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Real-time system to automatic harvesting of several marine data types, granting interoperability and resilience, using ISO and OGC standards

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This work describes the development of an application for the harvesting of real-time data. It allows the real-time collection of several marine data types by automatic population of a relational database, granting interoperability and resilience, following international ISO and OGC standards.
In detail, using different expertises in marine data collection, calibration and validation, archiving and dissemination in the OGS Oceanographic Department, we made a real-time data management system with the automation and optimization of the entire data handling process: from the measurement of raw data to the end-users use. We followed some objectives like cut down the time needed to the harvesting of multiple data formats, the conversion in a homogeneous and standard format, the structuring in a database and, finally, the automation of the data validation.
The requirements of interoperability, as ability to cooperate and exchange information, and resilience, as ability of adaptation to new needs or to unforeseen, directed our technological choice.
The interoperability is guaranteed using XML and OGC standard schemata for data transport and representation. The conversion of the input textual data is made by a java library "ServingXML" that allows to read and to translate using the directives present inside the XML files (one for each input flat format). This conversion generates a new XML file following the "Observations and Measurements" (O&M) OGC schemata. We have decided to adopt these schemata since they allow to fully describe all kind of information of our interest and to fulfill standardization requirements.
The use of Java language guarantees the platform independence.
The resilience of the application is obtained adopting a new approach using "Apache Camel" as rule-based routing and mediation engine operating in an event driven way, decoupling software services, in a Java environment. This framework is responsible for the quality of service features such as message persistence, guaranteed delivery, failure handling, and transaction support.
The data structure coming from the storage in a relational database allows wide data-warehouse and analysis (data-mining) opportunity, granting capability to reach a wide end-user-needs spectrum.
Inspired by its European working experience the Italian NODC is building, in collaboration with other OGS groups, this technological infrastructure. At the moment the work is following the needs coming from the management of an already existent meteo-marine monitoring network. The data come from a wide range of instruments like: current profilers positioned on the river mouths to monitor the river flow rates, meteo-oceanographic buoys with a meteorological station and a CTD profiler, directional wave riders buoys with a satellite positioning systems. Some of our aims will be to increase the types of data covered and to rouse interest for future co-operation and joint developments.