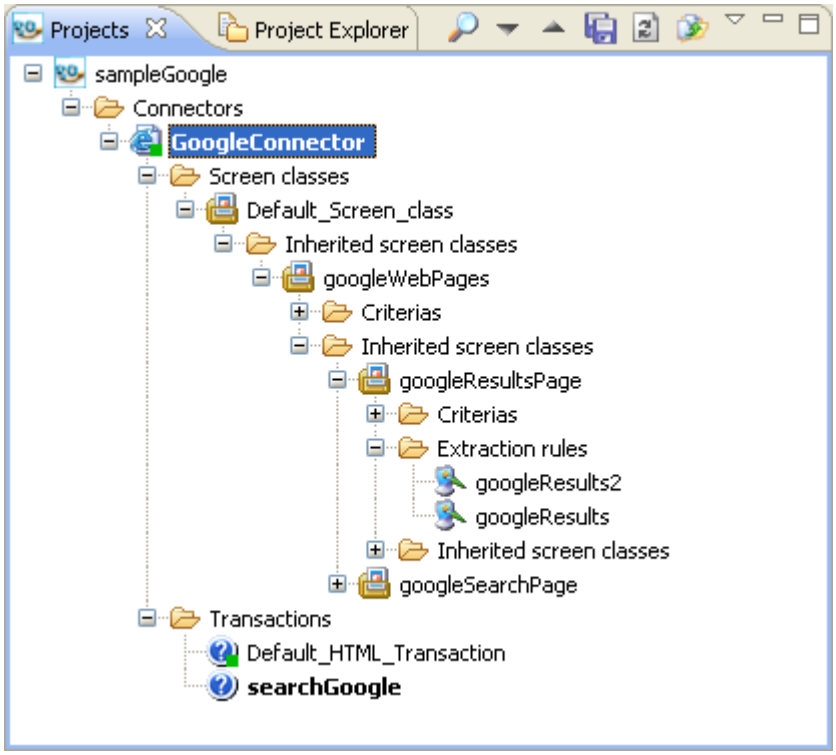


Figure 2 - 71: New transaction in Projects View

To set a transaction variable

We will now set the transaction *variable,* that is the transaction input data (i.e. search keyword).

Any transaction variable is added to the executed transaction JavaScript scope.

1 In the **Projects View**, right-click on the transaction (`searchGoogle` in this project)..

A contextual menu appears.

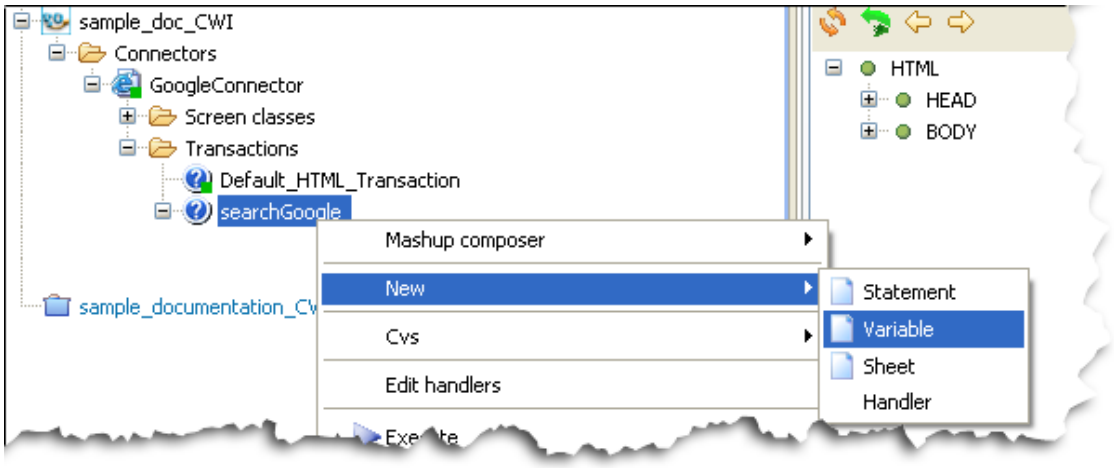


Figure 2 - 72: Creating a new transaction variable

2 Select ***New > Variable***.

A **New Variable** wizard is automatically launched.

3 Select **Variable**.

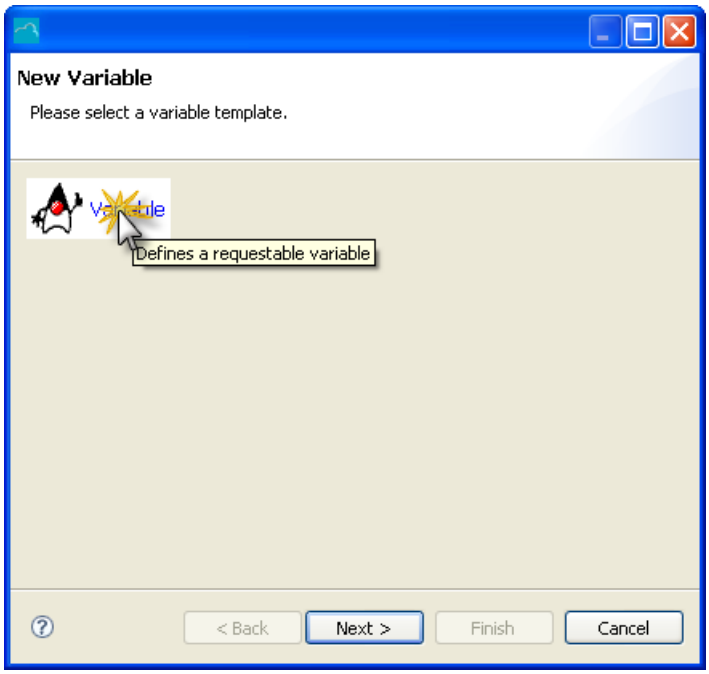


Figure 2 - 73: New Variable wizard

4 Click on **Next**;

5 In the **Name** field that appears, type in the name of the variable (for example `keyword`).

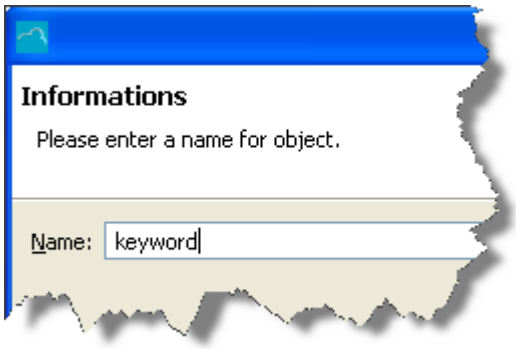


Figure 2 - 74: Giving a name to the new variable

6 Click on **Finish**.

The new variable appears in the transaction **Variables** folder in the **Projects View**:

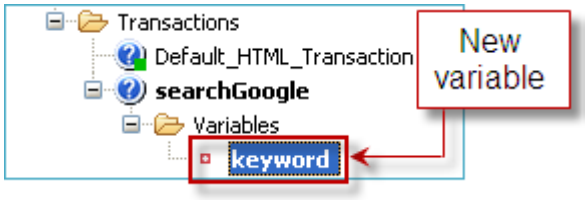


Figure 2 - 75: New variable in transaction Variables folder

7 Save your project by clicking on  or by pressing `Ctrl + S`.

The transaction variable is now created and saved. We can now set its properties.

*Only the **Description** property is set here as an example. For example, you can set a **Default value**. A default value is used as default search keyword if none is given in the transaction. This can be useful for setting parameters such as languages for example, which are supposed to be fixed.*

8 Select the `keyword` variable in the **Projects View**.

The **Properties View** is automatically updated:

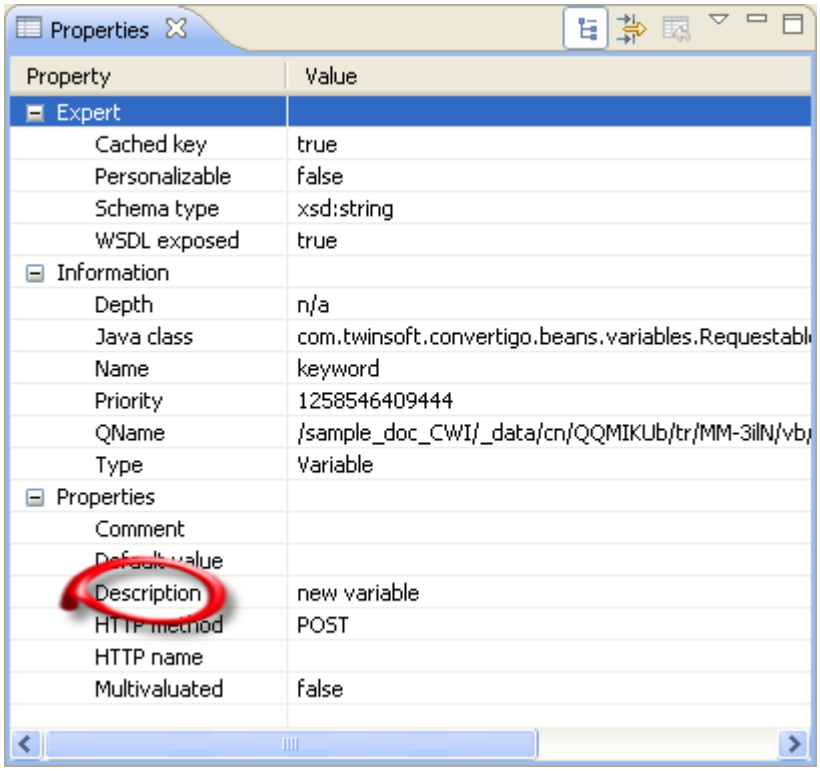


Figure 2 - 76: Variable properties

9 Click in the Value column of the **Description** property.

The property default value (`new variable`) is highlighted.

10 Type in a description for the variable (for example `keyword to be searched`).

11 Press `Enter`.

The value property is updated.

In the context of this Quick Guide project, all other values are left as default values.

The transaction variable is now created and properly set.

12 Save your project by clicking on  or by pressing `Ctrl + S`.

The previously defined variable is a Google search keyword to be entered in the search field

of the Google homepage.

We will now create the first screen class handler corresponding to the `googleSearchPage` screen class and add the required statements.

To create a screen class handler

1 Right-click on the transaction name (in our project, `searchGoogle`).

2 Select ***New > Handler*** in the contextual menu.

A **New transaction handler** window opens:

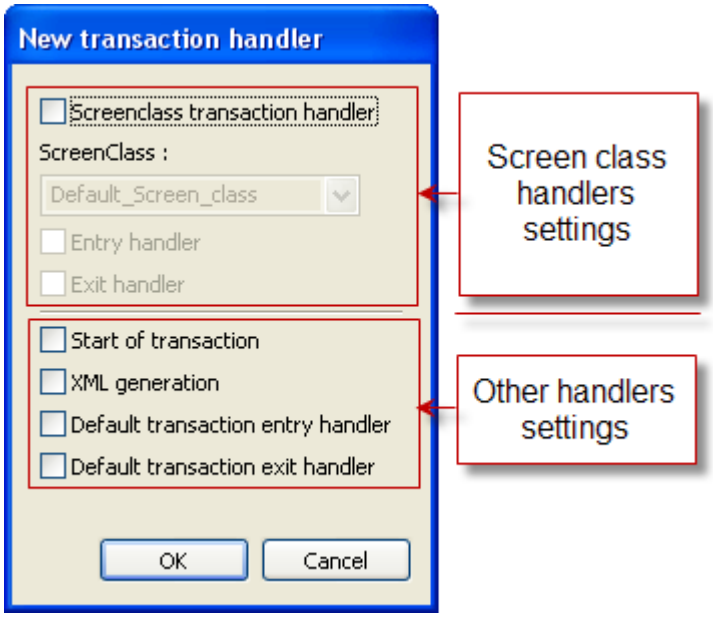


Figure 2 - 77: New transaction handler window

This window is divided into:

- a first part dedicated to *screen class* handlers (with three checkboxes and a drop-down menu);
- a second part dedicated to other types of handlers (with four checkboxes).

The table below describes these elements:

Table 2 - 3: New transaction handler window description

Window Element		Description
Screen class handler settings *Checkboxes*	Screen class transaction handler	Check this box if you want to create a screen class handler (as opposed to other available handlers) that wil be triggered on screen class detection.
	Entry handler	Check this box if screen class handler must be triggered when accessing the screen class. An entry screen class handler handles the following actions: access Web page, execute statements, exit to next Web page. Available only if **Screen class transaction handler** checkbox is checked.

Table 2 - 3: New transaction handler window description (...)

Window Element		Description
	Exit handler	Check this box if the screen class handler must be triggered when exiting the screen class. An exit screen class handler handles the following actions: access Web page, extract data according to extraction rules, execute statements, exit to next Web page. Available only if **Screen class transaction handler** checkbox is checked.
Drop-down menu	Screen class	Displays the list of screen classes available in the project.
Other handlers settings *Checkboxes*	Start of transaction	Check this box if you want to create a handler that will be triggered when starting the transaction.
	XML generation	Check this box if you want to create a handler that will be triggered at the end of the transaction (once the XML output has been generated).
	Default transaction entry handler	Check this box to create a default transaction entry handler.
	Default transaction exit handler	Check this box to create a default transaction exit handler.

The screen class handler we are about to create is triggered when accessing the home Google search page, so its parameters are the following:

- this is a *screen class transaction handler*, meaning that all the screen class handler settings of the **New transaction handler** window (see Figure 2 - 77) must be set;
- this is an ***entry*** handler, because no data has to be extracted from this page;
- it is triggered on detection of the `googleSearchPage` screen class.

We will now set the scren class handler parameters:

3 Check the **Screen class transaction handler** checkbox.

4 In the **ScreenClass** drop-down menu, select `googleSearchPage`.

5 Check the **Entry handler** checkbox.

6 Click on **OK**.

The screen class handler `ongoogleSearchPageEntry` appears in the **Functions** folder of the `searchGoogle` transaction of the **Projects View**:

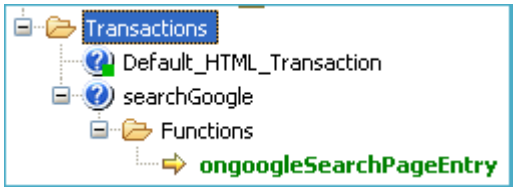


Figure 2 - 78: New entry screen class handler in the Projects View

Note the left to right yellow arrow identifying *entry* screen class handlers.

The following step consists in creating the statement that will enter the keyword in the search field. This is done by generating first the XPath corresponding to the Google

search field, for Convertigo to know where the search keyword is to be entered.

To create a statement

1 Assuming that the **Web Browser** displays the Google search page, right-click on the Google search field.

The search field is outlined in green in the **Web Browser** and the corresponding element is highlighted in green in the **DOM Tree**:

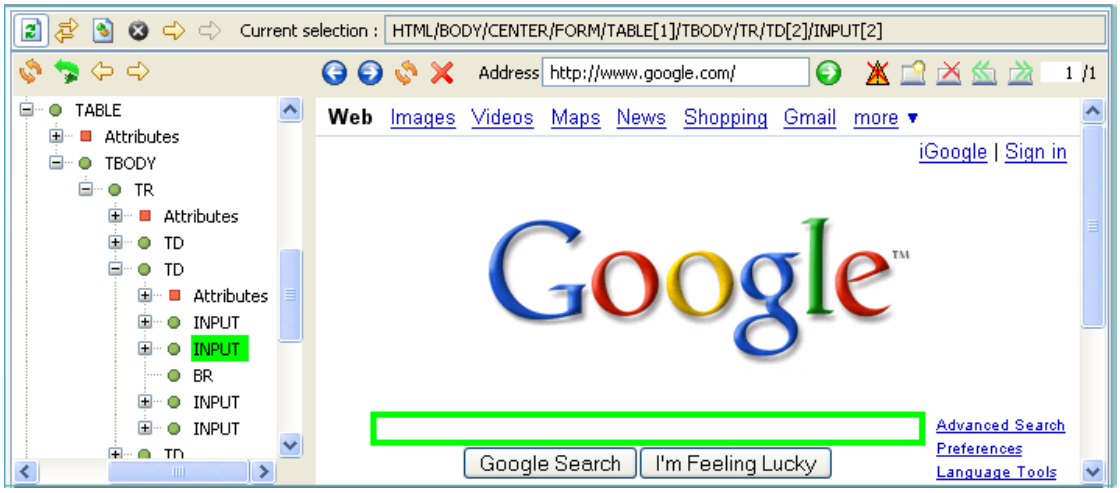


Figure 2 - 79: Selection of Google search field in Web Browser

2 Expand the **DOM Tree** to find an appropriate node:

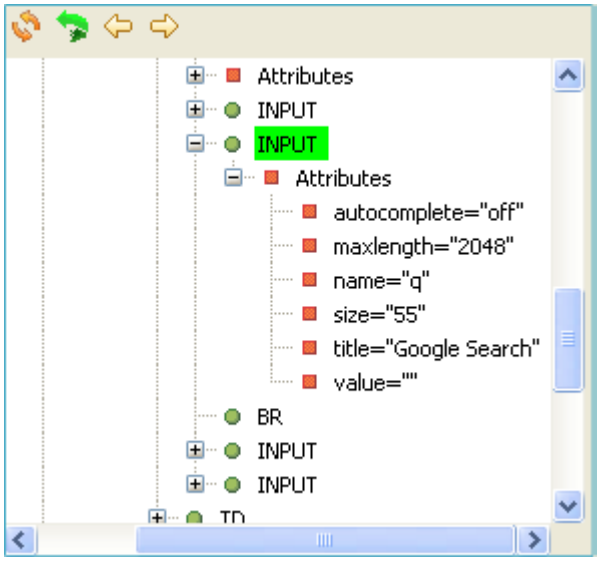


Figure 2 - 80: Expansion of the DOM tree to find an appropriate node for the search field

As mentioned before, the `name` HTML attribute is a good candidate for generating XPaths (as well as `id` attributes).

3 Right-click on `name="q"` and select **Generate selection XPath (Enter)** or select `name="q"` with a left-click and press **Enter**.

The XPath corresponding to the Google search field is displayed in the **xPath** field of the **XPath Evaluator**.

As we can see in the **Document** field, this Xpath corresponds to *one* element only:

Figure 2 - 81: Prevously generated XPath corresponds to one element of the Web page only

4 In the **Projects View**, select the `ongoogleSearchPageEntry` screen class handler, because we want to create the statement in this handler.

5 In the **XPath Evaluator**, click on the **Generate new statement from current XPath** icon  , which is active because a suitable handler or container is selected in the **Projects View**).

A **New Statement** wizard opens.

6 Click on **Input HTML set value** statement, which sets a value into an HTML input field:

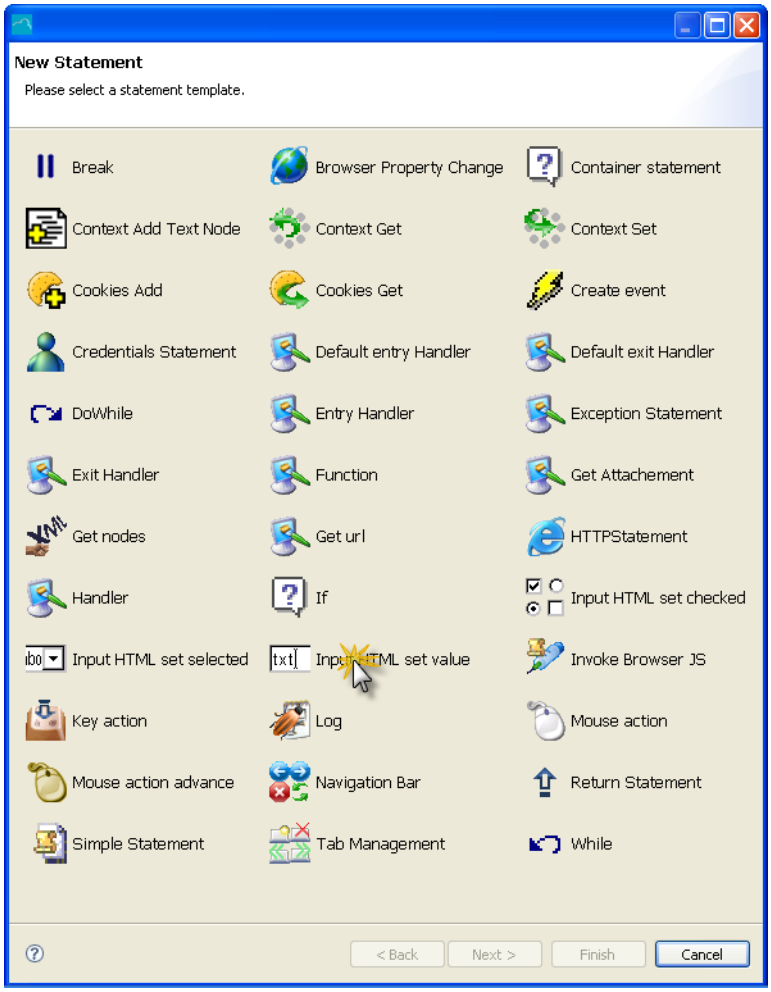


Figure 2 - 82: New Statement wizard - Input HTML set value

7 Click on **Next**.

8 Leave the statement name untouched or enter a new statement name in the **Name** field (for example `set_keyword_value`):

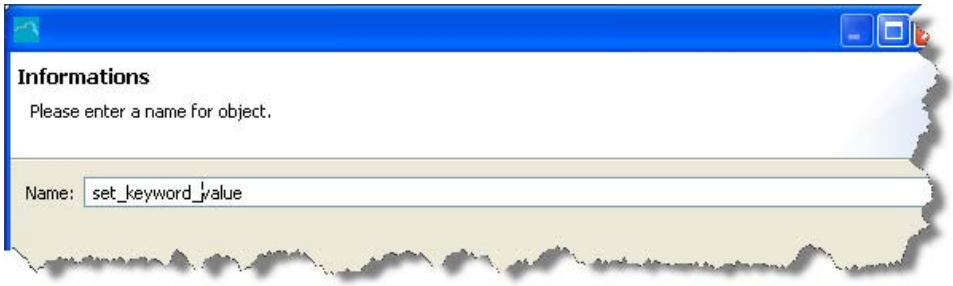


Figure 2 - 83: Proper statement name

If the statement name is several words long, separate each word with an underscore instead of a blank space. Otherwise, an error message will appear in the Informations part of the window (see Figure 2 - 84).

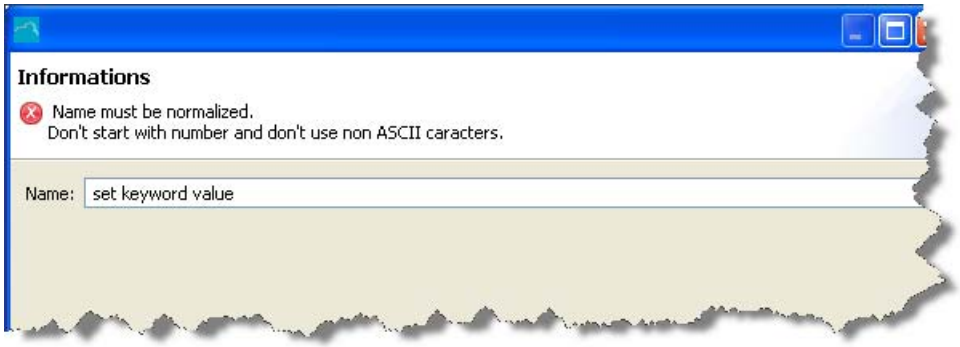


Figure 2 - 84: Improper statement name

9 Click on **Finish**. The new statement appears in the **Projects View**:

Figure 2 - 85: New Input HTML set value statement

The variable whose value must be set has still to be specified (corresponding to the `//todo` comment).

10 Select the newly created statement with a left-click.

The **Properties View** is automatically updated:

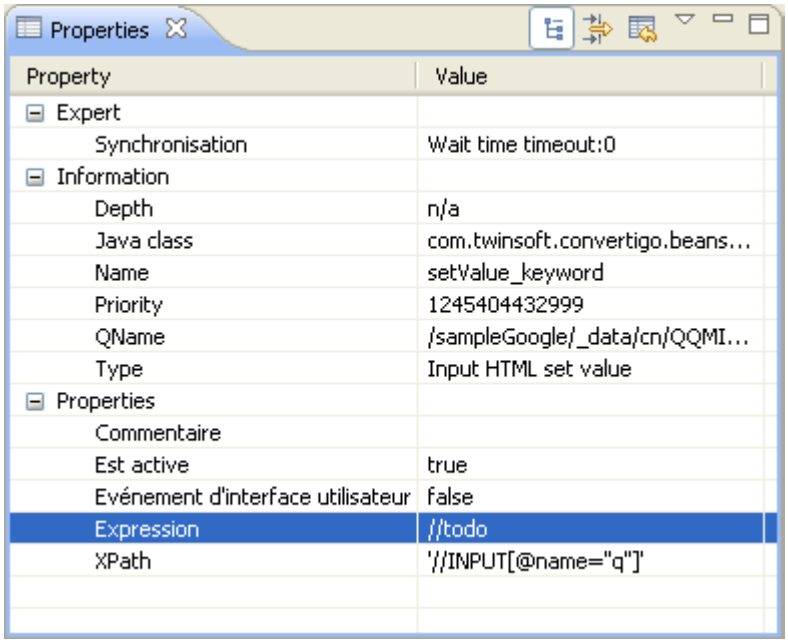


Figure 2 - 86: HTML Input set value statement properties

11 Click on the value of the **Expression** property (`//todo`).

12 Click on  . A JavaScript expression window opens:

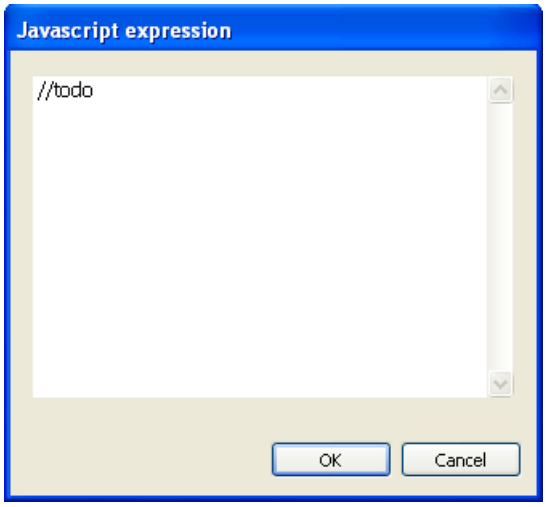


Figure 2 - 87: Edition of the Expression property

This form contains JavaScript expressions used as input for transactions.

13 Delete `//todo`.

14 Type in the name of your variable: `keyword`.

Any kind of JavaScript expression can be entered in this form. For example, `keyword + "toto"`.

The statement is updated in the **Projects View**:

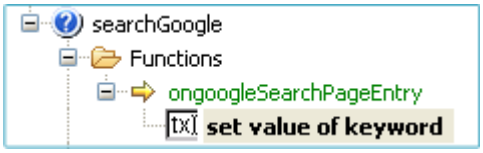


Figure 2 - 88: Updated statement

15 Save your project by clicking on or by pressing `Ctrl + S`.

We will now repeat the process (steps 1 to 9 of this procedure) to create the second statement of the `ongoogleSearchPage` screen class handler, which can be summed up as "click on the **Google Search** button".

16 In the **Web Browser**, right-click on the Google **Search** button.

The **Google Search** button is outlined in green in the **Web Browser** while its HTML container is highlighted in green in the **DOM Tree**:

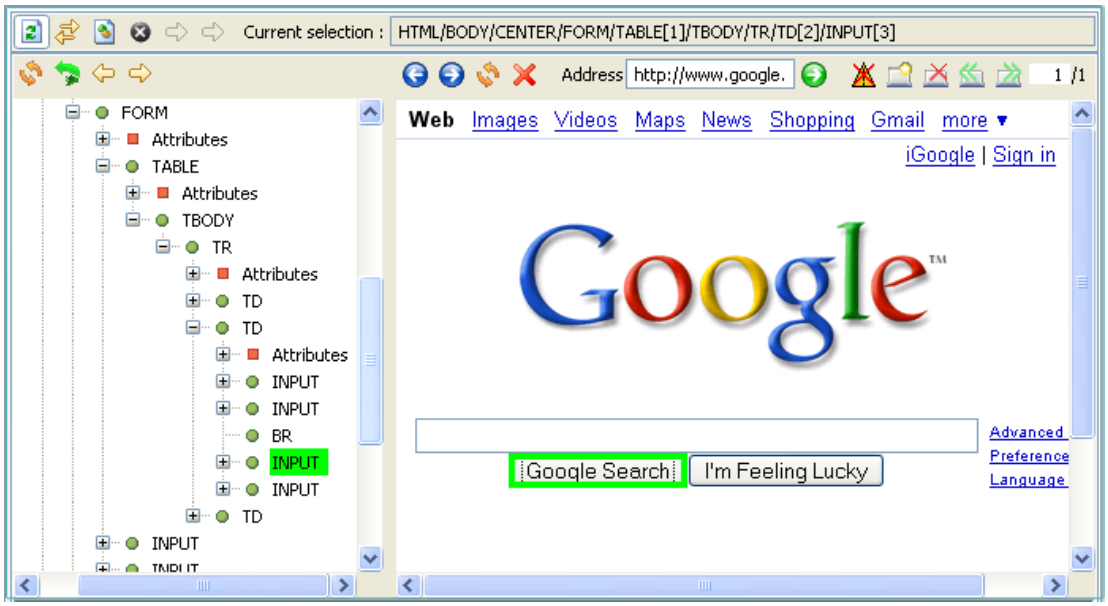


Figure 2 - 89: Selection of the Google Search button in the Web Browser

17 Expand the **DOM Tree** to find an appropriate element:

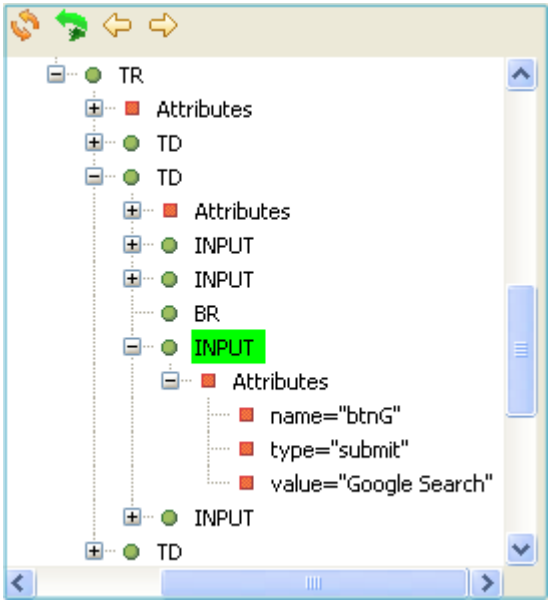


Figure 2 - 90: Expansion of the DOM tree to find an appropriate element for the Search button

As mentioned before, the `name` HTML attribute is a good candidate for generating XPaths (as well as the `id` attribute). To be sure there will be no conflict with any other HTML element (with same attribute name), we can add the type attribute (`type="submit"`, which is characteristic of HTML form validating buttons).

18 While keeping the `Shift` key pressed, select `name="btnG"` and `type="submit"` with a left-click and press **Enter** or right-click and select **Generate selection XPath (Enter)**.

The XPath corresponding to the **Google Search** button is displayed in the **xPath** field of the **XPath Evaluator**.

*Check in the **Document** field of the **XPath Evaluator** that the XPath corresponds to one element only (see step 3 of this procedure).*

19 In the **Projects View**, select the `ongoogleSearchPageEntry` screen class handler, because we want to add a statement to this handler.

20 In the **XPath Evaluator**, click on the **Generate new statement from current XPath** icon  .

A **New Statement** wizard opens.

21 Click on **Mouse action** statement, which emulates mouse clicks:

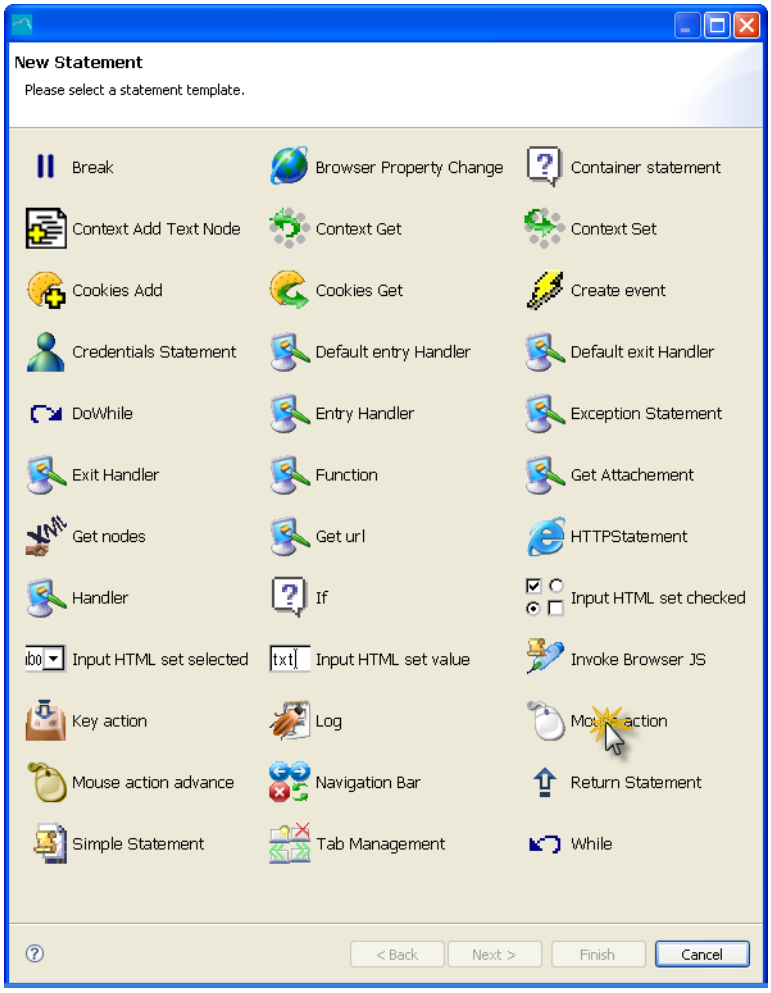


Figure 2 - 91: New Statement wizard - Mouse action

22 Click on **Next**.

23 Leave the statement name untouched or enter a new name in the **Name** field (see *Warning* on step 8, page 2-48): for example `clickSearchButton`.

24 Click on **Finish**. The new statement appears in the **Projects View**:

Figure 2 - 92: New mouse click statement on entry screen class handler

25 Select the newly created statement with a left-click.

The **Properties View** is automatically updated:

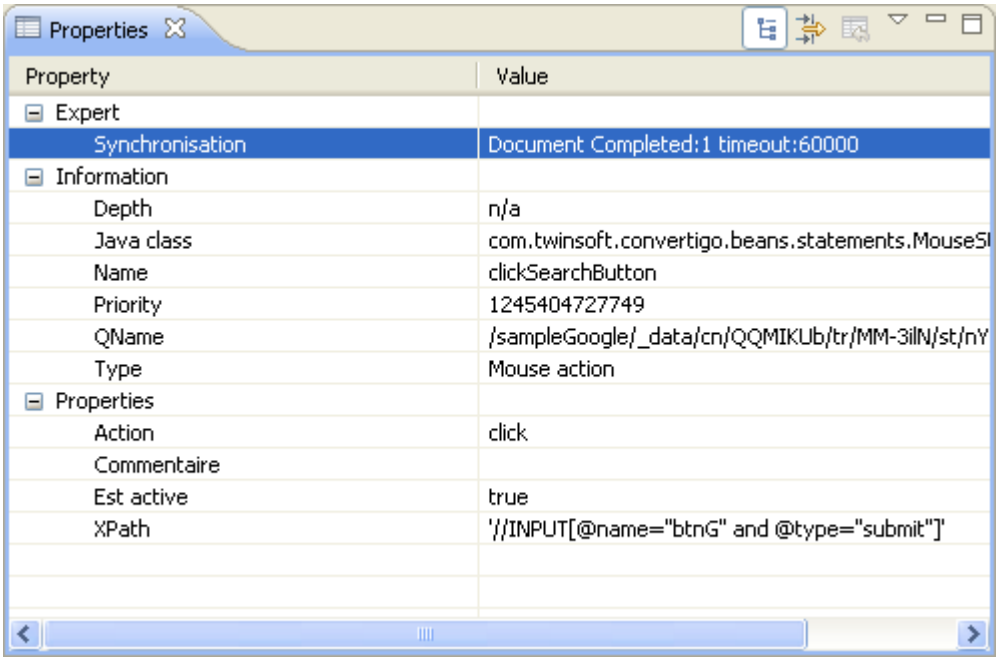


Figure 2 - 93: Mouse click statement properties

One property must still to be set: the **Synchronisation** property.

This property answers the following question: "Once the click has been performed, when can the transaction resume (for example once the result page have has been loaded), and what is the allowed maximum waiting time?".

26 In the **Properties View**, click on the value of the **Synchronisation** property.

27 Click on  .

A **Trigger Editor** window opens:

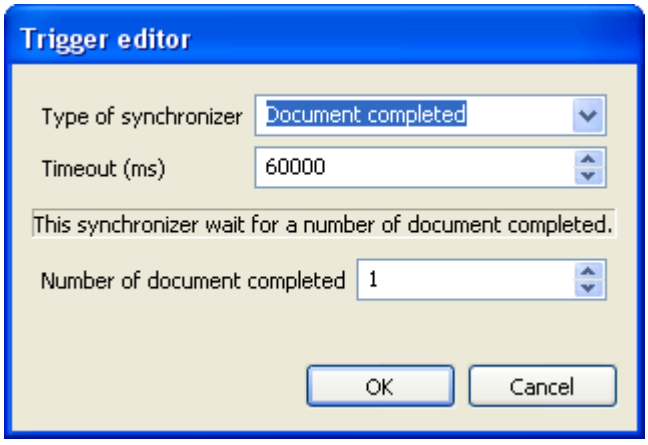
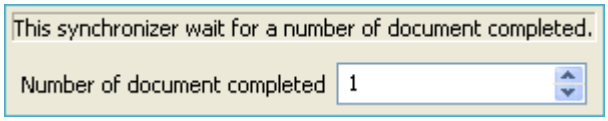
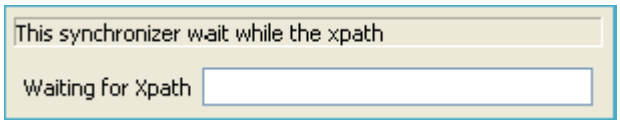
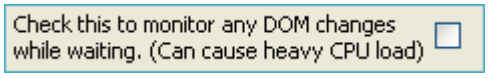
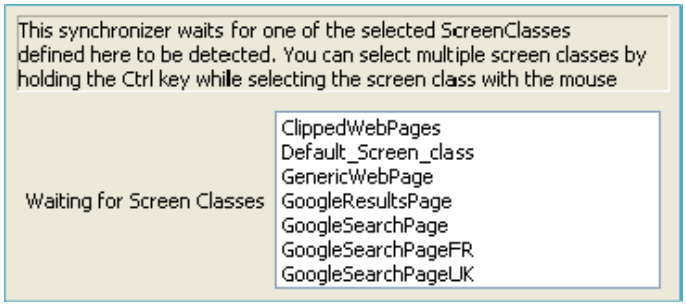


Figure 2 - 94: Trigger editor window

Three types of synchronizer are available:

Table 2 - 4: Synchronizer types

Synchronizer type	Description
Document completed	Transaction continues running once a number of document have been successfully loaded. The number of documents must be set in the **Number of document completed** field of the window: 
Xpath	Transaction continues running once an Xpath has been found. The XPath must be set in the **Waiting for XPath** field: 
Wait time	Transaction continues running after the specified wait time has been reached. With this parameter, you can also decide to monitor any DOM change while waiting: 
Screen class	Transaction continues running once one of the specified screen classes has been reached. The waited screen classes must be selected in the **Waiting for Screen Classes** list: 

28 Leave default values unchanged.

29 Click on **OK**.

30 Save your project by clicking on  or by pressing `Ctrl + S`.

The actions to be performed on detection of the `googleSearchPage` screen class are now defined.

We must inform the transaction that once all the screen class handler statements have been executed, a new criterion match detection must be carried out on the next accessed Web page without extracting data.

This is done through the **Result** entry screen class property, which can take the

following values:

Table 2 - 5: Result property values for *entry* screen class handlers

The value...	Means that the application will...
<blank>	stop the transaction and extract data from last detected screen class using extraction rules
continue	stop the transaction and extract data from last detected screen class using extraction rules.
redetect	redetect a new screen class without extracting data. This is the default value, which corresponds to what the transaction should do in our case.
skip	stop the transaction without extracting data from last detected screen class.

31 Select the `ongoogleSearchPageEntry` screen class handler in the **Projects View**.

The **Properties View** is automatically updated:

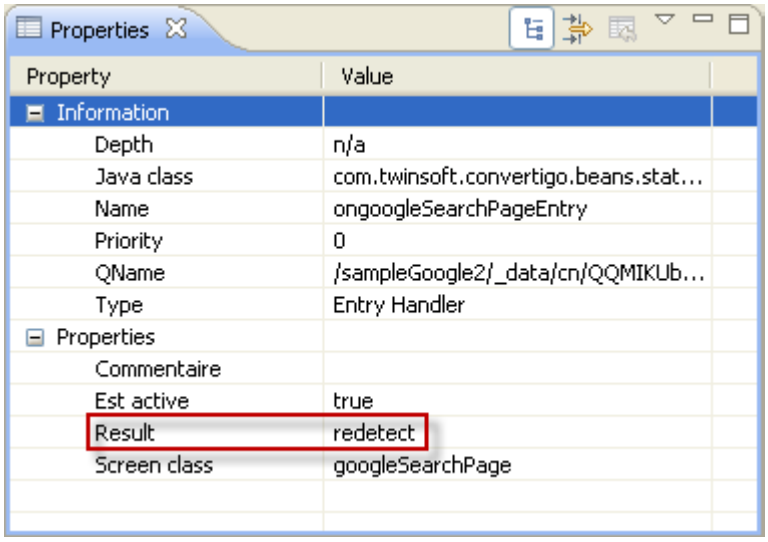


Figure 2 - 95: Entry screen class handler properties

The first screen class handler, which is intended to input a search keyword and click on the **Google Search** button, is now properly set.

The second screen class handler we are about to create is needed only if you access the `www.google.com` Web site from outside the USA and need CWI to be redirected from your country-specific Google page to the Google.com page in English.

Case of a Country-Specific Google Search Page - Definition of the `ongoogleSearchPageFREntry` Screen Class Handler

This screen class handler will be triggered on detection of the `googleSearchPageFR` screen class, when accessing a country-specific Google page (for example, the French version). Its role will be to handle, through a dedicated statement, the mouse click on the **Google.com in English** link.

This screen class handler can be defined as follows:

- this is a *screen class transaction handler*;

- this is an ***entry*** handler, because no data needs to be extracted from the screen class;
- it is triggered on detection of the `googleSearchPageFR` screen class.

After it has been created, this screen class handler will be associated with the statement allowing to switch back to the English Google search page. This statement is "click the **Google.com in English** link".

To create the ongoogleSearchPageFR screen class handler

1 Right-click on the transaction name (in our project, `searchGoogle`).

2 Select ***New > Handler*** in the contextual menu. A **New transaction handler** window opens.

For more information on this window, see Table "New transaction handler window description" on page 2-45.

3 Check the **Screen class transaction handler** checkbox.

4 In the **ScreenClass** drop-down menu, select `googleSearchPageFR`.

5 Check the **Entry handler** checkbox.

6 Click on **OK**.

The screen class handler `ongoogleSearchPageFREntry` appears in the **Functions** folder of the `searchGoogle` transaction in the **Projects View**:

Figure 2 - 96: ongoogleSearchPageFR screen class handler in Projects View

We now need to define the statement that will perform, on detection of the `googleSearchPageFR` screen class, the required action: "click on the **Google.com in English** link".

To this end, we will use the same XPath as the one used to create the `googleSearchPageFR` screen class, corresponding to the mentioned link.

7 Assuming that the **Web Browser** displays a country-specific Google search page, right-click on the **Google.com in English** link.

The **Google.com in English** link is outlined in green in the Web Browser and its corresponding element is highlighted in green in the **DOM Tree**:

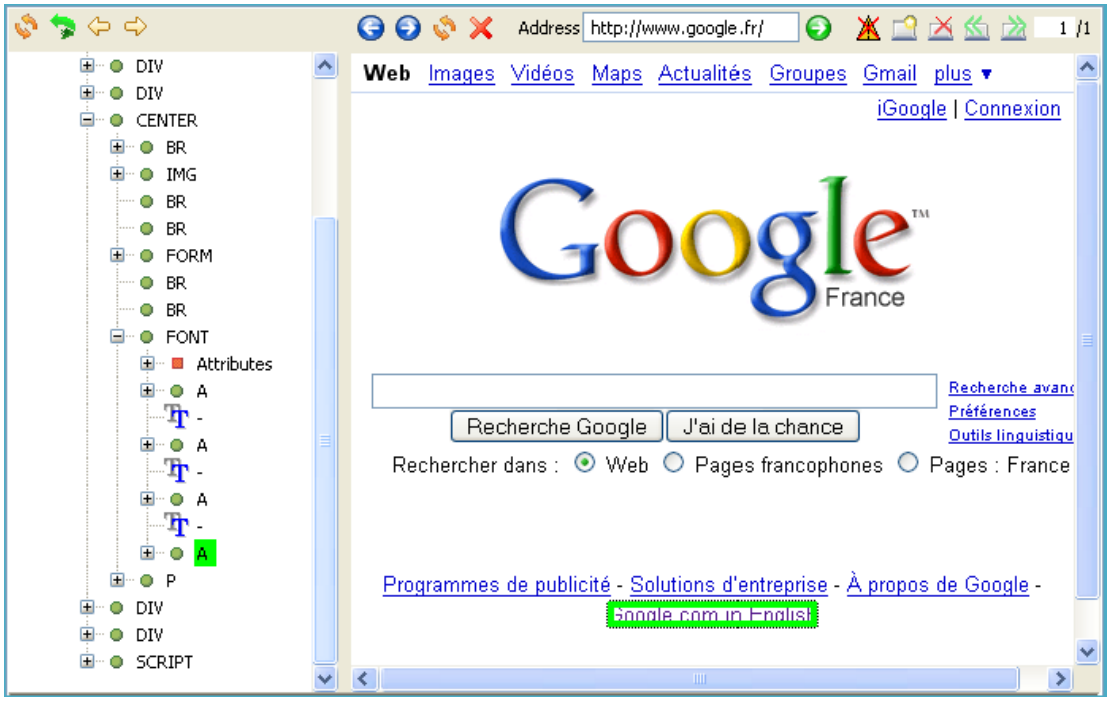


Figure 2 - 97: Selection of a detection criterion for the googleSearchPageFR screen class

We will expand the A element node to see if it contains interesting attributes to generate the XPath corresponding to the link.

8 Expand the A element in the **DOM Tree** by clicking on ⊞:

Figure 2 - 98: Expanding an element to find relevant attributes in the DOM Tree

As we can notice, two nodes are associated with the A element: a `href` attribute node, which contains the URL address of the hypertext link, and a text node (`Google.com in English`), which represents the element content.

The `href` attribute is not so interesting as regards XPath generation because its value may often change. We will select the text content only and generate the XPath from it.

9 Right-click the text node 

and select **Generate selection XPath (Enter)** or select it with a left-click and press **Enter**:

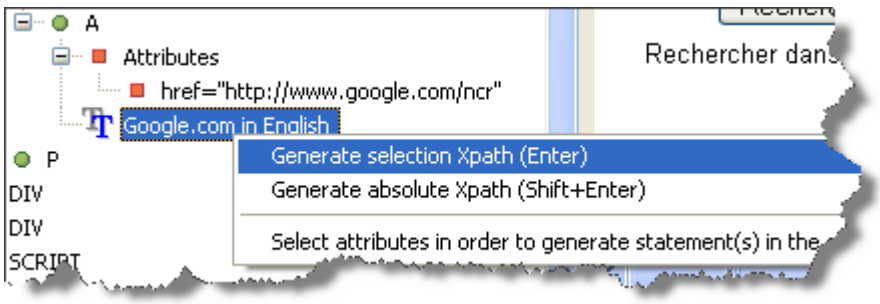


Figure 2 - 99: Generation of XPath for the googleSearchPageFR screen class

The XPath expression of the selected node appears in the **XPath Evaluator**.

10 Select the `ongoogleSearchPageFREntry` handler object in the **Projects view**.

11 In the **XPath Evaluator**, click on the **Create new statement from current XPath** icon  , which is activated because a suitable handler or container is selected in the **Projects View**.

A **New Statement** wizard opens.

12 Click on **Mouse action** statement, which emulates mouse clicks:

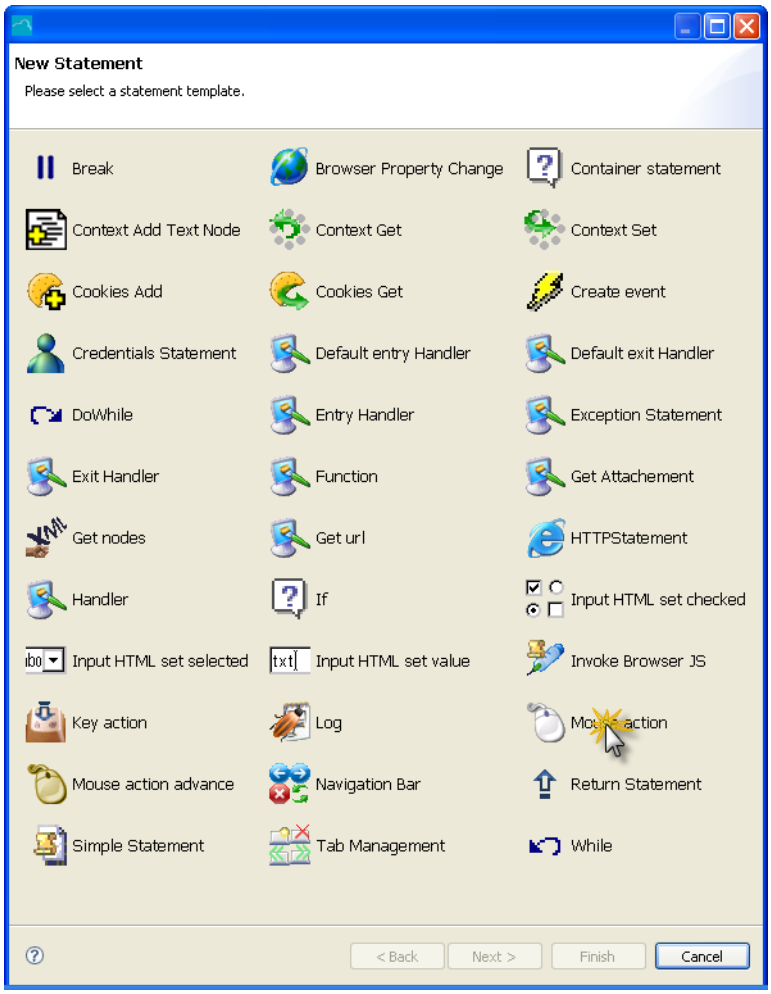


Figure 2 - 100: New Statement wizard - Mouse action

13 Click on **Next**.

14 Leave the statement name untouched or enter a new name in the **Name** field (see *Warning* on step 8, page 2-48): for example `clickLinkGoogleCom`.

15 Click on **Finish**.

The new statement appears in the **Projects View**:

Figure 2 - 101: New mouse click statement on entry screen class handler

The statement's **Synchronisation** property is set by default to the following value:

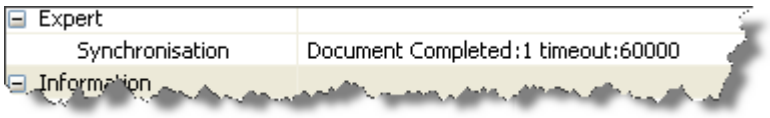


Figure 2 - 102: clickLinkGoogleCom statement - Synchronization value

You can leave the default value.

*For more information on the **Synchronisation** property, see Table 2 - 4 on page 2-55.*

16 Save your project by clicking on  or by pressing `Ctrl + S`.

The actions to be performed on detection of the `googleSearchPageFR` screen class are now defined.

The `ongoogleSearchPageFR` **Result** property is set by default to `redetect`. This informs the transaction that once all the screen class handler statements have been executed for this screen class, a new criterion match detection must be carried out on the next accessed Web page without extracting data.

You can leave the default value.

*For more information on the **Result** property for **entry** screen class handlers, see Table 2 - 5 on page 2-56.*

The `ongoogleSearchPageFR` screen class handler is now properly set.

The next step is to define a third (or second if you have not defined any country-specific screen class and corresponding screen class handler) screen class handler associated with the `googleResultsPage`. Its role is to handle data extraction (i.e. *XMLisation* of the result page) and exit the result page by navigating to the next page.

This screen class handler can be defined as follows:

- this is a *screen class transaction handler*;

- this is an ***exit*** handler, because data needs to be extracted from the screen class;
- it is triggered on detection of the `googleResultsPage` screen class.

To create the ongoogleResultsPageExit screen class handler

1 Right-click on the transaction name (in our project, `searchGoogle`).

2 Select **New > Handler** in the contextual menu. A **New transaction handler** window opens.

For more information on this window, see Table "New transaction handler window description" on page 2-45.

3 Check the **Screen class transaction handler** checkbox.

4 In the **ScreenClass** drop-down menu, select `googleResultsPage`.

5 Uncheck the **Entry handler** checkbox and check the **Exit handler** checkbox.

6 Click on **OK**.

The screen class handler `ongoogleResultsPageExit` appears in the **Functions** folder of the `searchGoogle` transaction in the **Projects View**:

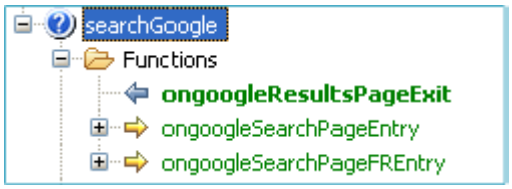


Figure 2 - 103: New exit screen class handler in the Projects View

Note the right to left blue arrow  identifying exit screen class handlers.

We will now create the statement associated to this screen class handler. This statement can be summed up as follows: "in the Google result page, click on the **Next** link".

The following step thus consists in creating the statement that will do so. First, we have to generate the XPath corresponding to the **Next** link of Google result pages.

7 Assuming that the **Web Browser** displays a Google results page, right-click on the Google **Next** link.

The **Next** link is outlined in green in the **Web Browser** and the corresponding HTML node is highlighted in green in the **DOM Tree**:

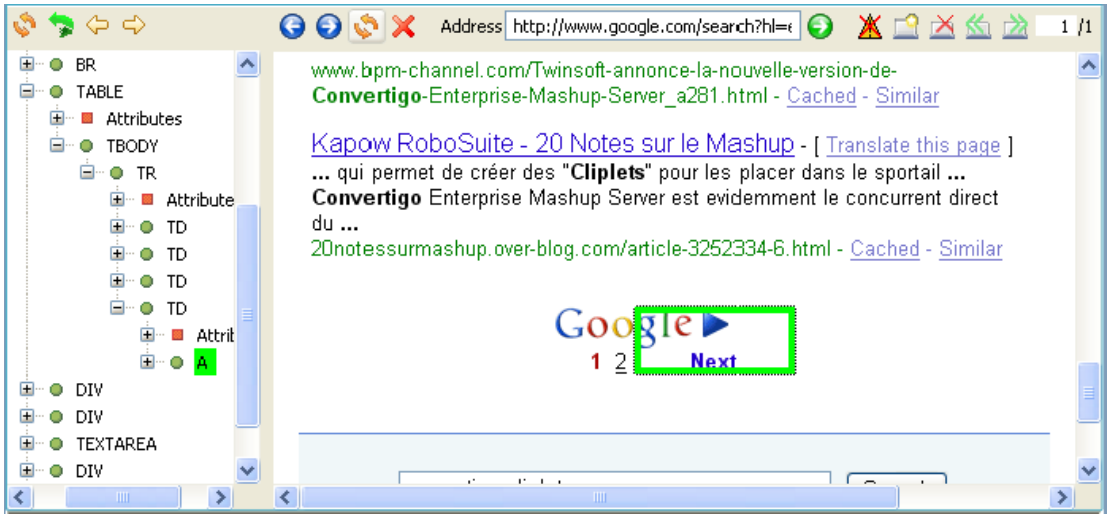


Figure 2 - 104: Selection of the Google results Next link in the Web Browser

8 Expand the **DOM Tree** to find an appropriate node:

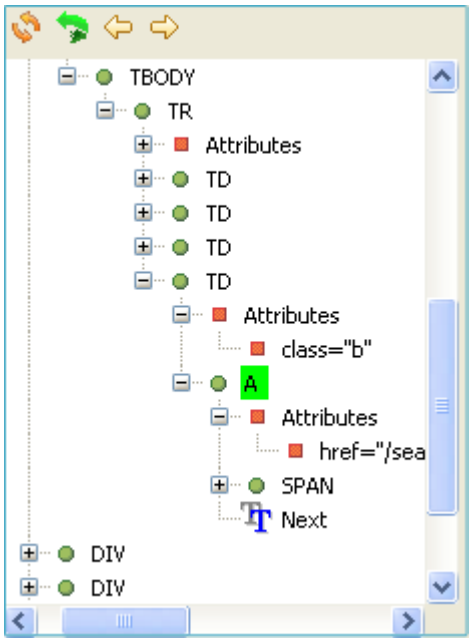
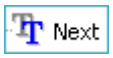


Figure 2 - 105: Expansion of the DOM tree to find an appropriate node for the Next button

No other interesting attribute being present in the **DOM Tree**, the `Next` text node seems the best candidate for generating the XPath corresponding to the **Next** link.

9 Right-click on 

and select **Generate selection XPath (Enter)** or select 

with a left-click and press **Enter**.

The XPath corresponding to the Google **Next** link is displayed in the **xPath** field of the **XPath Evaluator**.

*Check in the **Document** field of the **XPath Evaluator** that the XPath corresponds to one element only (see step 3 of this procedure).*

10 In the **Projects View**, select the `ongoogleResultsPageExit` screen class handler, because we want to add a statement to this handler.

11 In the **XPath Evaluator**, click on the **Generate new statement from current XPath** icon  .

A **New Statement** wizard opens.

12 Click on **Mouse action** statement, which emulates mouse clicks:

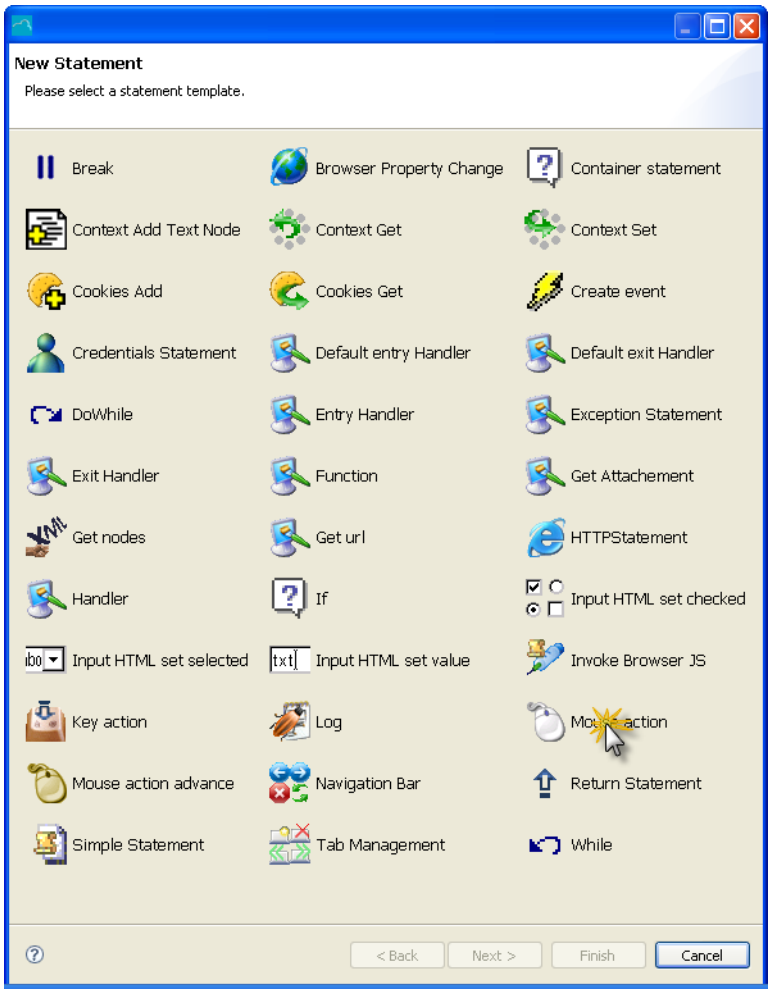


Figure 2 - 106: New Statement wizard - Mouse action

13 Click on **Next**.

14 Leave the statement name untouched or enter a new name in the **Name** field (see *Warning* on step 8, page 2-48): for example `clickNext`.

15 Click on **Finish**.

The new statement appears in the **Projects View**:

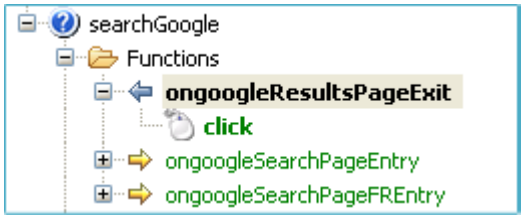


Figure 2 - 107: New mouse click statement on exit scren class handler

16 Save your project by clicking on  or by pressing `Ctrl + S`.

To complete the setting of the `ongoogleResultsPageExit` screen class handler, one last property needs to be set: the **Result** property.

In the context of *exit* screen class handlers, this property specifies what results from exiting the HTML page.

The **Result** property can take the following values:

Table 2 - 6: Result property values for *exit* screen class handlers

The value...	Means that the application will...
<blank>	end the transaction.
accumulate	accumulate extracted data (data is extracted from last detected screen class then added to any other extracted data) and redetect a new screen class. This is the default value, which corresponds to what the transaction should do in our case.

*For more information on the use of the **Result** property in the context of **entry** screen class handlers, see Table 2 - 5 on page 2-56.*

17 Select the `ongoogleResultsPageExit` screen class handler in the **Projects View**.

The **Properties View** is automatically updated:

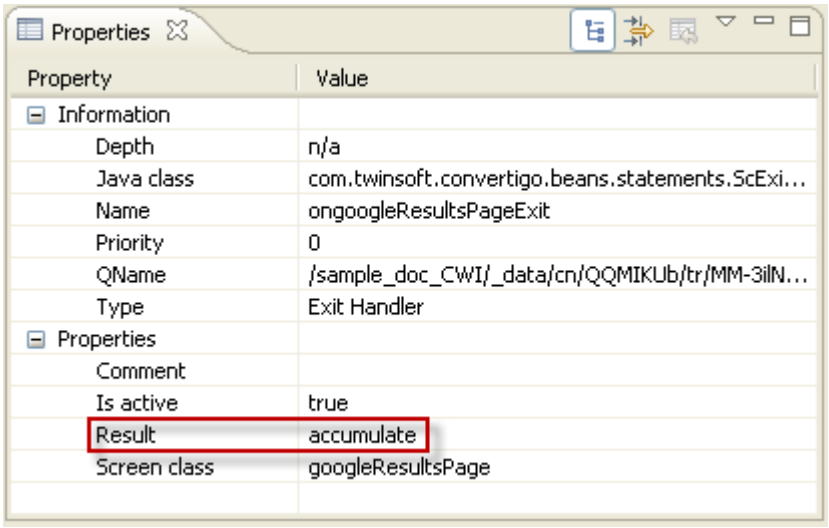


Figure 2 - 108: Exit screen class handler properties

The second screen class handler is now created together with its statement.

An issue is emerging - *for any given search, the last Google result pages has no* ***Next*** *link*:

Figure 2 - 109: Google page with no Next link

Executing the "click **Next** link" statement therefore returns an error.

Moreover, we need to find an ending condition for the transaction - the absence of a **Next** link is a suitable stopping criteria.

A distinction needs to be made between:

- ***current*** result pages - with **Next** link;
- the ***final*** result page - without **Next** link.

The problem can be summed up as follows:

Table 2 - 7: Google result page distinction

A Google result page with...	Is a...	And its screen class is...
a results DIV element and a **Next** link	current Google page	`googleResultsPageCurrent`
a results DIV element and **no Next** link	final Google page	`googleResultsPageFinal`

The `googleResultsPageCurrent` screen class is basically defined as a `googleResultsPage` screen class, to which an extra criterion must be added: the **Next** link.

18 In the **Projects View**, select `googleResultsPage` with a left-click.

19 In the **Web Browser**, right-click on the **Next** link:

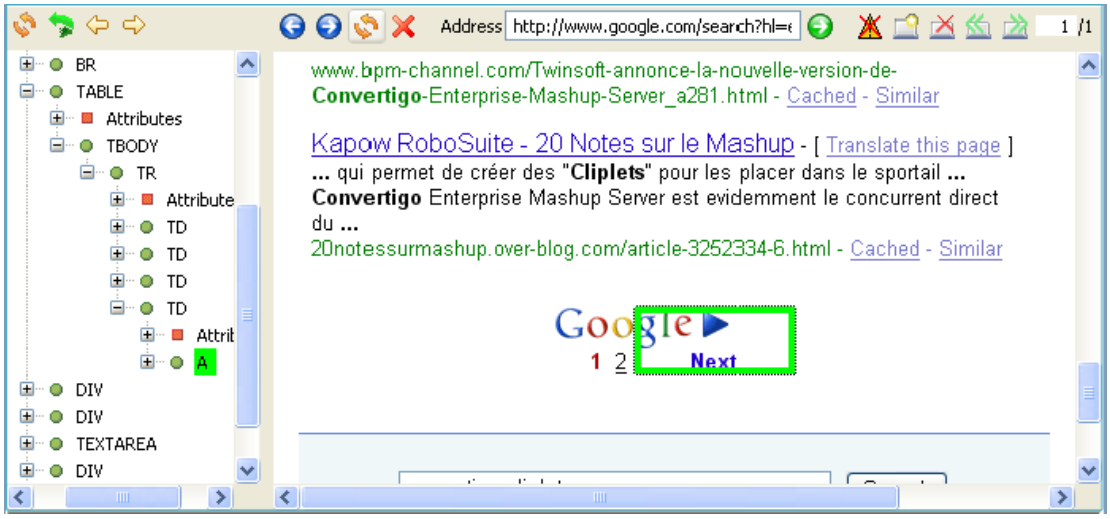


Figure 2 - 110: Creation of a new screen class based on the detection of the Next link

20 Expand the **DOM Tree** to find an appropriate node:

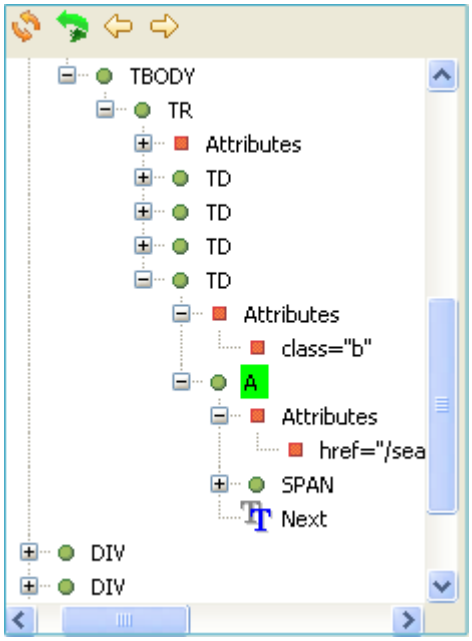
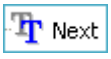
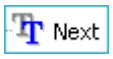


Figure 2 - 111: Expansion of the DOM tree to find an appropriate node for the Next button

21 Right-click on 

and select **Generate selection XPath (Enter)** or select 

with a left-click and press **Enter**.

The XPath corresponding to the Google **Next** link is displayed in the **xPath** field of the **XPath Evaluator**.

22 In the **XPath Evaluator**, click on the **Create new child screen class from current XPath** icon  .

A **New Screen Class** wizard opens.

23 Click on **Screen class**.

24 Click on **Next**.

25 In the **Name** field, enter `googleResultsPageCurrent`.

26 Click on **Finish.**

The new screen class appears in the **Projects View** as an *inherited* screen class of the `googleResultsPage` screen class. Its inherited criteria and extraction rule are greyed:

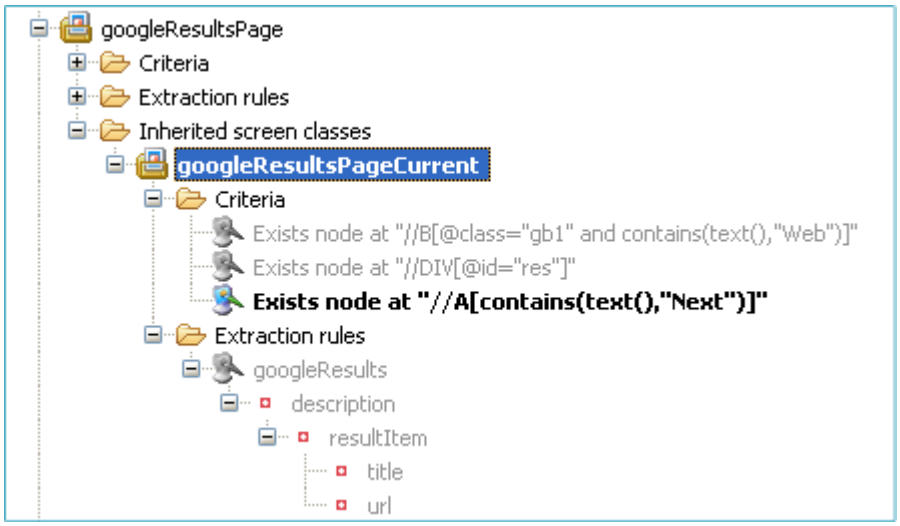


Figure 2 - 112: googleResultsPageCurrent screen class in the Projects View

We will now create the `googleResultsPageFinal` screen class.

The existing `googleResultsPage` screen class can simply be assimilated with the `googleResultsPageFinal` screen class, since it is based on detection of the results DIV element. If no **Next** link is detected, the screen class is not assimilated with the `googleResultsPageCurrent` screen class.

We just need to rename the parent screen class:

27 Right-click on the `googleResultsPage` screen class in the **Projects View**.

28 Select **Rename**. The screen class name is highlighted.

29 Type in `googleResultsPageFinal` and press **Enter**.

When renaming a screen class, all screen class handlers are automatically renamed and the values of their screen class properties are changed.

The screen class handler `ongoogleResultsPageExit` becomes `ongoogleResultsPageFinalExit`.

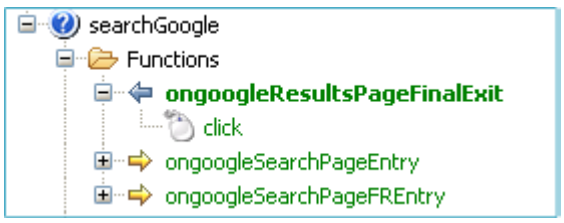


Figure 2 - 113: ongoogleResultsPageFinalExit screen class handler in the Projects View

This poses a problem in our project because the "click on **Next**" statement applies to

current Google result pages, not to *final* result page: we therefore need to associate the screen class handler with the proper screen class.

30 Select the `ongoogleResultsPageFinalExit` in the **Projects View**.

The **Properties View** is automatically updated:

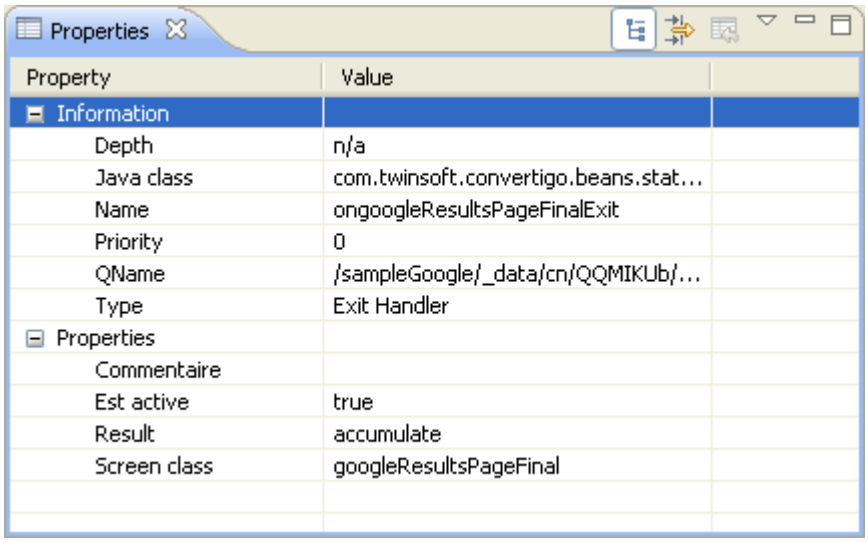


Figure 2 - 114: ongoogleResultsPageFinal properties

31 Click on the value of the **Screen class** property. The associated screen class is highlighted and a drop-down menu appears:

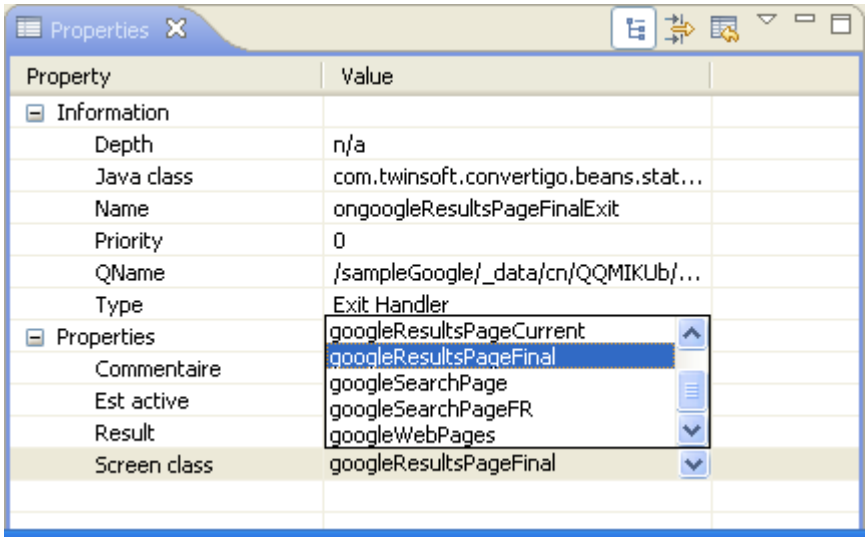


Figure 2 - 115: Screen class handler properties - Screen class drop-down menu

32 Select `googleResultsPageCurrent`.

33 Save the project by clicking on  or by pressing `Ctrl + S`.

No screen class handler is needed in the transaction for the `googleResultsPageFinal` screen class because no action needs to be performed on this page. The transaction will just stop when accessing this page (after execution of extraction rules).

2.2.5 Executing a Transaction

The Web integration project is now set up.

You can test the transaction either:

- by executing it from the Studio using the **Execute** command;
- by calling a properly formatted URL from a Web browser to access a test platform included in the project.

To execute the transaction from the Studio, the input variable defined for the transaction (`keyword`, see *"To set a transaction variable"* on page 2-42) must be given a default value.

To execute the transaction from the Studio

1. In the **Projects View**, left-click on the transaction variable (`keyword`).

   The **Properties View** is automatically updated.
2. Click in the **Value** column of the **Default Value** property.
3. Enter a search keyword (for example `convertigo cliplet`).
4. Press `Enter`.
5. Save the project by clicking on  or by pressing `Ctrl + S`.

   The transaction variable is now set as a fixed variable with a default value.
6. In the **Projects View**, right-click on the transaction `searchGoogle`.
7. Select **Execute**.

   The transaction starts. The **Connector Editor** of the CWI Studio shows the successive steps of the transaction being executed in real time.

   Results appear in the **Output** tab of the **Connector View**:

Figure 2 - 116: XML output without accumulate data in same table property set

The XML output is structured into several distinct XML tables (two in our project), each starting and ending with a `listResults` tag name (the extraction rule name). These tables correspond to the Google result pages successively detected and from which Web page titles and URLs have been extracted.

8 To accumulate data in a single XML table, select the extraction rule `googleResults` with a left-click in the **Projects View**.

The **Properties View** is automatically updated.

9 Set the extraction rule **Accumulate data in same table** property to `true`:

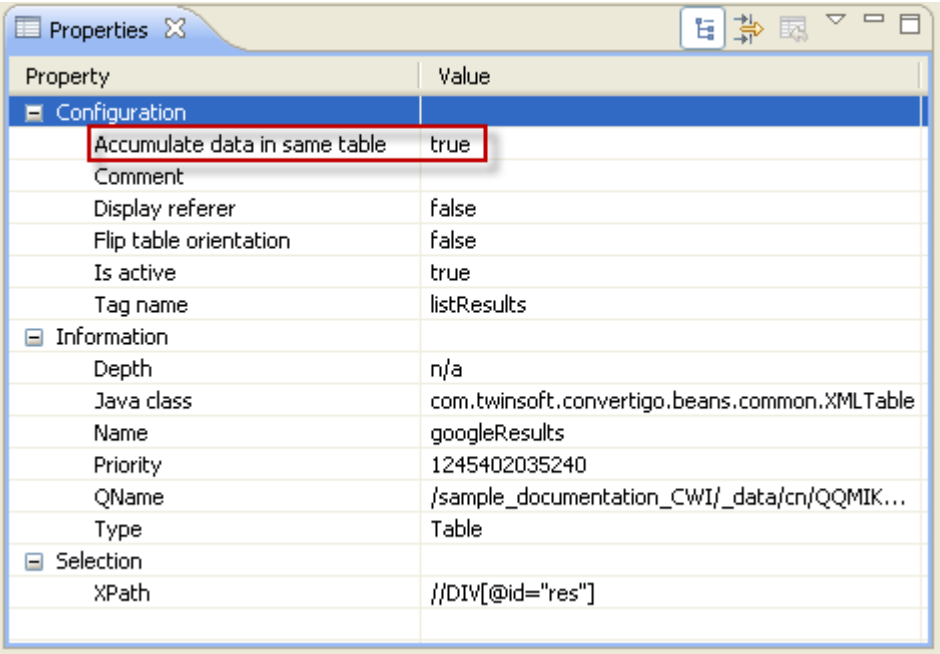


Figure 2 - 117: Extraction rule properties - Accumulate data in same table

10 Save the project by clicking on or by pressing `Ctrl + S`.

11 Relaunch the execution of the transaction using the **Execute** command (steps 6 and 7 of this procedure).

Results are now accumulated in a single XML table:

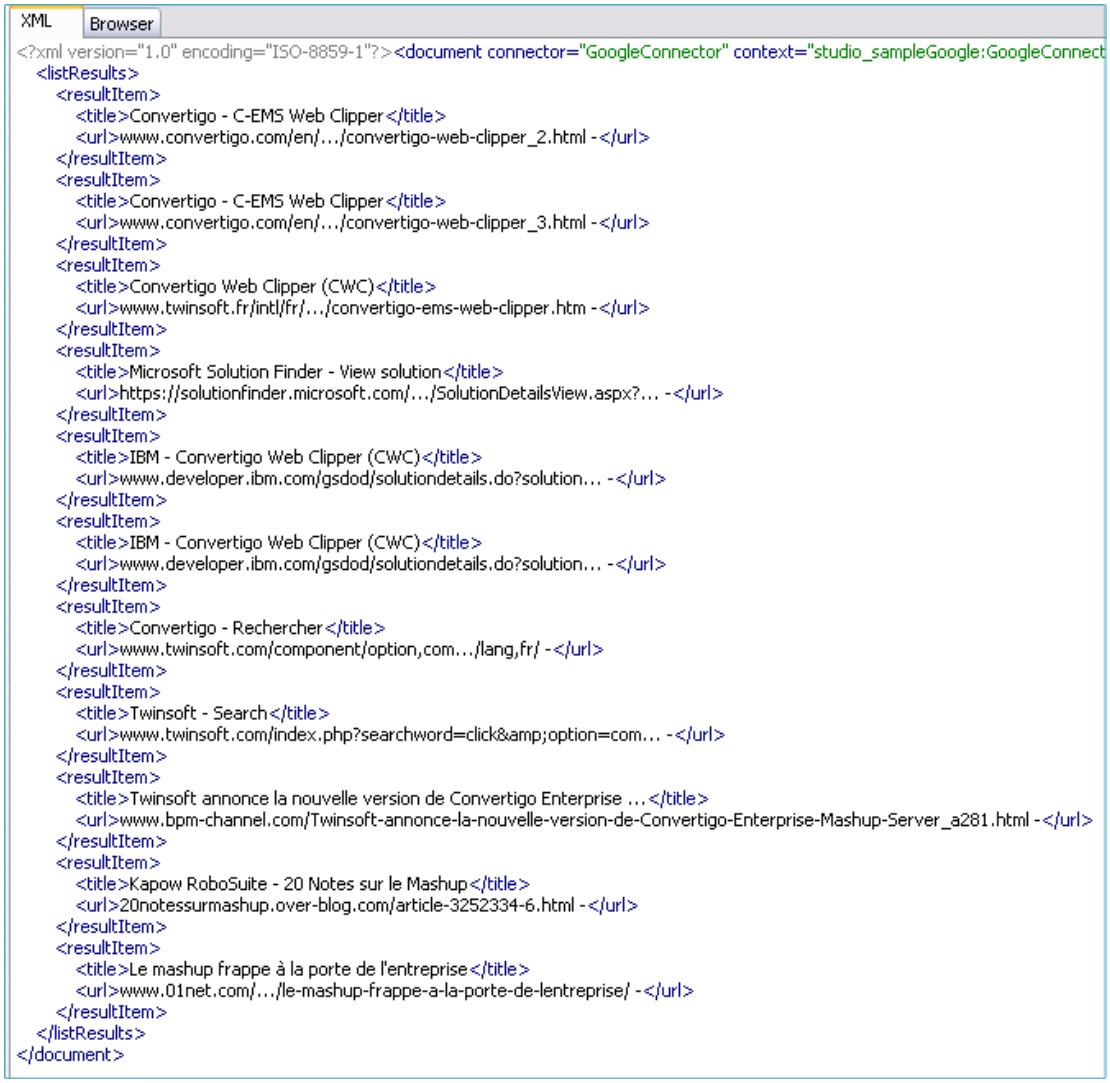


Figure 2 - 118: XML output with accumulate data in same table property set

To test the transaction using the test platform

1. Launch a standard Web browser.
2. In the URL address field, type in the URL in the following format:

```
http://<HostName>:<ConvertigoPortNumber>/convertigo/projects/
<ProjectName>
```

For example, in our project:

- *HostName* = `localhost`;
- *ConvertigoPortNumber* = `18080`;
- *ProjectName* = `sampleGoogle`;

For example, in a Mozilla Firefox URL address bar:

Figure 2 - 119: Convertigo test platform URL

The test platform opens:

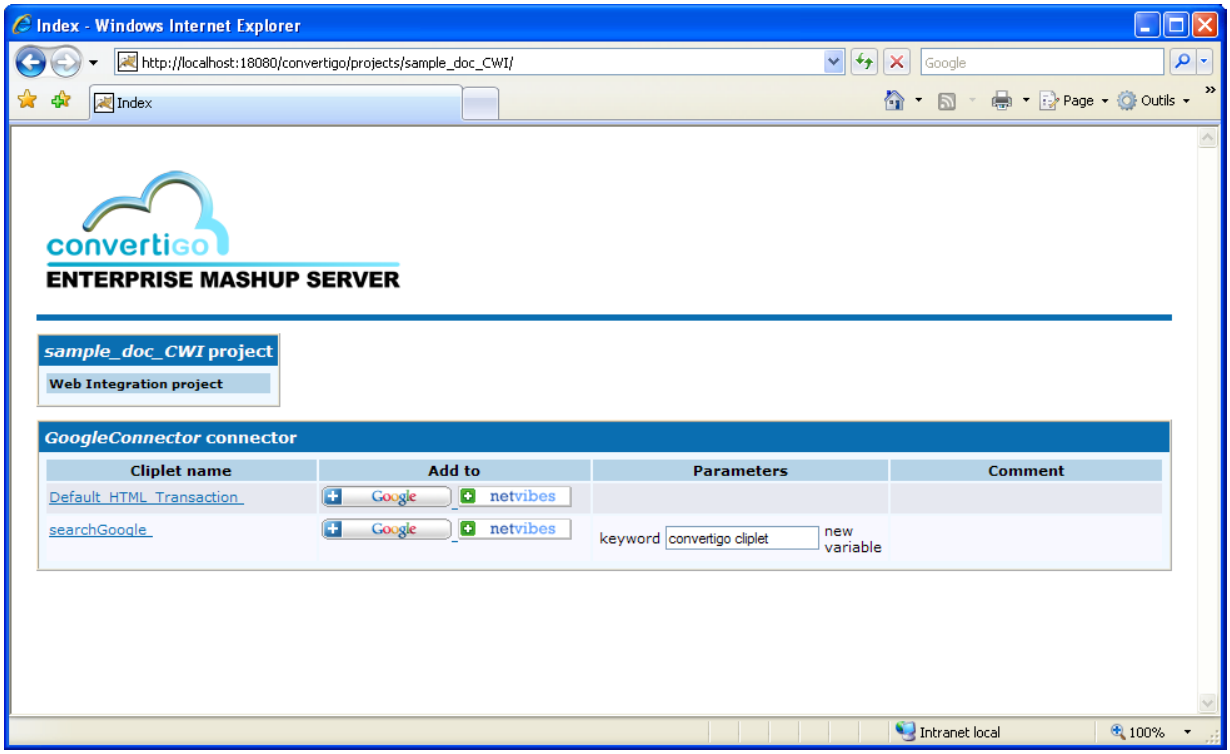


Figure 2 - 120: Test platform

It displays:

- in a first table:
  - the **project name** (in our example, `sampleGoogle`);
  - the **project type** (a Web integration project type);
- in a second table:
  - the ***connector*** defined for the project (in our example, `GoogleConnector`);
  - all ***transactions*** defined for the connector (in our example, `Default_HTML_Transaction`, `searchGoogle`) and their *variables* (`keyword` for the `searchGoogle` transaction).

3 Enter a search keyword in the **keyword** field (Parameters column of the `searchGoogle` transaction): for example `convertigo cliplet`.

4 Click on the `searchGoogle` link.

The transaction starts. The **Connector Editor** of the CWI Studio shows the successive steps of the transaction being executed in real time.

5 Once the transaction has been completed, the list of results is displayed in an **Execution result** window in the test platform:

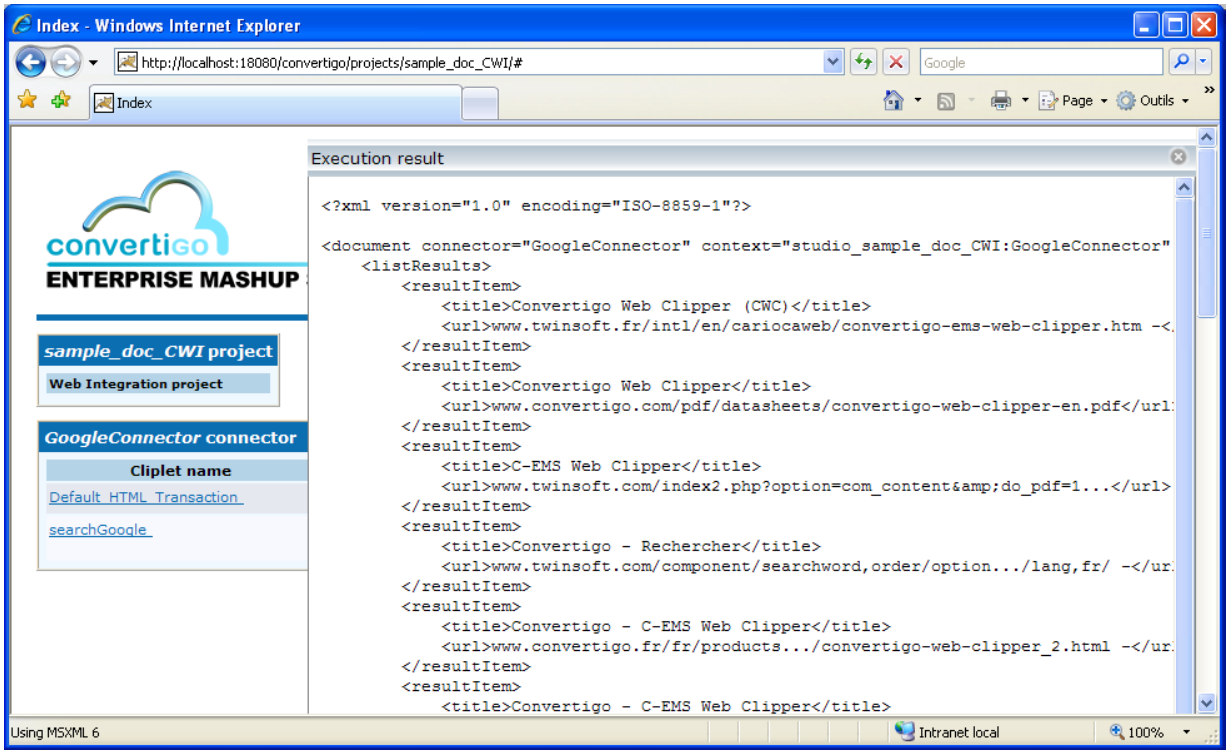


Figure 2 - 121: XML output in the Execution result window of the test platform

3 Exposing Projects as Web Services & Presenting Data

The previous chapter describes how to extract data into a simple XML output document.

The first section of this chapter introduces Web services and gives instructions on how to expose projects either as REST or SOAP Web services.

The second section is dedicated to XSL transformation. It describes how to transform XML data into an HTML document for display purpose using XSL style sheets.

- Exposing Projects as Web Services
- XSL AJAX Presentation

Examples of this chapter are based on the Web integration project described in chapter "My First Convertigo Web Integrator Project" on page 2 - 1.

3.1 Exposing Projects as Web Services

Convertigo Web Integrator allows to expose projects either as REST or as SOAP Web services.

Exposing projects as REST Web services is a straightforward process: it requires calling the transaction from any Web Browser via a properly formatted URL.

Exposing projects as SOAP Web services requires setting transactions as public methods and selecting data types before generating SOAP request and response envelopes.

This section describes how to expose projects as Web services in both architectures:

- Exposing a Project as a REST Web Service
- Exposing a Project as a SOAP Web Service

3.1.1 Exposing a Project as a REST Web Service

CWI transactions are by design exposed as methods of a REST Web service: each transaction can be called via an URL; each transaction is a REST method providing data.

Transactions result in the generation of an XML document including data represented in XML format.

The URL syntax used for the external call is *standard* URL syntax.

To invoke a transaction as a REST Web service method

1 Launch your default Web Browser.

2 In the URL address bar, type in the URL in the following format:

```
http://<HostName>:<ConvertigoPortNumber>/convertigo/projects/
<ProjectName>/.xml?__connector=<ConnectorName>&__transaction=
<TransactionName>&keyword=<KeywordName>
```

For example, in our project:

- *HostName* = `localhost`;
- *ConvertigoPortNumber* = `18080`;
- *ProjectName* = `sample_doc_CWI`;
- *ConnectorName* = `googleConnector`;
- *TransactionName* = `searchGoogle`;
- *KeywordName* = `convertigo cliplet`;

For example, in a Mozilla Firefox URL address bar:

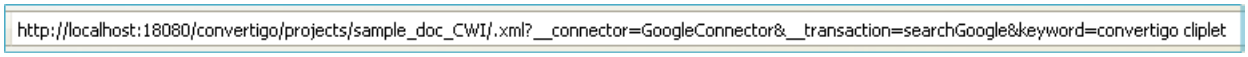


Figure 3 - 1: URL syntax for exposing transactions as REST Web services

3 Press **Enter**.

The transaction is launched in the CWI Engine.

4 Switch to the **CWI Studio**.

In the **Web Browser**, you can see Convertigo accessing the Google homepage, then inputing the keyword (`convertigo cliplet` in our project) and navigating through Web pages.

5 Click on the **Output** tab of the **Connector View**.

The view displays the result list in XML format.

6 Switch to the Web Browser launched in step 1.

CWI has sent the response data in XML format to its client.

3.1.2 Exposing a Project as a SOAP Web Service

A CWI project can be seen as a SOAP *service* and CWI transactions as SOAP *methods.*

Exposing projects (resp. transactions) as SOAP Web services (resp. Web service methods) requires:

1 *Informing* Convertigo that **one or several** transactions will be exposed as SOAP Web service methods; this is done by setting one or several transactions as *public methods* through the **Public Method** transaction property.

2 *Describing* all methods and *request/response* SOAP envelopes for these methods in WSDL (*Web Services Description Language*) format.

For more information on WSDL, see the WSDL tutorial from W3Schools available at http://www.w3schools.com/wsdl/.

The following procedure gives instructions on how to to expose transactions as SOAP Web service methods.

To expose transactions as SOAP Web service methods

1 In the **Projects View**, click on the transaction (`searchGoogle` in our project).

The **Properties View** is automatically updated:

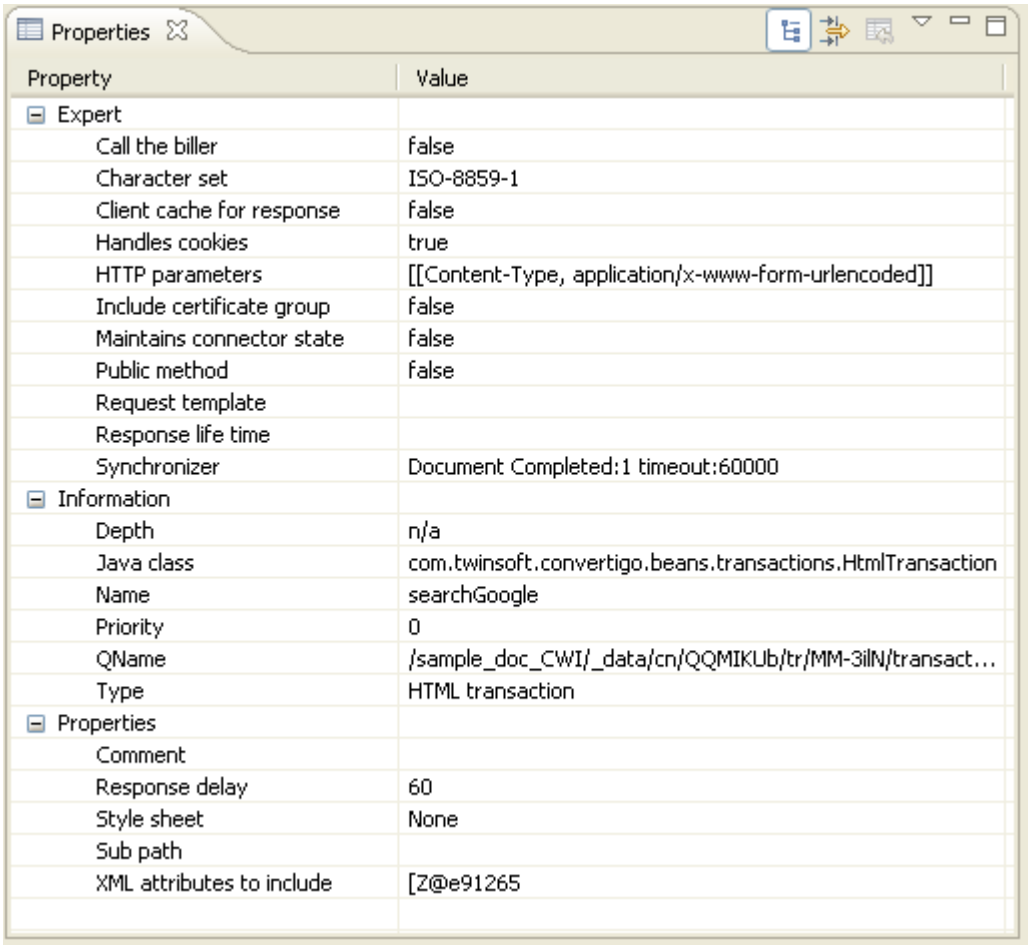


Figure 3 - 2: searchGoogle transaction properties

2 Set the **Public Method** property to `true` and press **Enter**.

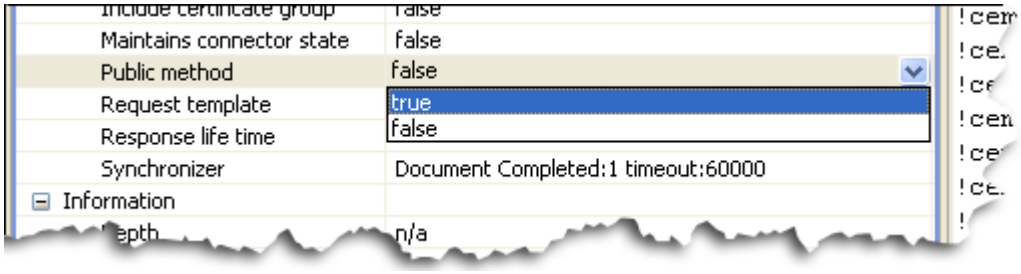


Figure 3 - 3: Setting the Public Method property to true

3 Save the project by clicking on  or by pressing `Ctrl + S`.

When the the **Public Method** property is set to `true`, the transaction is exposed in the SOAP WSDL as a Web service method. The `searchGoogle` transaction created in our sample project will therefore be exposed as a Web service method, and the `sample_doc_CWI` project as a Web service.

We now need to generate the schema (in XML format) of:

- the project,
- each transaction (one in our case).

The overall schema structure for the whole project (for the `sample_doc_CWI` Web service) is automatically generated by Convertigo. Schema parts corresponding to each exposed transaction are automatically generated as well, but additionnal data must be set prior to generating them.

To sum up, for a transaction:

- The *request schema* is automatically generated by CWI.
- The *response schema* is generated by CWI based on manually selected types among types automatically proposed by CWI depending on the transaction definition.

The WSDL is automatically generated in both "RPC" and "document/literal" modes.

4 In the **Projects View**, right-click on the transaction.

5 Select **Update schema from transaction's definition**:

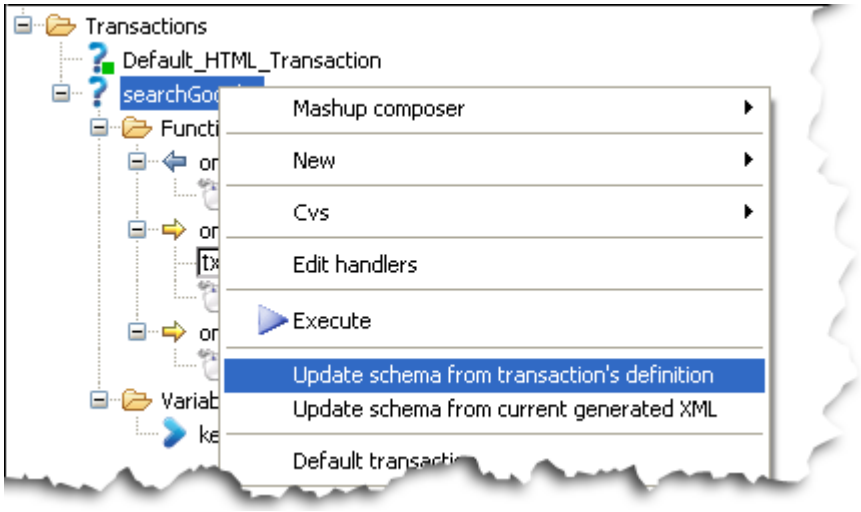


Figure 3 - 4: Update transaction schema from transaction definition

A confirmation window opens:

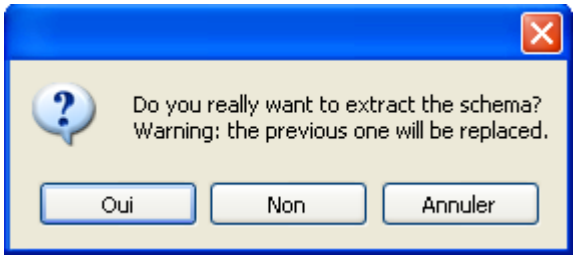


Figure 3 - 5: Update transaction schema- Confirmation window

6 Click on **Yes**.

Clicking on Yes overwrites previously stored schema.

A **Transaction schema types** window opens:

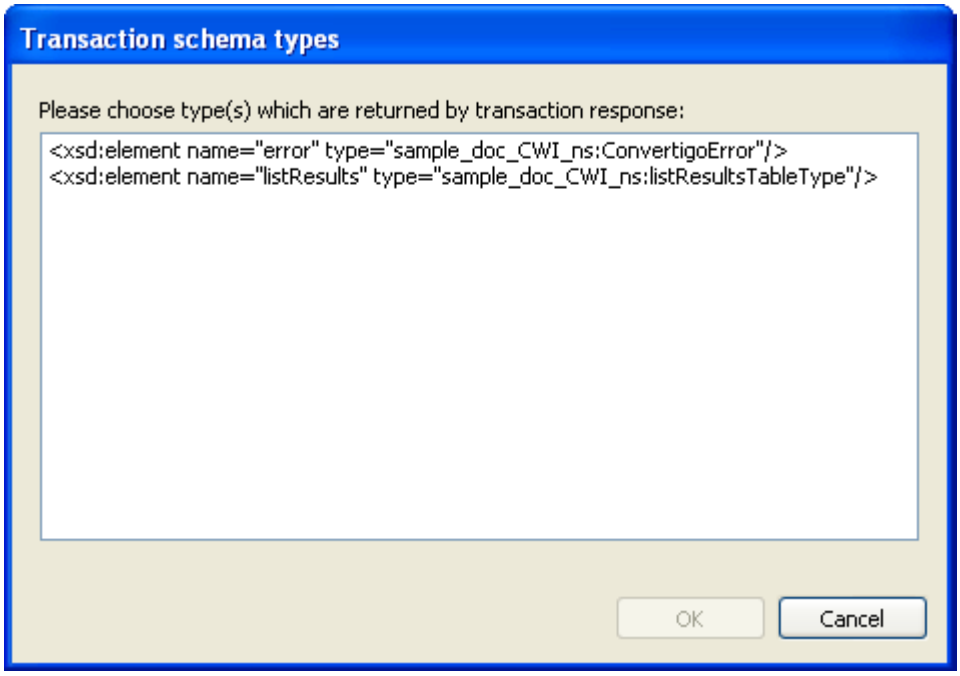


Figure 3 - 6: Transaction schema types window

The window contains data types corresponding to extraction rules defined on project screen classes.

In our project `sample_doc_CWI`, only one extraction rule is defined: `listResults`, the table extraction rule associated with the `googleResultsPageCurrent` screen class. The data type corresponding to this extraction rule appears in the **Transaction schema types** window as a `listResultsTableType` type (see Figure 3 - 6).

One type is always present: `ConvertigoError`.

This standard type corresponds to an exception error XML that can appear in the output XML of a transaction when the Convertigo engine stops in error.

The `ConvertigoError` data type should always be selected.

7 While keeping the `Shift` button pressed, select both types.

8 Click on **OK**.

The project schema is updated: the **transaction response schema** is generated, the `searchGoogle` transaction appears bold in the **Projects View**.

9 Save the project by clicking on  or by pressing `Ctrl + S`.

Data types used to describe the transaction and all other types generated by CWI for this project are fully described in the `sample_doc_CWI.xsd` file. It can be opened in an **Editor**.

To edit the `sample_doc_CWI.xsd` file

1 In the **Projects View,** click on the **Project Explorer** tab.

2 Expand the project folder.

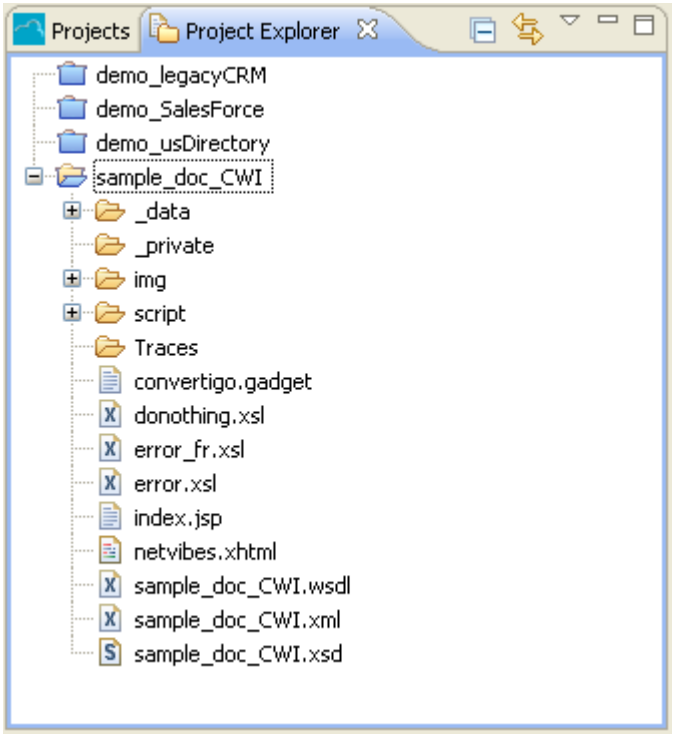


Figure 3 - 7: Project folder in Project Explorer

3 Doucle-click on the `sample_doc_CWI.xsd` file to open it.

The `sample_doc_CWI.xsd` file appears in the **Editor**:

- in the **Design** tab of the **Editor**, the schema appears as follows:

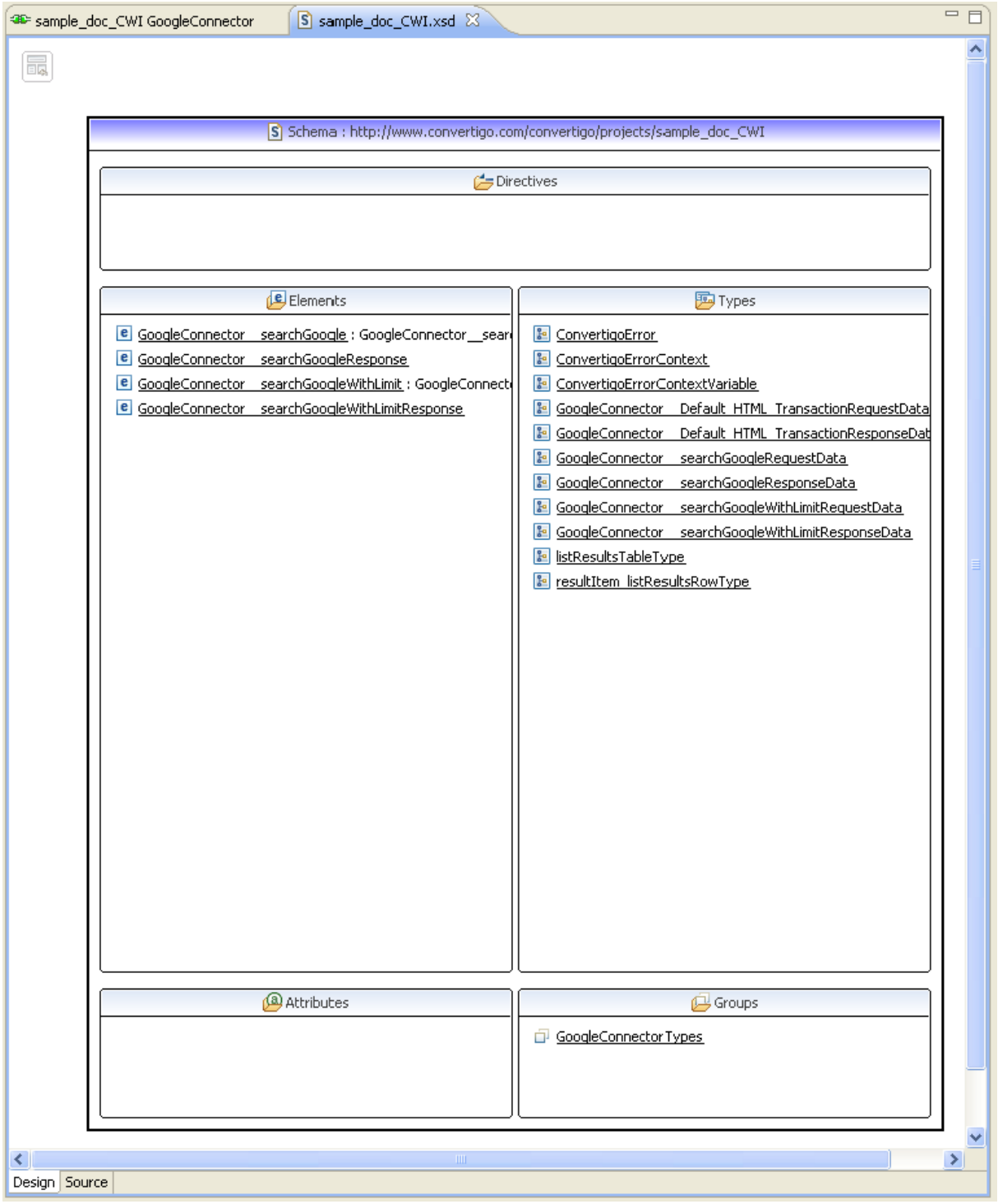


Figure 3 - 8: Project schema in Design tab of Editor

- in the **Source** tab of the **Editor**:

sample_doc_CWI GoogleConnector | sample_doc_CWI.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:sample_doc_CWI_ns="http:/
<xsd:complexType name="ConvertigoError">
<xsd:sequence>
<xsd:element name="context" type="sample_doc_CWI_ns:ConvertigoErrorContext"/>
<xsd:element name="exception" type="xsd:string"/>
<xsd:element name="message" type="xsd:string"/>
<xsd:element name="stacktrace" type="xsd:string"/>
</xsd:sequence>
</xsd:complexType>
<xsd:complexType name="ConvertigoErrorContextVariable">
<xsd:attribute name="name" type="xsd:string"/>
<xsd:attribute name="value" type="xsd:string"/>
</xsd:complexType>
<xsd:complexType name="ConvertigoErrorContext">
<xsd:sequence>
<xsd:element maxOccurs="unbounded" minOccurs="0" name="variable" type="sample_doc_CWI_ns
</xsd:sequence>
</xsd:complexType>
<xsd:element name="GoogleConnector__searchGoogleWithLimit" type="sample_doc_CWI_ns:Googl
<xsd:element name="GoogleConnector__searchGoogleWithLimitResponse">
<xsd:complexType>
<xsd:sequence>
<xsd:element name="response" type="sample_doc_CWI_ns:GoogleConnector__searchGoogleWithLi
</xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:complexType name="GoogleConnector__searchGoogleWithLimitRequestData">
<xsd:sequence>
<xsd:element name="keyword" type="xsd:string"/>
<xsd:element name="maxPages" type="xsd:string"/>
</xsd:sequence>
</xsd:complexType>
<xsd:complexType name="GoogleConnector__searchGoogleWithLimitResponseData">
<xsd:sequence>
<xsd:element minOccurs="0" name="error" type="sample_doc_CWI_ns:ConvertigoError"/>
<xsd:element maxOccurs="unbounded" minOccurs="0" name="listResults" type="sample_doc_CWI
</xsd:sequence>
</xsd:complexType>
<xsd:element name="GoogleConnector__searchGoogle" type="sample_doc_CWI_ns:GoogleConnecto
<xsd:element name="GoogleConnector__searchGoogleResponse">
<xsd:complexType>
<xsd:sequence>
<xsd:element name="response" type="sample_doc_CWI_ns:GoogleConnector__searchGoogleRespor
</xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:complexType name="GoogleConnector__searchGoogleRequestData">
<xsd:sequence>
<xsd:element name="keyword" type="xsd:string"/>
```

Design | Source

Figure 3 - 9: Project schema in Source tab of Editor

Data types selected in step 7 of previous process appear in the schema:

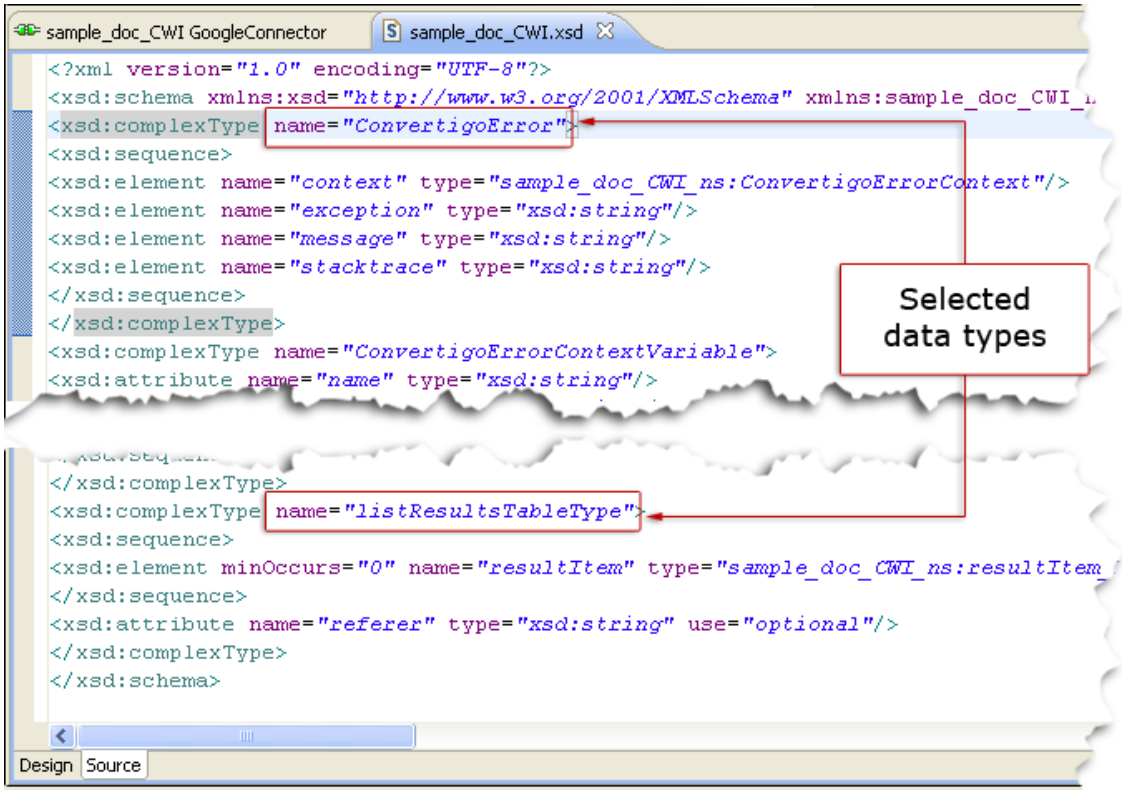


Figure 3 - 10: Transaction data types in schema

Editing this schema can be usefull when, for example, specific restrictions are to be set on some elements.

The `searchGoogle` transaction is now exposed by CWI as a SOAP Web service method of a SOAP Web service (the project).

To display the SOAP Web service WSDL

1. Launch your default Web Browser;
2. In the URL address bar, type in the URL in the following format:

```
http://<HostName>:<ConvertigoPortNumber>/convertigo/projects/
<ProjectName>/<SOAPmode>?wsdl
```

For example, in our project:

- *HostName* = `localhost`;
- *ConvertigoPortNumber* = `18080`;
- *ProjectName* = `sample_doc_CWI`;
- *SOAPmode* = `.ws` for RPC mode, *SOAPmode* = `.wsl` for document/litteral mode.

For example, in a browser URL address bar:

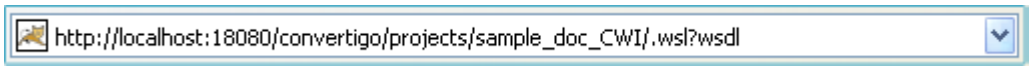


Figure 3 - 11: URL syntax for displaying the SOAP Web service WSDL

3. Press **Enter**.

The Web browser displays the SOAP Web service WSDL with:

- the list of methods (in our project, the `searchGoogle` method);
- the method input variable;
- the output format description.

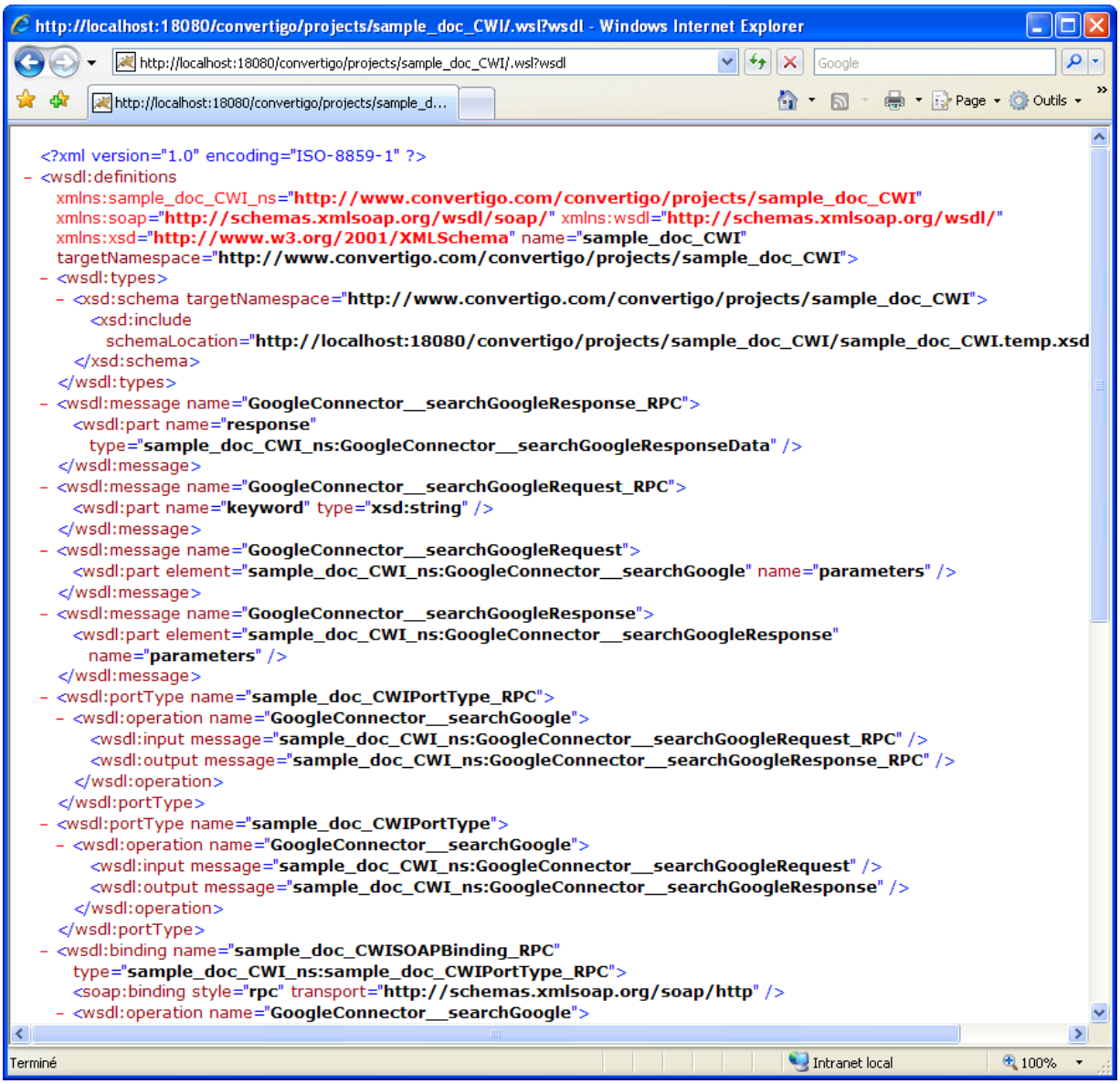


Figure 3 - 12: SOAP Web service WSDL

To invoke a transaction as a SOAP Web service method

Eclipse provides a tool named **Web Services Explorer** which is used, among other features, to invoke SOAP Web services without writing SOAP envelopes. We will launch it to invoke our newly created SOAP Web service.

1 Click on ***Run > Launch the Web Services Explorer*** or click on the  icon in the studio toolbar:

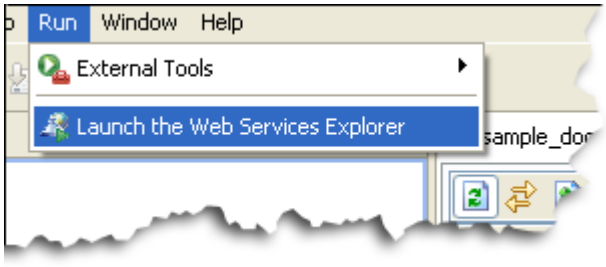


Figure 3 - 13: Launching the Web Services Explorer

The **Web Services Explorer** view opens in front of the **Connector View**:

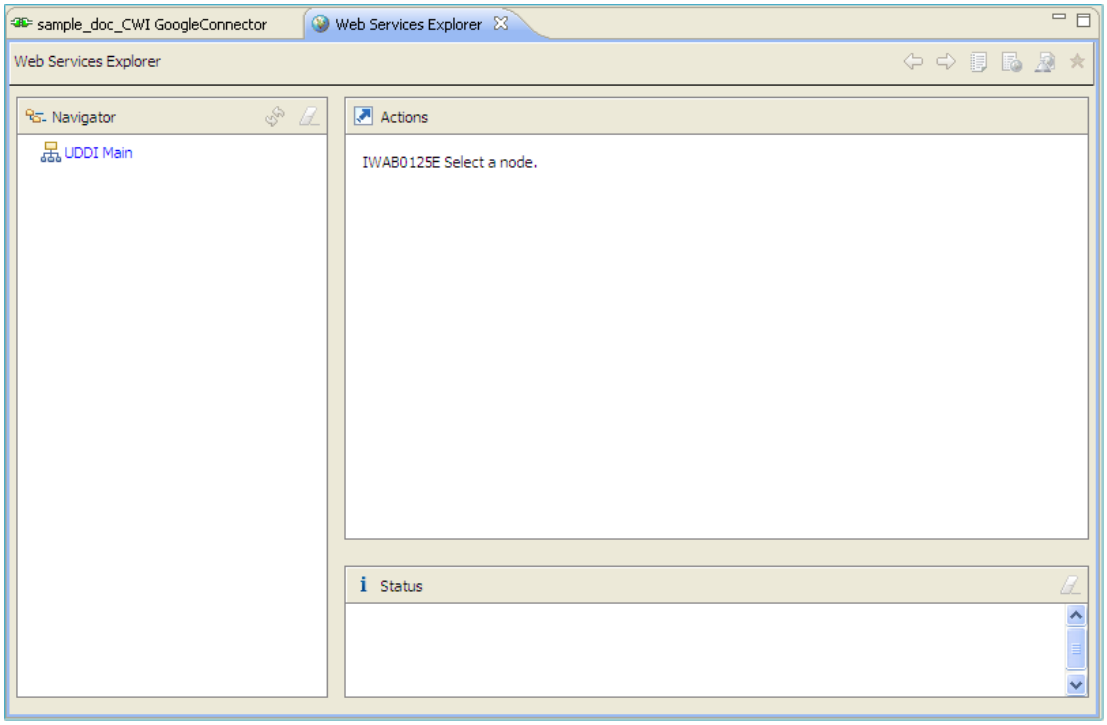


Figure 3 - 14: Web Services Explorer

The **Web Services Explorer** connects to the service WSDL and displays *WSDL binding details* such as*:*

- *methods* (called *Operations* in the interface);
- *endpoints*.

The interface contains three panes and six icons:

Table 3 - 1: Web Services Explorer

Explorer elements		Description
Pane	Navigator	Contains the WSDL tree structure: service URL, methods, WSDL Binding details, etc.
	Actions	Contains, in the form of links and buttons, actions to be performed on methods, endpoints, services, etc..
	Status	Displays error messages and other information.

Table 3 - 1: Web Services Explorer (...)

Explorer elements		Description
Icons		*Back* icon. Navigates back one page in the Explorer.
		Forward icon. Navigates forward one page in the Explorer.
Icons		*UDDI Page* icon. Displays the **UDDI Main** tree in the **Navigator** and related actions ion UDDI registries n the **Actions** pane.
		WSIL Page icon. Displays the **WSIL Main** tree in the **Navigator** and related actions on WSILs in the **Actions** pane.
		WSDL Page icon. Displays the **UDDI Main** tree in the **Navigator** and related actions on WSDL services in the **Actions** pane.
		Favorites icon. Displays favorites UDDI registries, WSILs and WSDL services.

2 Click the **WSDL Page** icon in the **Web Services Explorer** toolbar.

3 In the **Navigator** pane of the **Web Services Explorer**, click on **WSDL Main** link.

The **Actions** pane of the **Web Services Explorer** is automatically updated:

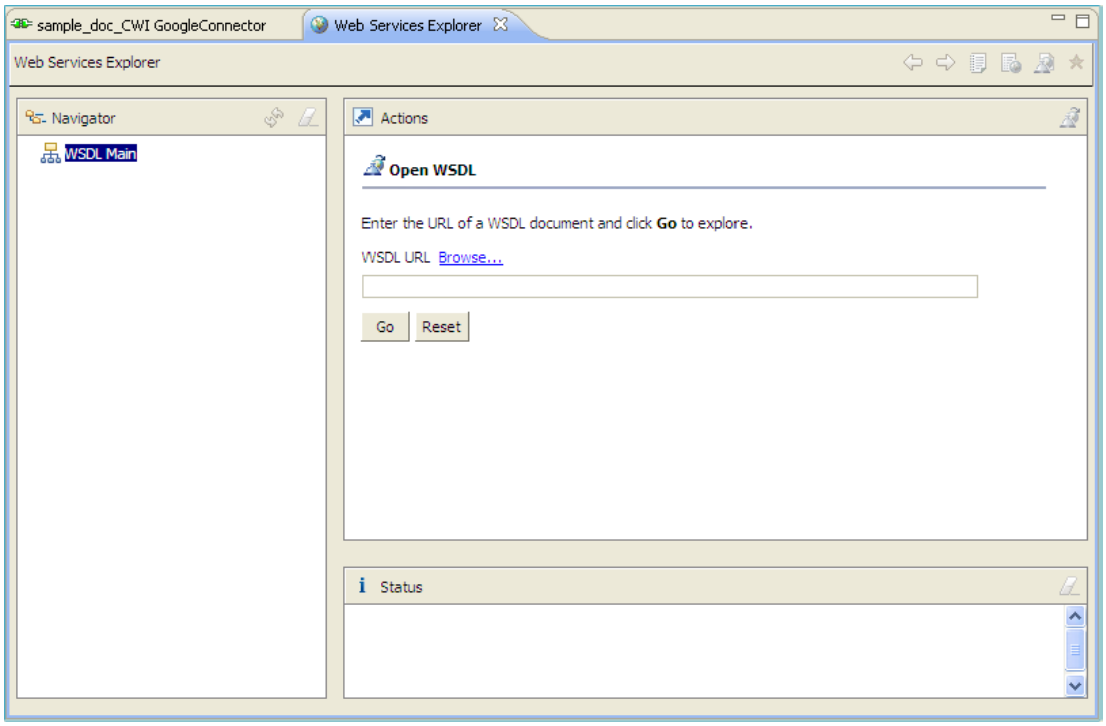


Figure 3 - 15: Web Services Explorer

4 In the **WSDL URL** of this pane, enter the URL of the SOAP service in the following format:

```
http://<HostName>:<ConvertigoPortNumber>/convertigo/projects/
<ProjectName>/<SOAPmode>?wsdl
```

For example, in our project:

- *HostName* = `localhost`;
- *ConvertigoPortNumber* = `18080`;
- *ProjectName* = `sample_doc_CWI`
- *SOAPmode* = `.ws` for RPC mode, *SOAPmode* = `.wsl` for document/litteral mode.

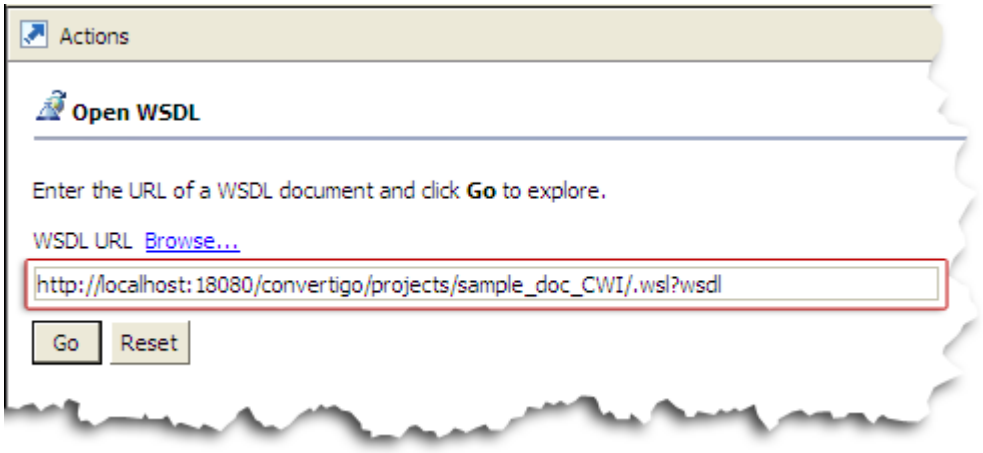


Figure 3 - 16: URL of the SOAP service in the Web Services Explorer

5 Click on **Go**. The three panes are automatically updated:

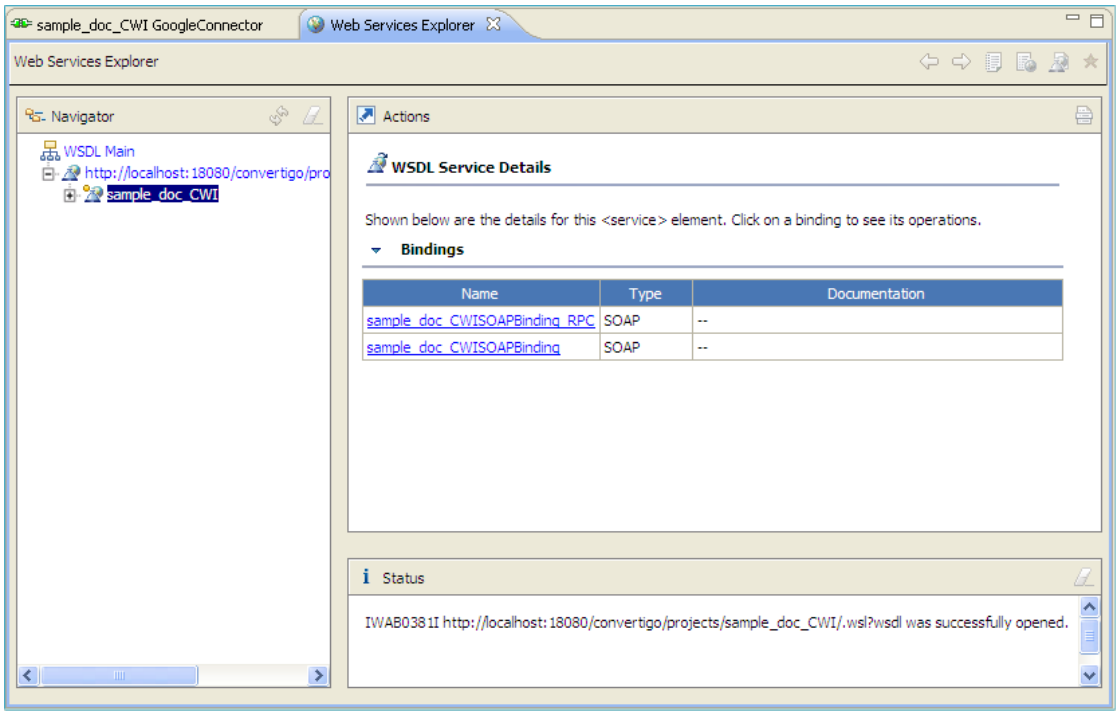


Figure 3 - 17: Web Services Explorer panes after a WSDL URL is reached

6 Expand `sample_doc_CWI` in the **Navigator** pane, then click on `sample_doc_CWISOAPBinding` link. The **Actions** panes is updated:

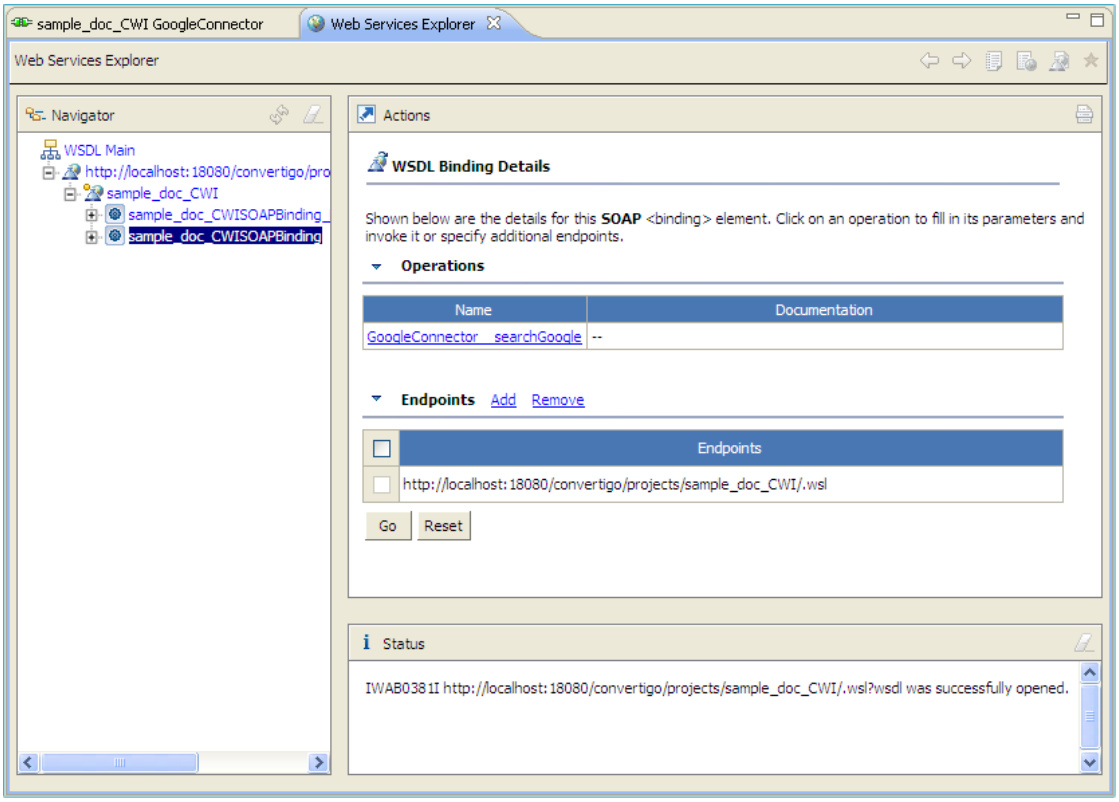


Figure 3 - 18: WSDL Binding Details in Actions pane of the Web Services Explorer

The **Operations** table of the **Actions** pane displays all available *methods* (corresponding to transactions) for the invoked service (`sampleGoogle`):

Figure 3 - 19: List of methods displayed in the Web Services Explorer

The **Navigator** pane displays the elements of the WSDL service in a tree structure:

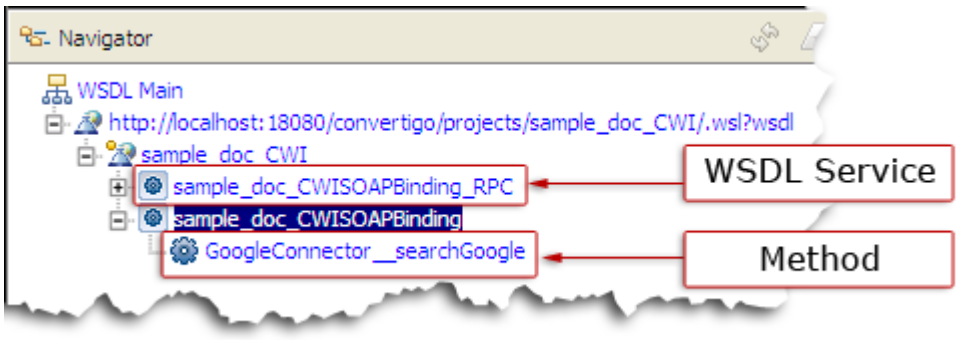


Figure 3 - 20: WSDL service elements displayed in the Navigator pane

7 Click on `GoogleConnector__searchGoogle` in the **Operations** table. The **Actions** pane is automatically updated:

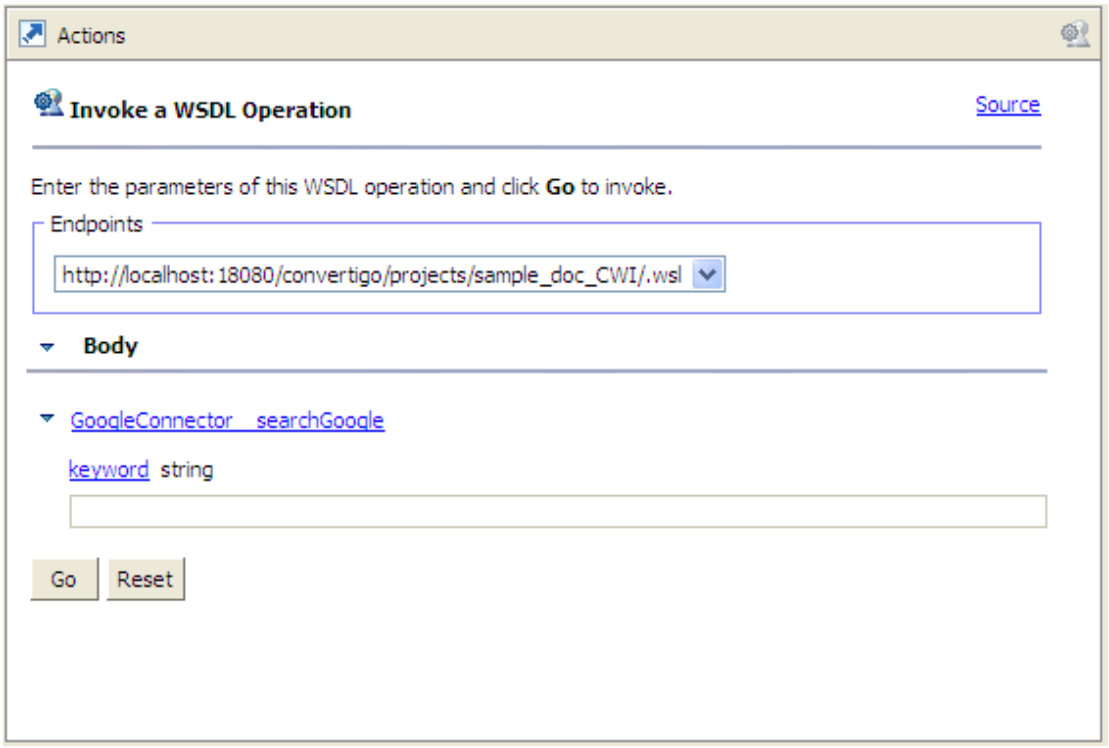


Figure 3 - 21: Invoke a WSDL Operation view in the Actions pane

The method input variable as well as its type are displayed (here, `keyword`, variable of `string` type).

8 Type in a search keyword in the **keyword** field: for example `convertigo cliplet`.

9 Click on **Go**:

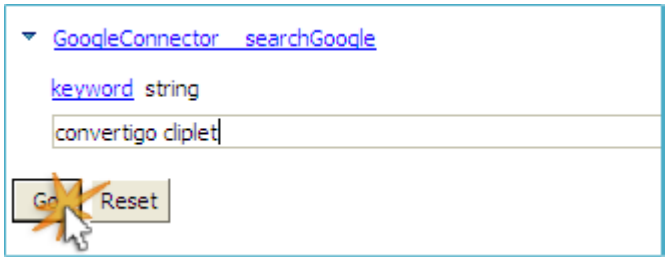


Figure 3 - 22: Invoking a WSDL Operation

The **Status** pane is automatically updated. A **source** link appears on the upper right corner of the pane.

10 Click on the **source** link:

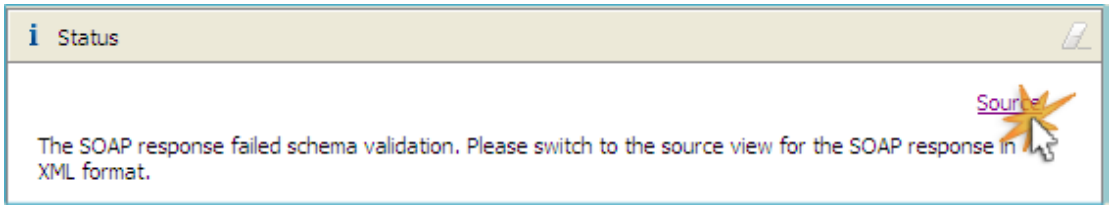


Figure 3 - 23: Status pane after WSDL operation invocation

The **Status** pane diplays :

- the SOAP *request* envelope `searchGoogleRequest`, which was generated using

the input variable entered as keyword:

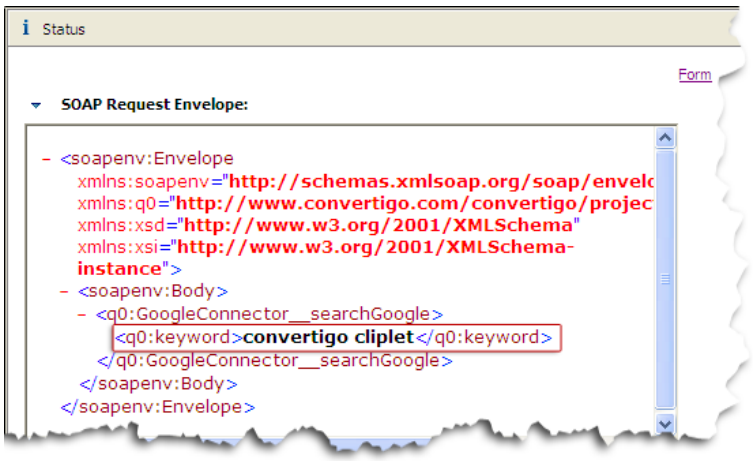


Figure 3 - 24: SOAP Request envelope detail

- the SOAP *response* envelope `searchGoogleResponse`, which corresponds to the WSDL description previously generated. The list of results included in the response envelope is similar to the list obtained when invoking a REST service. The difference is that it is embedded in a SOAP envelope:

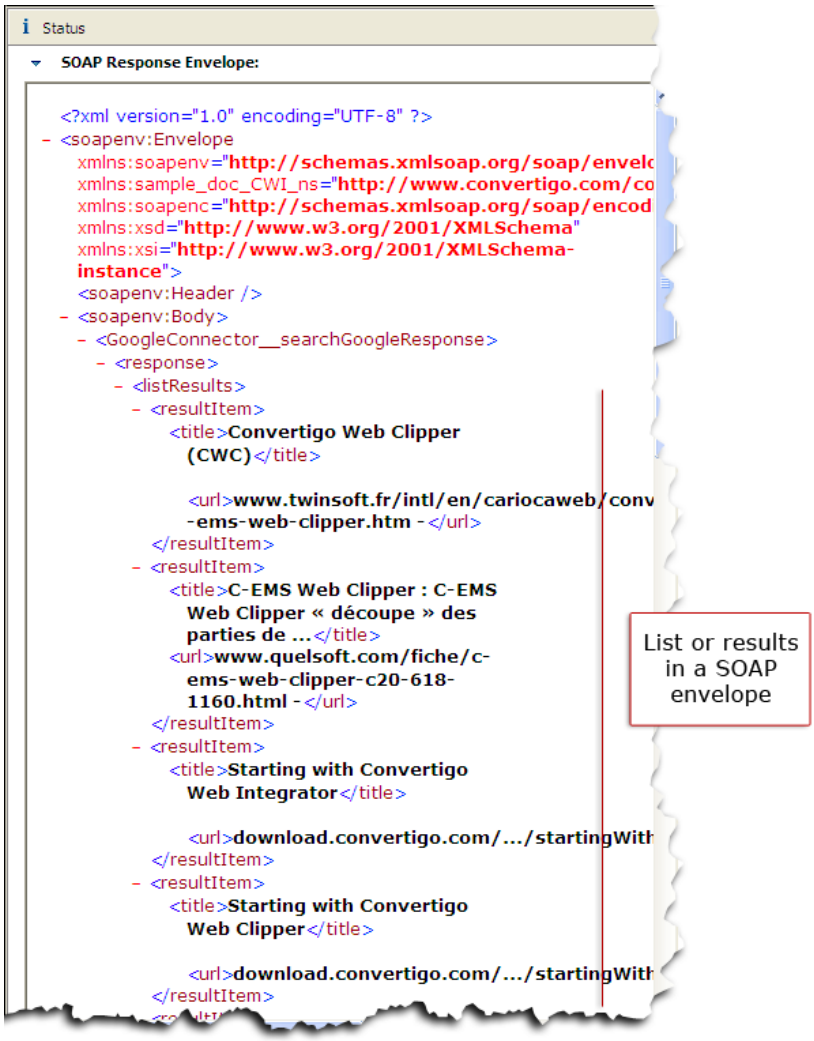


Figure 3 - 25: SOAP response envelope detail

3.2 XSL AJAX Presentation

Convertigo features a *test platform* for calling projects, visualizing project-related transactions and testing them.

This platform is accessed using any standard Web browser.

To see how to launch the test platform, see "To test the transaction using the test platform" on page 2-72.

The test platform includes an AJAX library (JavaScript) for calling transactions and presenting them using XSL (for *eXtensible Stylesheet Language*) style sheets.

XSL style sheets process XML nodes of extracted XML data to transform them into an HTML document. The XSL *transformation* is performed by the AJAX library included in the project.

The basic process is the following:

1. *Creating* an XSL style sheet that processes our transaction XML output. This is done in two steps: first creation of a CWI **Sheet** object, then creation and edition of the related `.xsl` file;
2. *Associating* the previously created style sheet with the transaction for CWI to know that, on call of a transaction, this XSL style sheet must be returned together with associated XML data.

We will now create the XSL style sheet and associate it to our transaction.

To set up an XSL transformation

1. In the **Projects View**, right-click on the transaction (`searchGoogle`).
2. Select ***New > Sheet***.

   A **New Sheet** wizard opens:

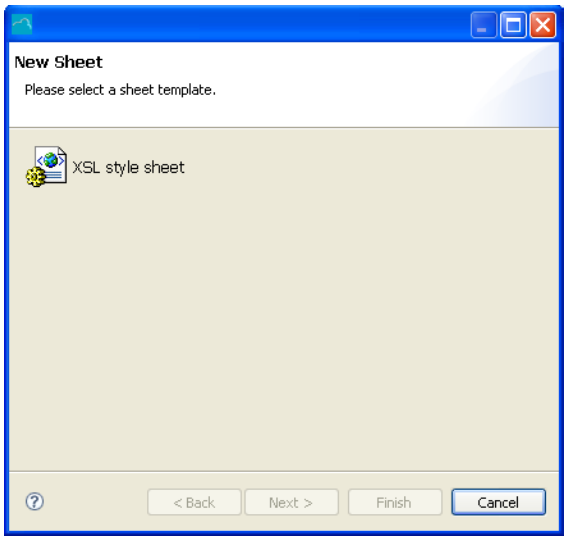


Figure 3 - 26: New Sheet wizard

3. Click on **XSL style sheet**.

4 Click on **Next**:

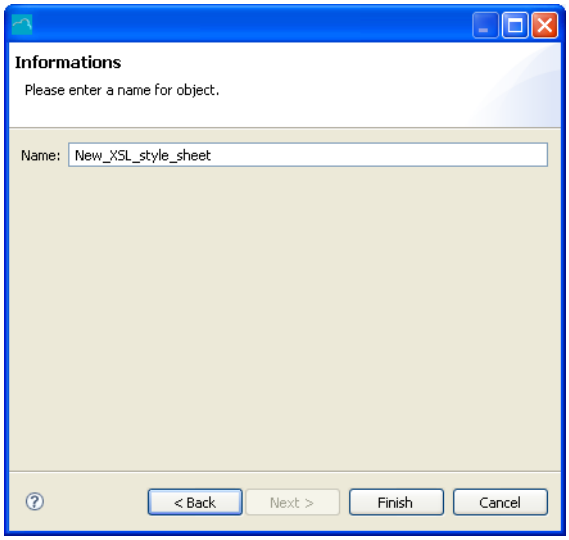


Figure 3 - 27: Entering a name for the new style sheet

5 Enter a name in the **Name** field (for example `results_list`).

6 Click on **Finish**.

The new style sheet object is created in the **Sheets** folder of the transaction:

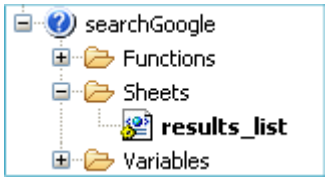


Figure 3 - 28: New style sheet object in the Projects View

Now that the Convertigo sheet object has been created, we will associate it with a physical file, `results.xsl`, that will be edited for presenting data as required.

7 In the **Projects View**, click on the **Project Explorer** tab.

8 Right-click on the project (for example `sample_doc_CWI`).

9 Select ***New > File***:

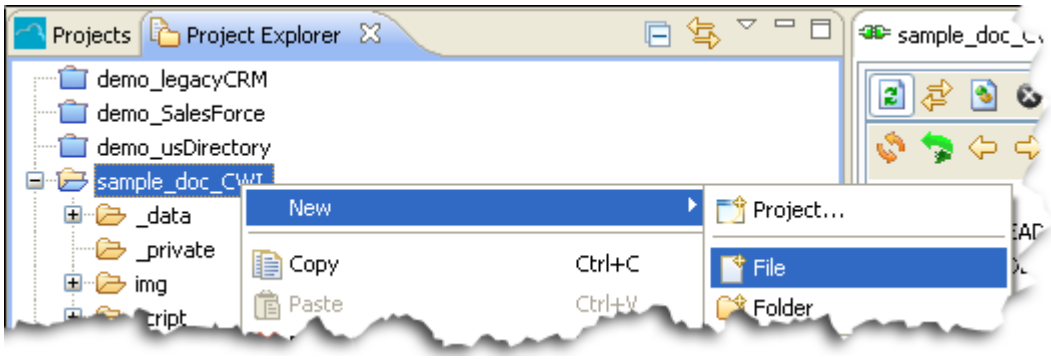


Figure 3 - 29: Project Explorer - New file

A **New File** wizard opens:

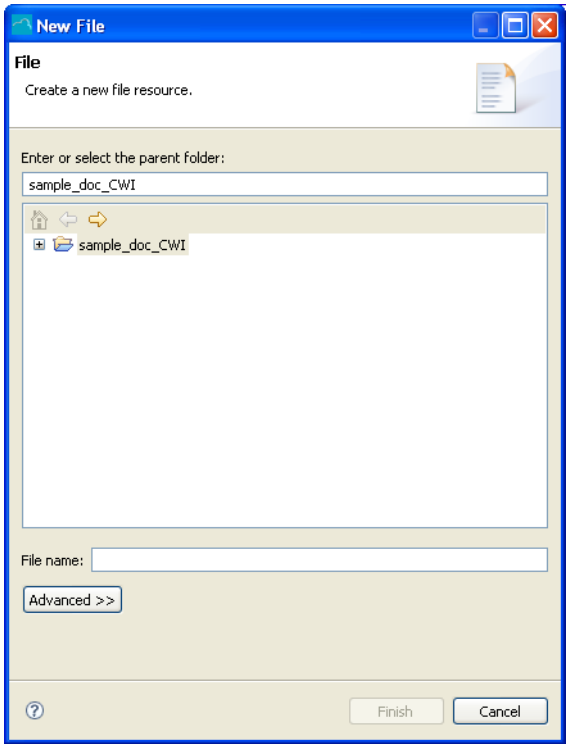


Figure 3 - 30: New File wizard

10 In the **File name** field, enter a filename (`results.xsl` for example).

11 Click on **Finish**.

The `results.xsl` file is:

- created in the **Project Explorer** tree structure:

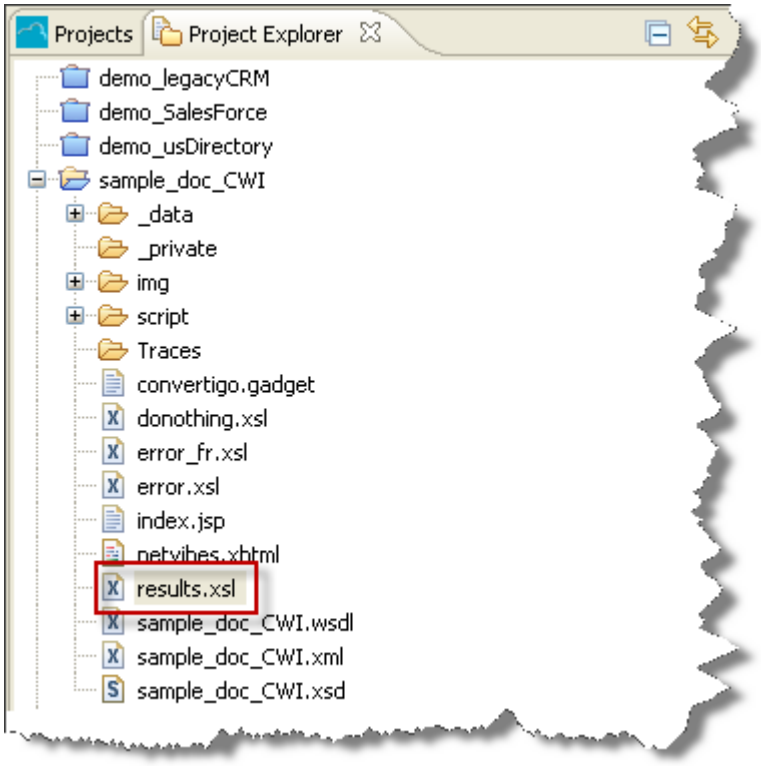


Figure 3 - 31: New file in Project Explorer

- displayed in the **Editor** (**Source** tab selected):

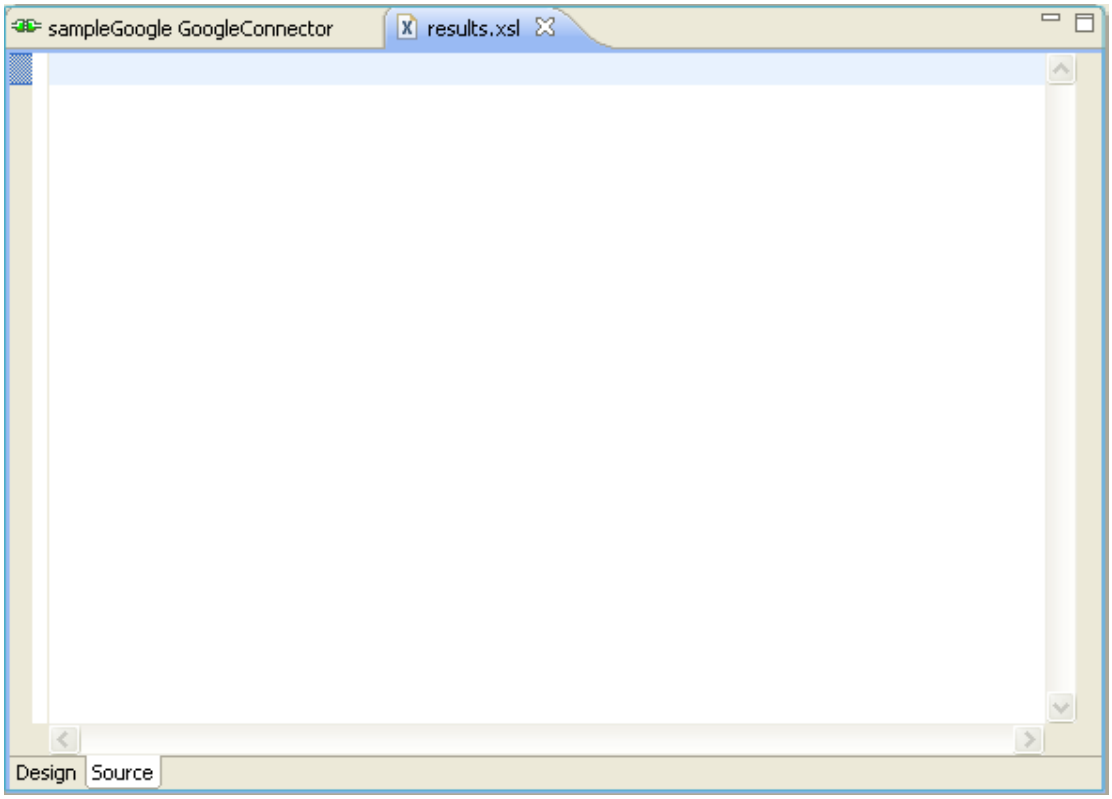


Figure 3 - 32: XSL style sheet

After edition, the XSL style sheet is divided into *template rules* that match parts of the XML document to be processed: the document (`document` element) and the list of results (`listResults` element).

In our case, it is edited to obtain a document defined as follows:

- the title of the Web page is "Google search results" (template rule matching on `/document` node and HTML title identified by <h2> tag name):
- following the title, the Web content is set in an HTML table divided into two columns called `Title` and `Url` (template rule matching on `listResults` nodes of the XML output generated by the transaction). For each `resultItem` of the XML output, the `title` and `url` values are displayed in previously defined columns.

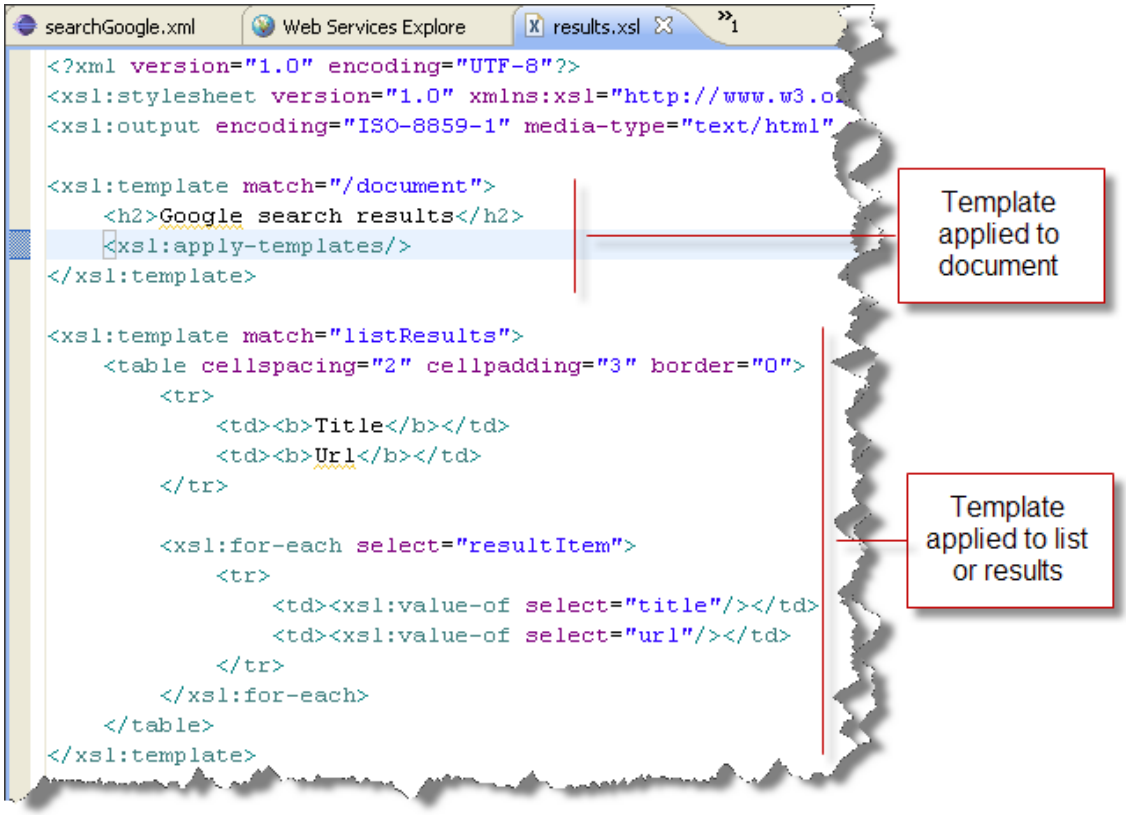


Figure 3 - 33: XSL style sheet templates

For more information on XSL, see the XSLT tutorial from W3Schools at http://www.w3schools.com/xsl/.

Now that the XSL style sheet has been created, we must associate it to the sheet previously created in the transaction, by setting the **URL** sheet property to `results.xsl`.

12 In the **Projects View**, click on the sheet (`results_list`).

The **Properties View** is automatically updated:

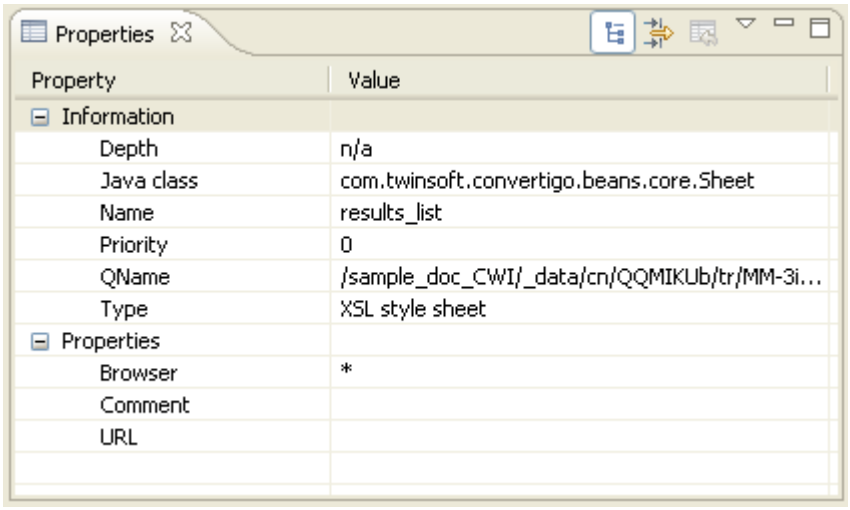


Figure 3 - 34: Sheet properties

13 Click on the value of the **URL** property. The value is highlighted.

14 Type in the name of the previously created XSL style sheet file: `results.xsl` for example, and press **Enter**.

15 Save the project by clicking on  or by pressing `Ctrl + S`.

The sheet object is now created. The next step consists in associating the sheet with the transaction execution, by setting a transaction property: **Style Sheet**.

This property specifies whether or not and which style sheet must be used to perform the XSL transformation of the transaction execution. The property can take on three values:

Table 3 - 2: Style Sheet transaction property

Style Sheet value	Description
None	Does not process with XSLT. Usually set for Web services (SOAP or REST), as plain XML data is then to be returned.
From transaction	Uses the XSL style sheet attached to this transaction.
From last detected screen class	Uses XSL style sheet attached to the last detected screen class.

16 In the **Projects View**, click on the transaction (`searchGoogle`).

The **Properties View** is automatically updated:

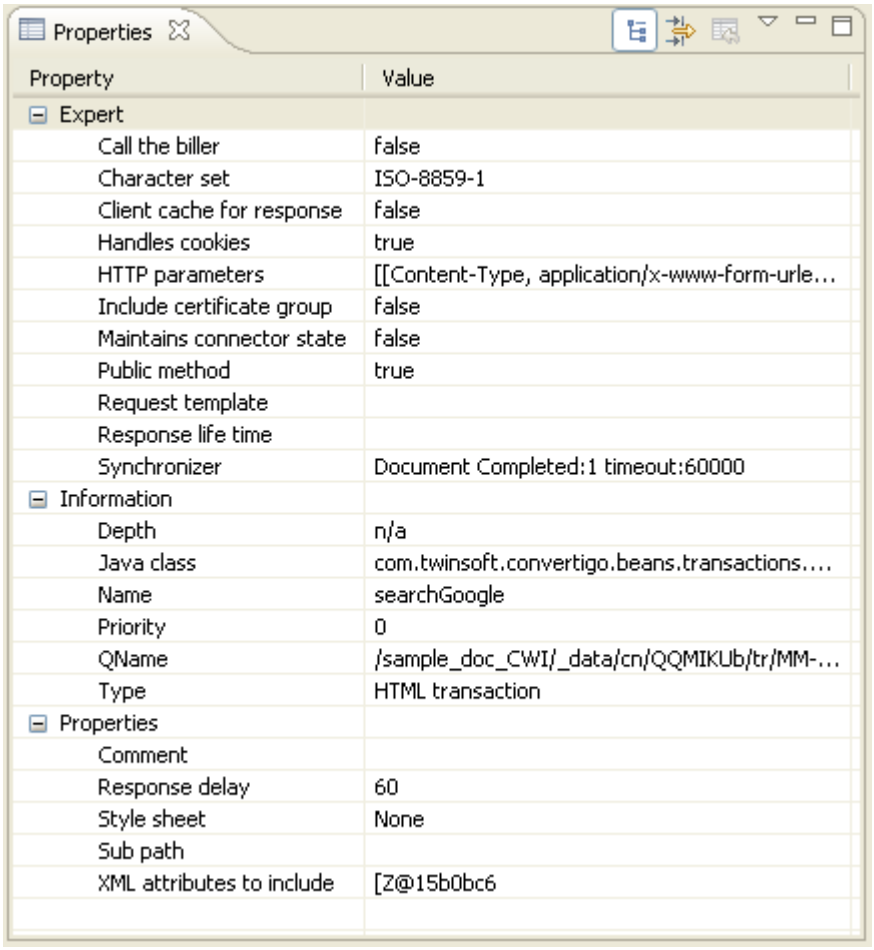


Figure 3 - 35: Transaction properties

17 Click on the value of the **Style Sheet** property. A drop-down menu appears:

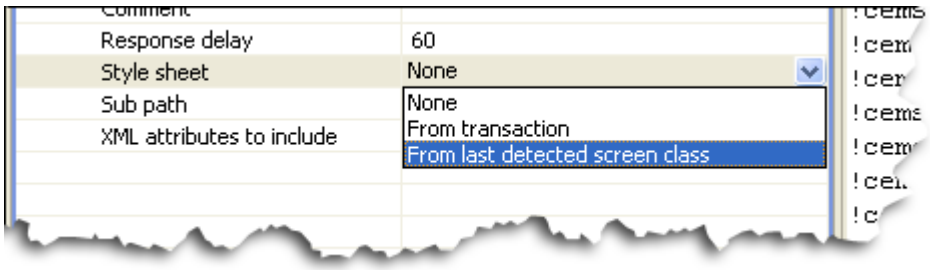


Figure 3 - 36: Transaction Style Sheet property

18 Select **From transaction** and press **Enter**.

19 Save the project by clicking on  or by pressing `Ctrl + S`.

We will switch back to the test platform and invoke the transaction to see how XML data was transformed.

20 Follow instructions of procedure *"To test the transaction using the test platform"* on page 2 - 72.

The XML output generated by the transaction (see Figure 2 - 121) is processed by the defined XSL style sheet. It appears in the **Execution result** window as an HTML document:

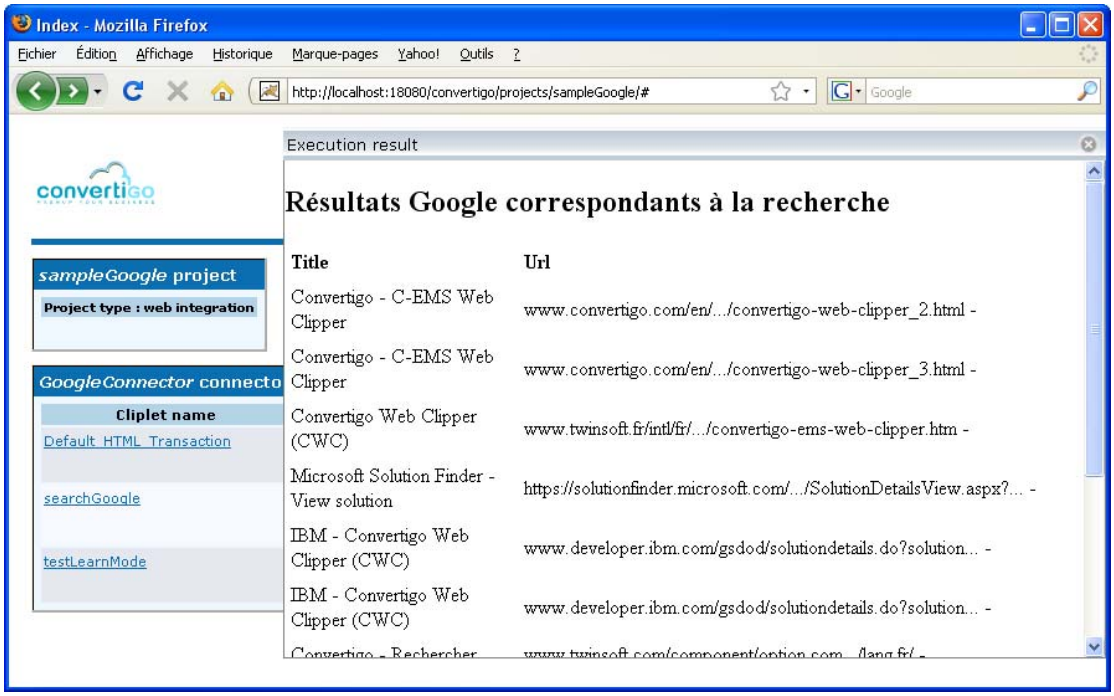


Figure 3 - 37: XML output after XSL transformation