Java4inspire: A java library for INSPIRE data
Example of use for Eurostat data transformation

Julien Gaffuri
Joint Research Centre, Ispra, Italy

Most of the open source GIS libraries and desktop softwares are developed in Java. The Java4inspire library aims at providing a bridge to access INSPIRE data from any Java environment. Java4inspire allows to handle easily INSPIRE data as java objects. The target audience is all GIS java programmers looking for an access to INSPIRE data. These user profiles may be:

1. **Spatial data producers**

Java4inspire can be used to transform existing spatial datasets into INSPIRE compliant datasets. Existing datasets encoded in various formats can be loaded using existing Java GIS libraries like for example the Geotools (http://www.geotools.org/) or Geotoolkit library (www.geotoolkit.org). The loaded data can be transformed into INSPIRE java objects using some other Java GIS libraries. Java4inspire provides then an easy way to encode these objects into INSPIRE compliant GML files.

2. **Spatial data users**

In the opposite way, Java4inspire provides a direct way to parse INSPIRE GML objects into java objects. These Java objects can then be easily manipulated using common GIS java libraries. Java4inspire is designed to be a generic interface between INSPIRE GML data (accessible for example through a WFS) and existing Java spatial data processing components. With Java4inspire, existing Java GIS desktop softwares can be fed with INSPIRE data. European institution spatial analysts may use this library to access and use INSPIRE data published by all European countries.

Java4inspire has been built with the JAXB (Java Architecture for XML Binding, http://jaxb.java.net/) XML mapping library. INSPIRE and ISO/OGC application schemas encoded as XSD files have been converted into java binding classes using the JAXB compiler. For the OGC application schemas, some outcomes from the *OGC Schemas and Tools Project* (http://confluence.highsource.org/display/OGCS/Home) have been reused. These binding Java classes are exact mirrors of the INSPIRE GML application schemas following the JAXB specification. They are the base of another layer of java classes to be used by Java developers to easily access INSPIRE spatial objects. The following figure presents the case of the class *VectorStatisticalUnit* from the INSPIRE theme *Statistical Unit*. A vector statistical unit is created; its properties are accessed with getter and setter methods.

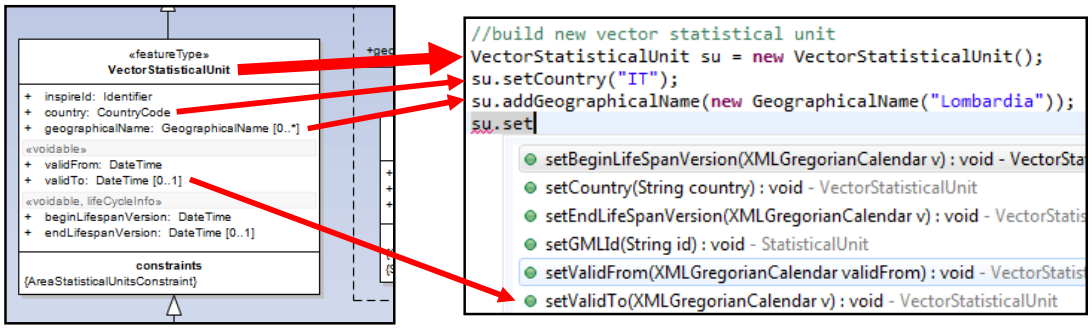

Figure: From INSPIRE features to Java objects

Original use case: Testing of Statistical Units theme

Java4inspire has originally been developed for the testing phase of annex 2 and 3 during summer 2011. It has been used for the feasibility testing of the *vector package* of the *statistical units* theme. The input datasets were the three EuroStat datasets freely downloadable from EuroStat website:

- NUTS regions
- Urban Audit
- Countries

Three workflows, *Nuts2inspire*, *UrbanAudit2inspire* and *Countries2inspire*, based on the ETL (Extract Transform Load) approach have been developed for these datasets and successfully applied. These workflows are available on the Java4inspire project website.

The outcome of this testing work has shown the possibility to apply the proposed approach to transform existing data into INSPIRE compliant data. This approach is fully based on open source technologies. The resulting library covers nowadays only a part of INSPIRE data specifications, version 2.0: The statistical unit theme, and all its dependencies such as the Generic Conceptual Model, the geographical names theme and the administrative units theme. The approach may be extended to other INSPIRE themes, and not only for a dataset transformation initial purpose: The Java4inspire components may be used for any manipulation of INSPIRE objects. It may be used as-is for geostatistical analyses based on INSPIRE statistical units.

Future development

Java4inspire will be extended to other INSPIRE themes and be updated following the progress of the data specification development work. Depending on the need for different thematic communities, additional binding classes may be produced with the approach used for the testing of statistical units theme. Having a common interface library to access different thematic data may improve the development of cross-thematic activities, like for example the implementation of cross-thematic models. Spatial data services using Java4inspire may also be developed.

Java4inspire project website

https://joinup.ec.europa.eu/software/java4inspire/description