



Design Tool v.0.2.0

for the Planetary Data System

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1.1 Overview

About Design Tool

The Design Tool provides functionality for designing product label schemas using the XML Schema standard. Although a PDS-specific tool may be developed in the future, Commercial Off-The-Shelf (COTS) and Open Source tools have been identified to satisfy this functional need. Along with facilitating manipulation of a generic schema into a specific schema, the tool also generates sample product labels to aide users in schema comprehension.

Please send comments, change requests and bug reports to the [PDS Operator](mailto:pds_operator@jpl.nasa.gov) at pds_operator@jpl.nasa.gov.

1.2 Release Notes

Release Notes

The purpose of this section is to provide a description of a Design Tool release including any impact that the new or modified capabilities will have on the Discipline Nodes or the PDS user community. If viewing the web-based version of this document, a somewhat itemized list of changes for each release can be found on the [Release Changes](#) page.

Release 0.2.0

This release of the Design Tool is a component of the integrated release [1.1.0](#) of the PDS 2010 System. This release is intended as a prototype release in support of the assessment of the PDS4 standards and the system components to date. This release includes updates to the schema references in the Operation document.

Release 0.1.0

This release of the Design Tool is a component of the integrated release [1.0.0](#) of the PDS 2010 System. This release is intended as a prototype release in support of the assessment of the PDS4 standards. The new or modified capabilities for this release are as follows:

- Provide Installation and Operation documents for utilizing Oxygen and Eclipse for manipulating XML Schema files.

1.3 Installation

Installation

This section describes how to install the recommended Design Tool software packages. The following topics can be found in this section:

- [Eclipse Installation](#)
- [Oxygen Installation](#)

Eclipse Installation

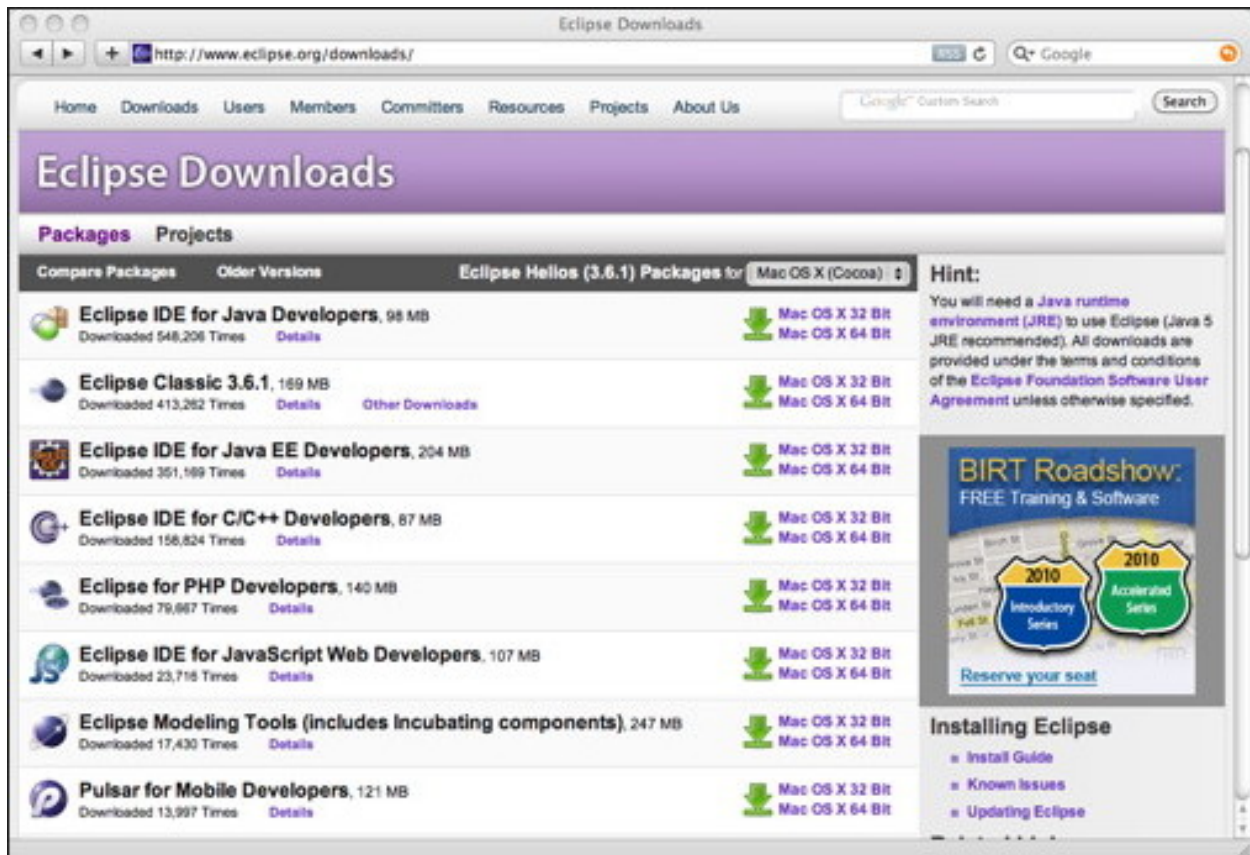
[Eclipse](#) is an open source software package that offers several plugins for software development. The plugin that we are especially interested in is the XML Editor, which facilitates the manipulation of XML and XML Schema files.

System Requirements

The Eclipse software was developed in Java and does require a Java Runtime Environment (JRE) to be installed on the host machine. Version 1.5 of the JRE is recommended but it should work fine under version 1.6.

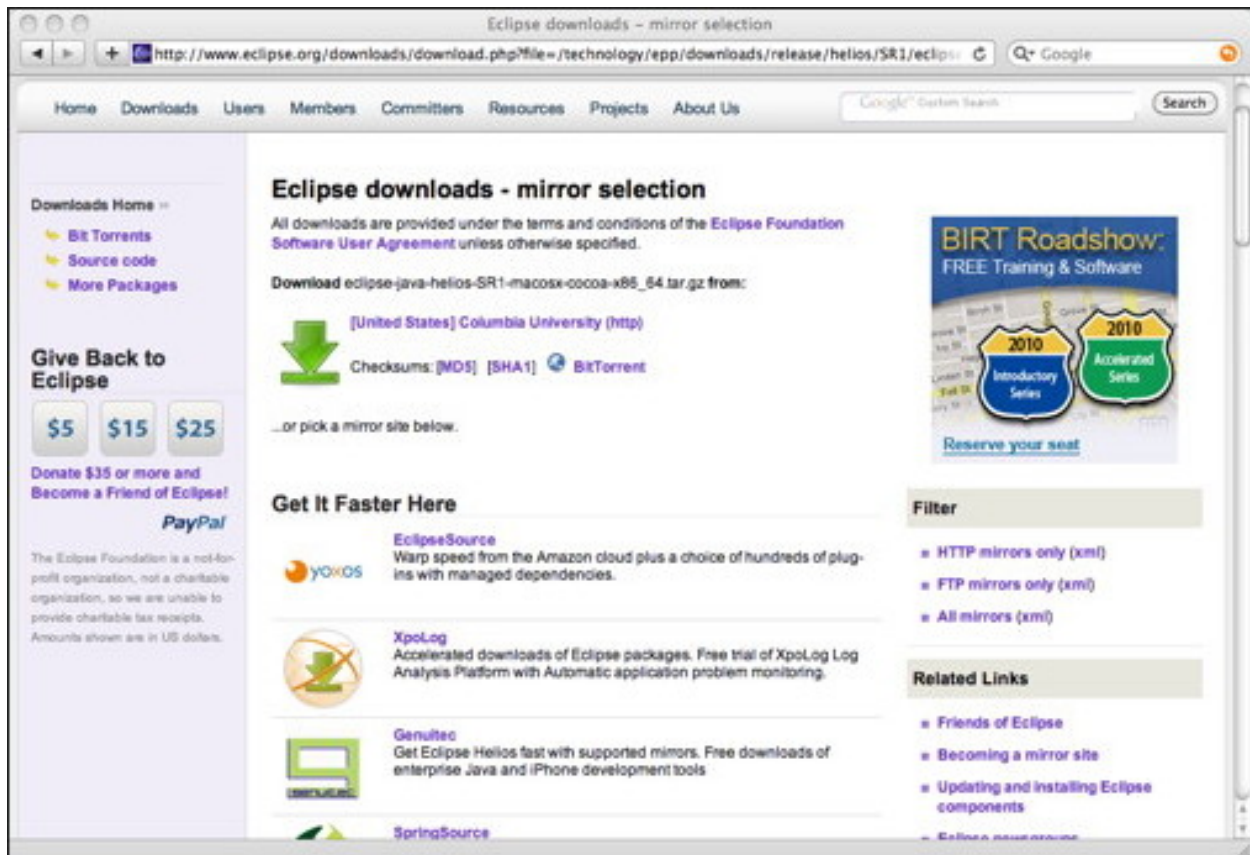
Download

The software package is available for download from <http://www.eclipse.org/downloads/> :



If viewing this document in online form, click the image for a larger version.

Eclipse offers several different downloads, but the IDE for Java Developers is sufficient for PDS purposes since it is the smallest package that includes the XML Editor plugin. In addition, the software is also available on several platforms. The main download page offers packages for Linux, Mac OS X and Windows in both 32-bit and 64-bit versions. Downloads for other platforms (e.g., Solaris) and older versions of Eclipse can be found at <http://download.eclipse.org/eclipse/downloads/>. Select the download that corresponds to your platform, which will display a new page with a link for downloading the package from a mirror site:

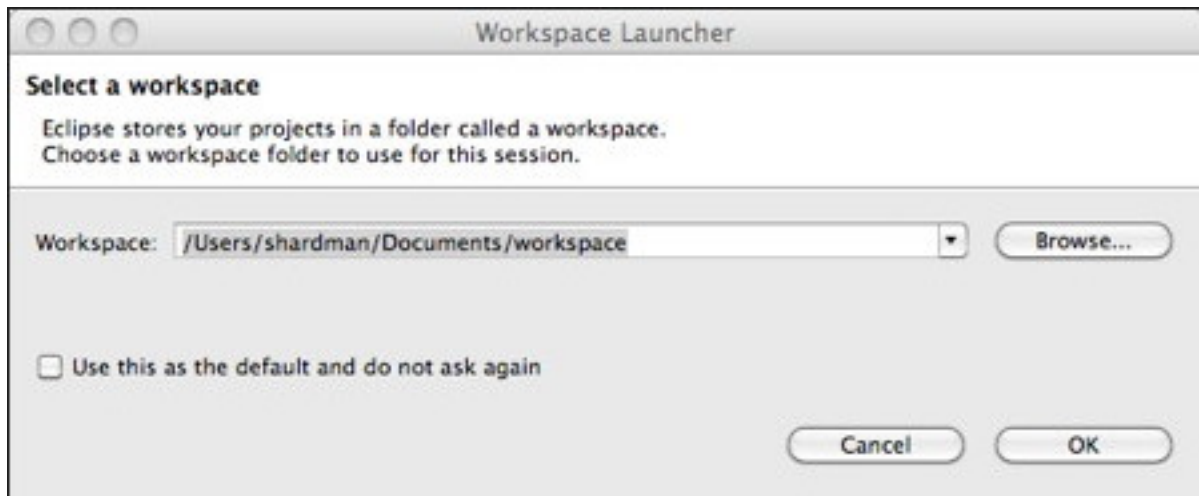


If viewing this document in online form, click the image for a larger version.

Select the big green arrow to download the package. Depending the platform, the download will come in various forms. The Mac version comes as a TAR file, Windows as a ZIP file and Linux as TAR/GZIP file.

Install

Once the software package has been downloaded, unpack the file according to its file format (e.g. TAR, ZIP, TAR/GZIP, etc.). The end result should be a folder named *eclipse* that contains the application and support files. Move the folder to the appropriate location on your machine for applications (i.e., the Applications folder on the Mac). Launch the application and it will ask to specify a location for your workspace:



You can use the default location, as determined by Eclipse, or specify your own location. Once you select the *OK* button, the main window will appear:



If viewing this document in online form, click the image for a larger version.

The installation is now complete and you are ready for some XML editing.

Oxygen Installation

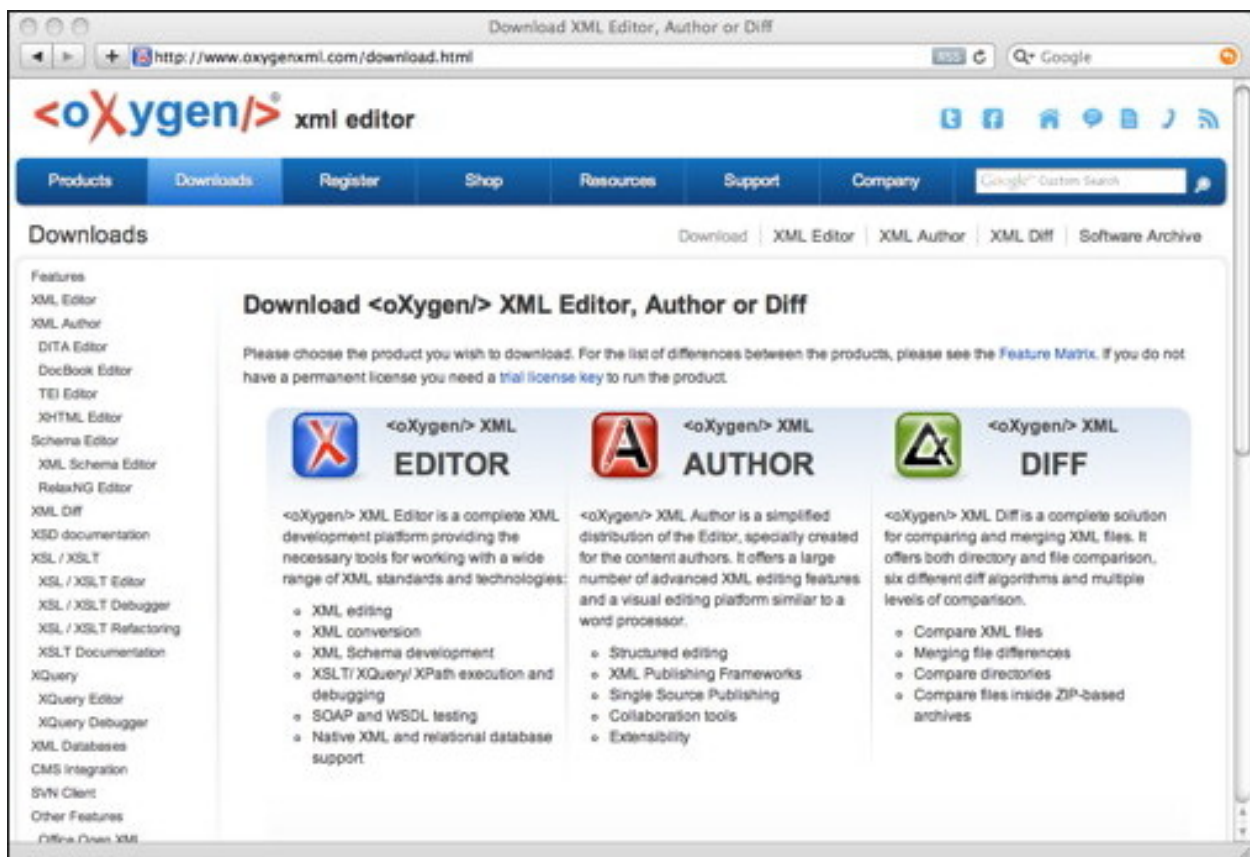
Oxygen is a commercial software package for XML-related software development.

System Requirements

The Eclipse software was developed in Java and does require a Java Runtime Environment (JRE) to be installed on the host machine. Version 1.5 of the JRE is recommended but it should work fine under version 1.6.

Download

The software package is available for download from <http://www.oxygenxml.com/download.html> :



If viewing this document in online form, click the image for a larger version.

Oxygen offers a few different downloads, but the XML Editor is the package of choice. Select the XML Editor package, which displays a new window listing the platform and license options:

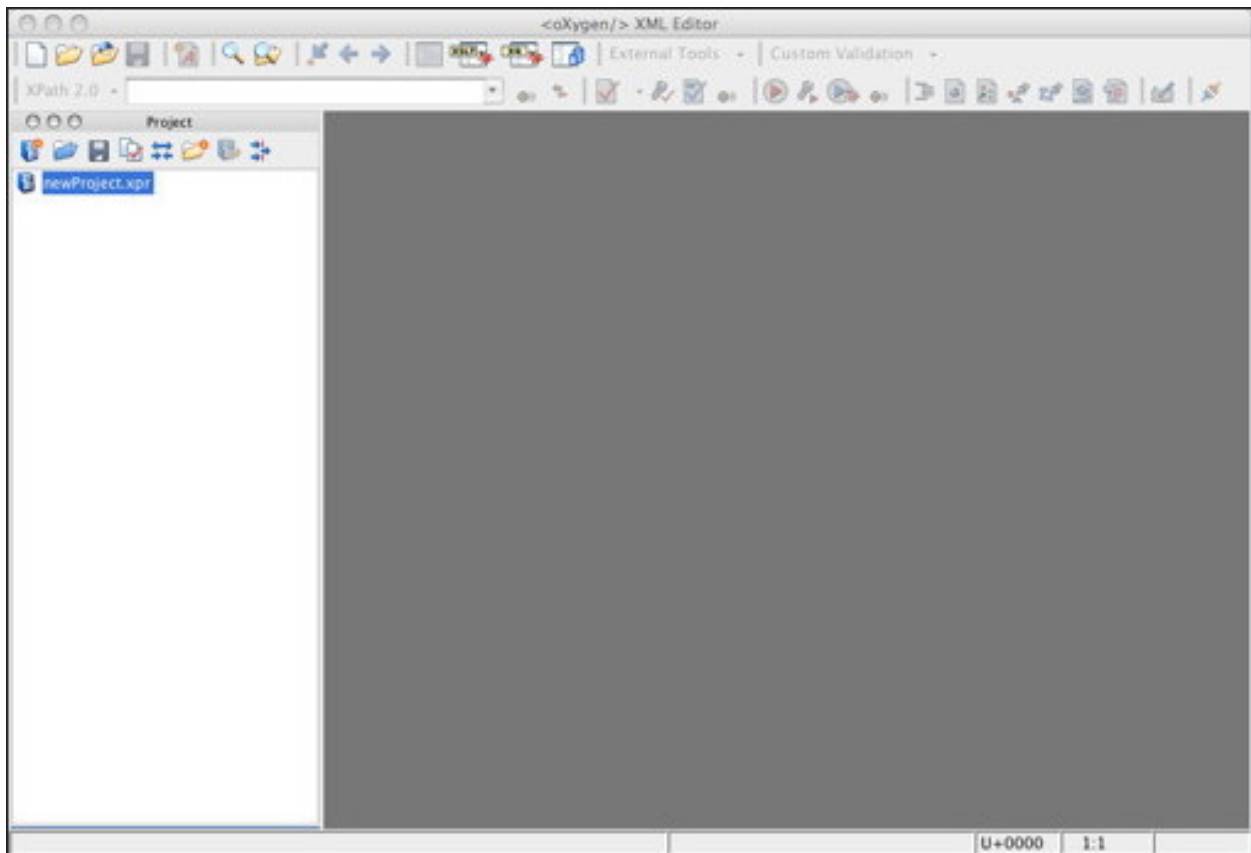
The screenshot shows the Oxygen XML Editor download page. The browser address bar displays http://www.oxygenxml.com/download_oxygenxml_editor.html. The page has a navigation bar with links: Download, XML Editor, XML Author, XML Diff, and Software Archive. The main heading is "Download <Oxygen> XML Editor". Below the heading is a description: "<Oxygen> XML Editor is a complete XML development platform providing the necessary tools for working with a wide range of XML standards and technologies:". A list of features includes: XML editing, XML conversion, XML Schema development, XSLT/XQuery/XPath execution and debugging, SOAP and WSDL testing, and Native XML and relational database support. A "Download" button is present. The page also includes a sidebar with a list of features and a "Buy <Oxygen> License" section with pricing for Enterprise (\$449), Professional (\$349), and Academic & SMP (\$64) licenses.

If viewing this document in online form, click the image for a larger version.

They offer three license choices ranging from \$449 for the Enterprise license to \$64 for the Academic license. The Enterprise license is probably overkill, so if you have to pay full price the Professional license should be sufficient. Select the download that corresponds to your platform and then select the big red button to download the package. Depending on the platform, the download will come in various forms. The Mac version comes as a TAR/GZIP file, Windows as an EXE file and Linux as a Bourne Shell script.

Install

Once the software package has been downloaded, unpack the file if necessary according to its file format (e.g. TAR/GZIP). On the Mac, the end result should be a folder named *oxygen* that contains the application and support files. For Windows and Linux, the download file is executable for that platform. Move the folder or executable to the appropriate location on your machine for applications (i.e., the Applications folder on the Mac). Launch the application and the main window will appear:



If viewing this document in online form, click the image for a larger version.

In order to register the application, navigate to the *Help* menu and select the *Register...* menu item, which will display the following window:

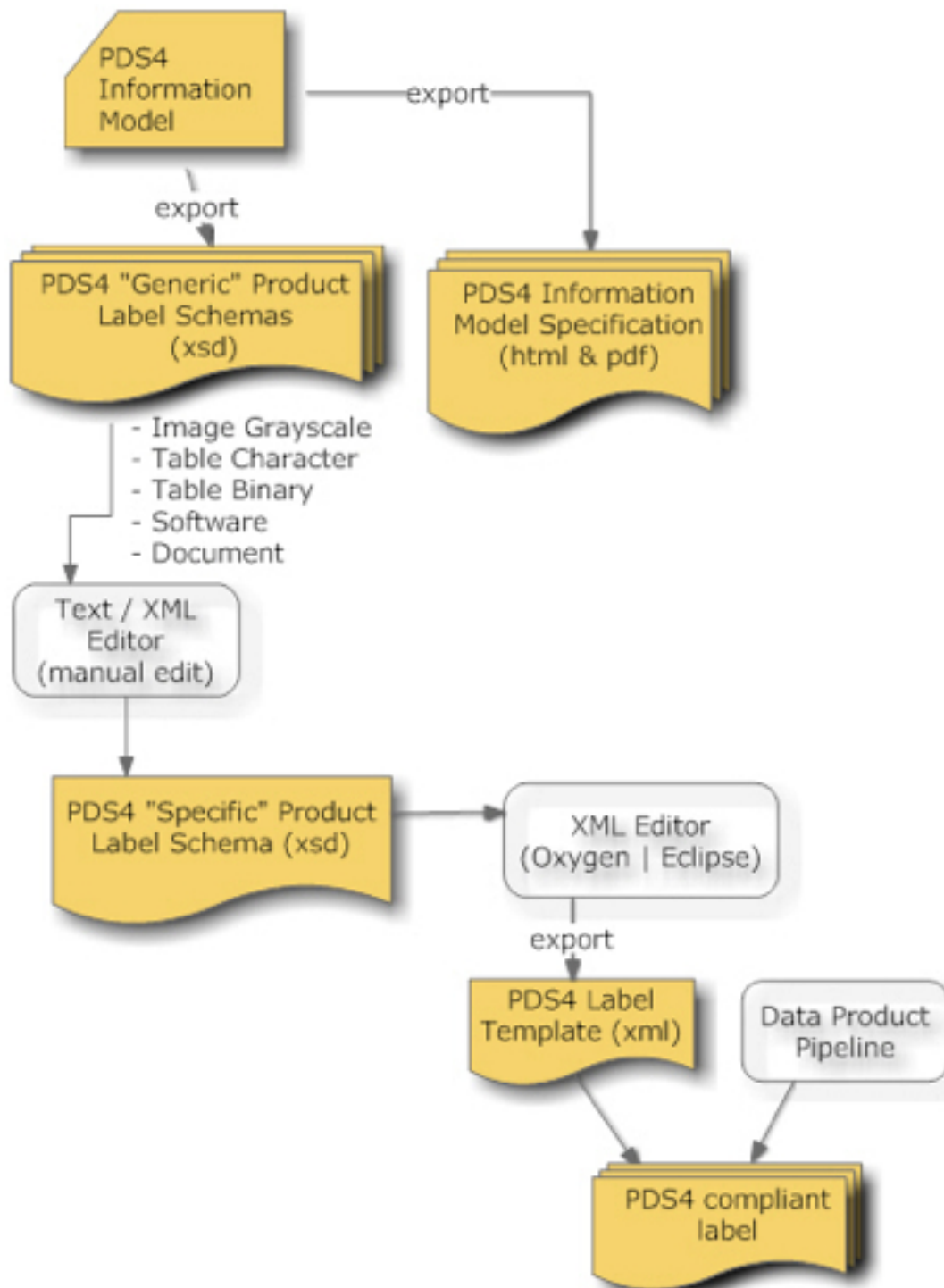


Paste in the license information from the email you received upon purchase of the license and then select the OK button. The installation is now complete and you are ready for some XML editing.

1.4 Operation

Operation

This section describes how to use the recommended Design Tool software packages to produce specific PDS product label schemas, which can then be used to generate product labels. In PDS4, product label schemas must conform to the [XML Schema](#) standard. The following diagram details the product label schema lifecycle:



As depicted in the diagram above, generic product schemas are derived from the information model. These schemas can be used as templates for defining new products via specific schemas. The steps detailed in this

section for producing a specific product label schema follow the steps (pretty closely) defined in section 6.0 - *PDS4 Product Label Schema* of the Data Providers' Handbook. In this section the steps have been narrowed down to the following:

- [Select Generic Schema](#)
- [Copy Schema](#)
- [Tailor Schema](#)
- [Create Sample Label](#)

Select Generic Schema

The first step is to select a generic product schema from the repository. The repository is located at <http://pds.nasa.gov/schema/pds4/generic/common/>. Generic schemas are available for several products (e.g., Grayscale Image, Character Table, etc.). Select the appropriate schema that corresponds with the data product to be described. In addition, download any ancillary schemas (e.g., base types, extended types, etc.) that are included in the selected generic schema. The examples in this document use schemas from version 0111c. A later version may be available from the repository. The following schemas are utilized in this example:

- [Product_Table_Character_0111c.xsd](#)
- [Extended_Types_0111c.xsd](#)
- [Base_Types_0111c.xsd](#)

Copy Schema

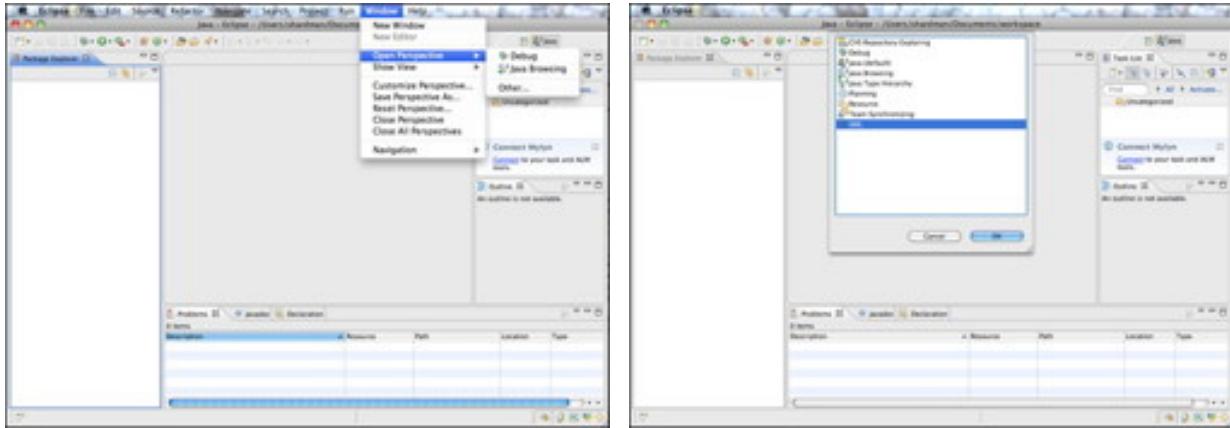
The next step is to make a copy of the generic schema so that it can be tailored into a specific schema. This can be accomplished via the operating system (e.g., cp ...) or via your XML Editor of choice. For this example, the *Product_Table_Character_0111c.xsd* is renamed to *My_Product_Table_Character_0111c.xsd*.

Tailor Schema

The next step involves tailoring the newly named specific schema. Options for tailoring include:

- Add data object definition(s) from building block schemas.
- Restrict valid values and optional references where appropriate.
 - Restrict a value set for appropriate keywords.
 - Restrict a value range for appropriate keywords.
 - Removing optional references (e.g. Object_Statistics_Type). Additional examples can be found in the Data Providers' Handbook.
- Incorporate Node or Mission-specific content, which can be accomplished by referencing Node or Mission-specific schemas.

Launch your XML Editor of choice. If using Eclipse, you should first change to the XML perspective:

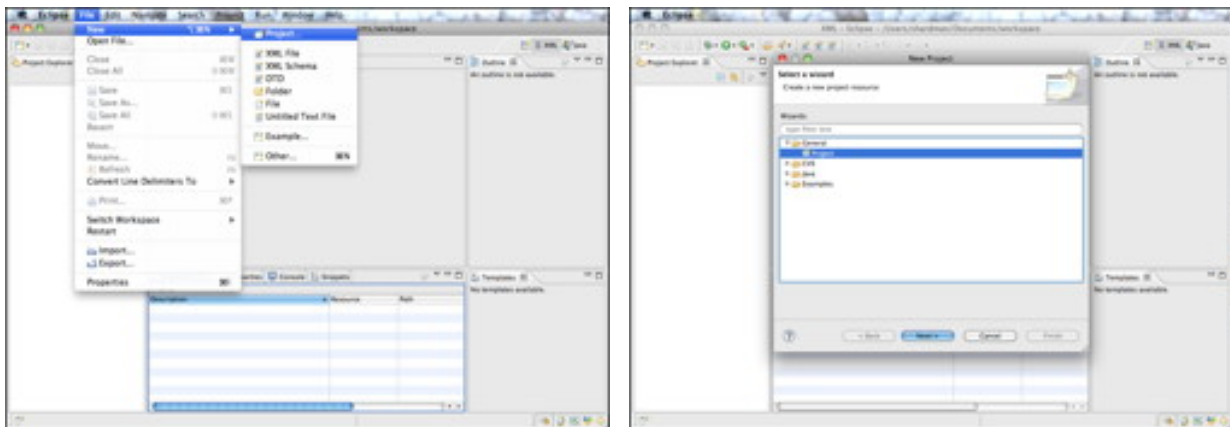


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Select the *Other...* menu item and then *XML* from the resulting list to enter the XML perspective.

Create Project

Create a new project for managing the specific schema tailoring. In Eclipse, navigate to the *File* menu, select the *New* menu item followed by the *Project...* menu item as follows:

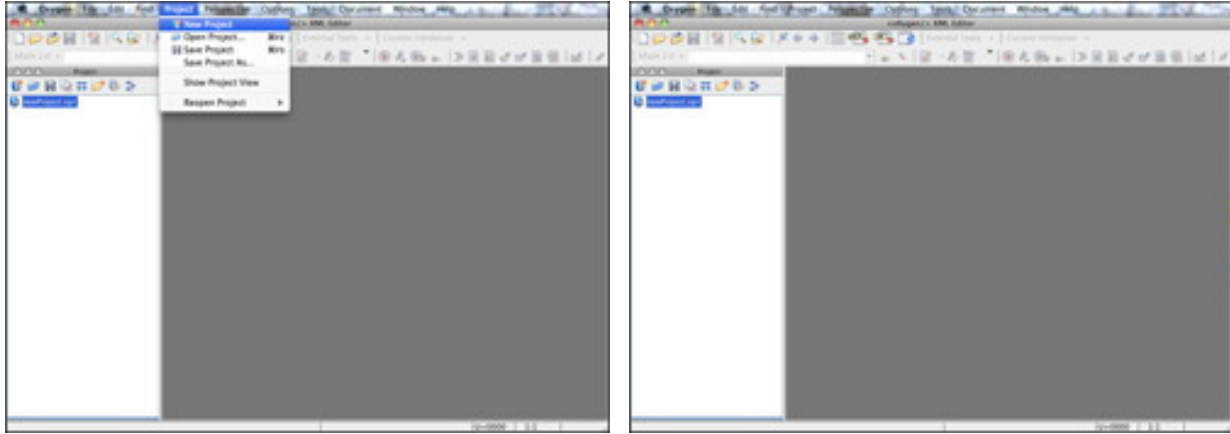


If viewing this document in online form, click the images for a larger version.

Select the *Project* item from the list on the *New Project* popup window and then select the *Next* button. Enter a name for the project and select the *Finish* button to create the project.

Although Eclipse prompts the user for a project name, Oxygen defaults to *newProject*. In Oxygen, the project

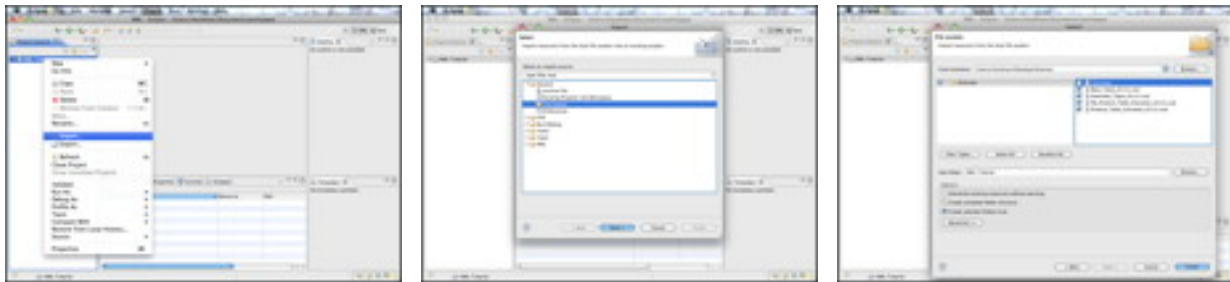
can be named later using the *Save As* feature. In Oxygen, navigate to the *Project* menu, select the *New Project* menu item as follows:



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Load Schemas

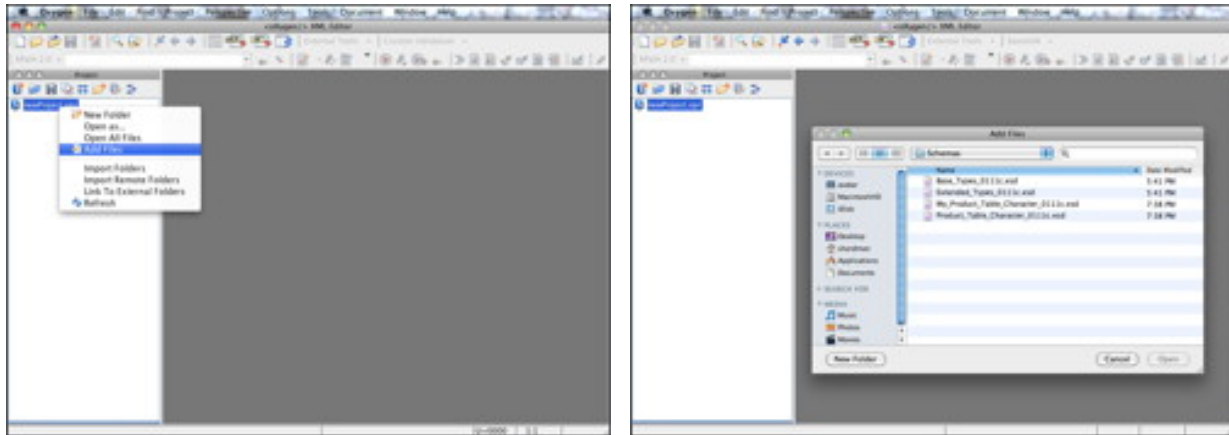
Load the schema files into the project. In both applications, the user can drag-and-drop the files into the project list. The alternative in Eclipse, is to right-click the project name from the project list and select the *Import...* menu item as follows:



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Select the *File System* item from the list in the *Import* popup window and then select the *Next* button. Specify the target schemas for import and then select the *Finish* button to import the schemas into the project.

In Oxygen, right-click the project name from the project list and select the *Add Files* menu item as follows:



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Specify the target schemas, one by one, for import and then select the *Open* button to import each schema into the project.

Modify Schema

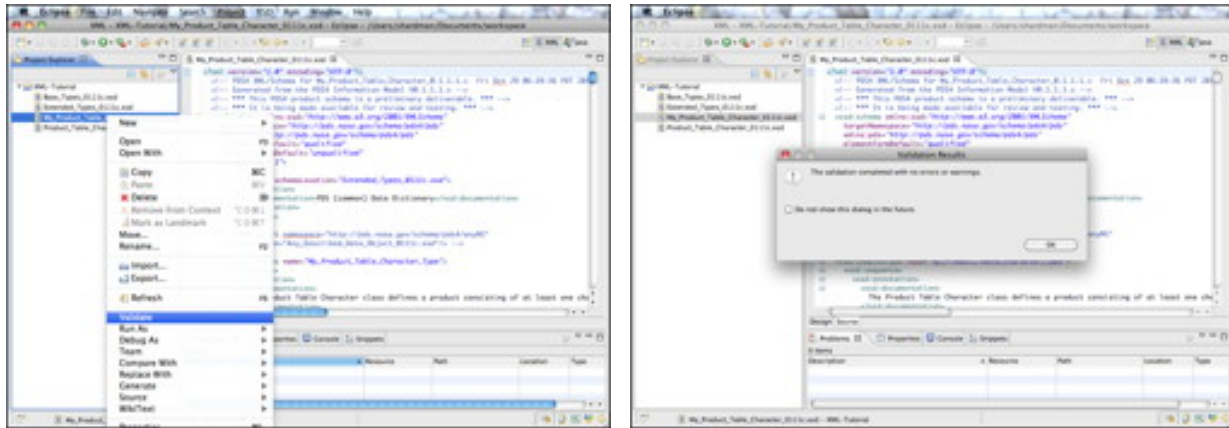
Open the *My_Product_Table_Character_0111c.xsd* schema file by double-clicking the file name from the project file list or navigating to the *File* menu and selecting the *Open...* menu item. In Eclipse, change from *Design* view to *Source* view. In Oxygen, change from *Schema* view to *Text* view.

Now that the file is open, the first modification is to change the name within the schema to correspond with the file name change. Find instances of *Product_Table_Character* and replace them with *My_Product_Table_Character*. In Eclipse, navigate to the *Edit* menu and select the *Find/Replace...* menu item. In Oxygen, navigate to the *Find* menu and select the *Find/Replace...* menu item.

This is where the assorted modifications listed at the beginning of this section can be made.

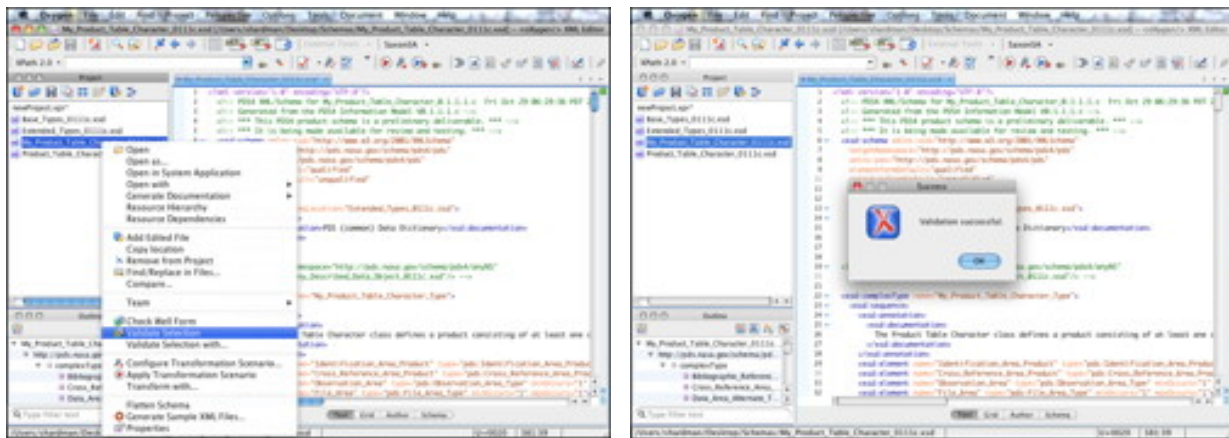
Validate Schema

Although both applications notify the user real-time when the active schema file is not valid, the schema can be validated using the XML Editor's validate feature. Example errors could include typos or non-XML conformant entries or missing element definitions. In order to initiate validation, right-click the file name from the project file list and select the *Validate* or *Validate Selection* menu item in Eclipse and Oxygen, respectively. In Eclipse, the pulldown menu and resulting window are as follows:



If viewing this document in online form, click the images for a larger version.

In Oxygen, the pulldown menu and resulting window are as follows:

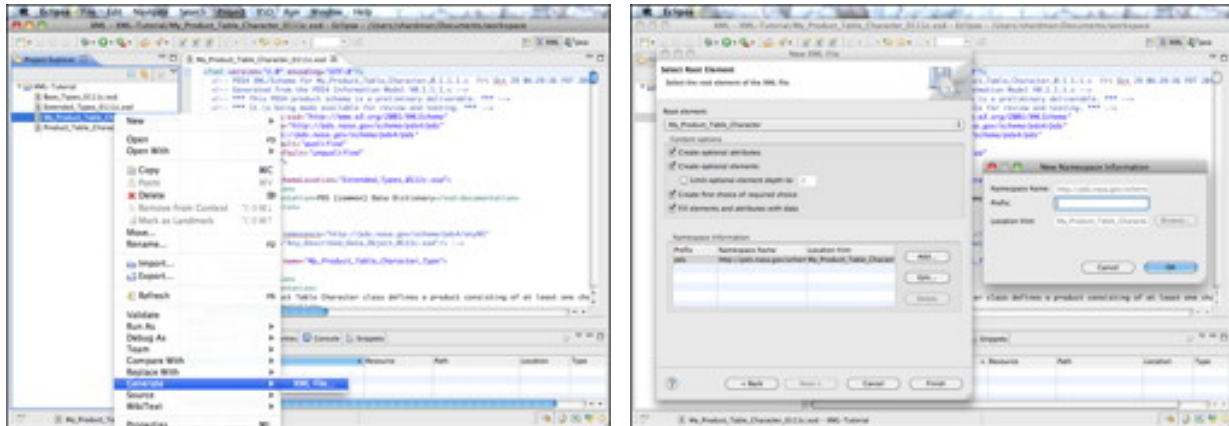


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After a few or many iterations of modifying the specific schema, save the completed specific schema.

Create Sample Label

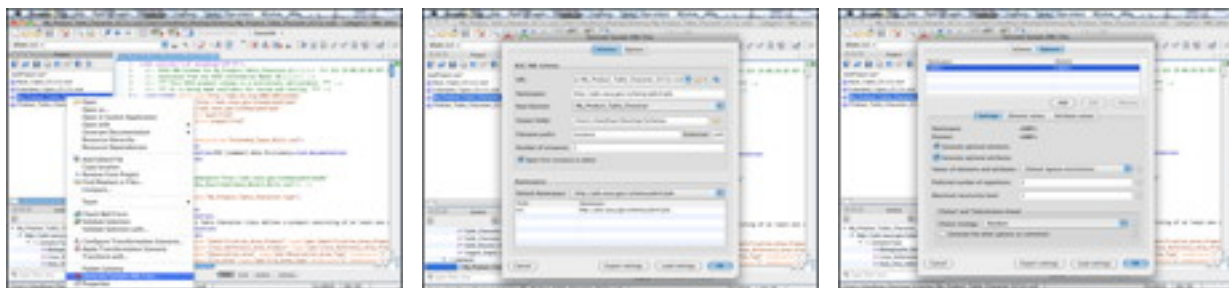
Create a sample label in XML from the tailored specific schema. In Eclipse, right-click the file name from the project list and select the *Generate->XML File ...* menu item as follows:



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Select the *Create optional attributes* and *Create optional elements* check boxes on the *New XML File* popup window. In addition, edit the namespace entry and blank out the prefix for the namespace. Select the *OK* button in the *New Namespace Information* popup window and then select the *Finish* button on the *New XML File* popup window to generate the sample label.

In Oxygen, right-click the file name from the project list and select the *Generate Sample XML Files...* menu item as follows:



If viewing this document in online form, click the images for a larger version.

Select the *OPTIONS* tab on the *Generate Sample XML Files* popup window and then select the *Generate optional elements* and *Generate optional attributes* check boxes. Select the *OK* button to generate the sample label.

The generated XML sample label is conformant with the *My_Product_Table_Character_0111c.xsd* schema.