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A prototype of information system for remotely sensed data management developed using Open Source technologies

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A prototype of an information system, whose aim is to manage remotely sensed data acquired by a direct readout system, was developed using Open Source technologies. The prototype allows: i) to build the catalogue of images acquired in a spatially enabled database; ii) to search products using both geographic and metadata based criteria; and iii) to navigate product quick-looks by an improved interface which provides functionalities such as vector layers overlay, navigation, and so on. The information system was designed following Open Geospatial Consortium [1] and ISO TC-211 [2] recommendations and using their compliant Open Source software.

In detail, we used PostgreSQL [3] with PostGIS extentions [4] for implementing the data base management system and the University of Minnesota Map Server [5] for the development of the improved interface for quick-look navigation. PostGIS adds support for geographic objects to the PostgreSQL object-relational database, and allows its use as a backend spatial database for geographic information systems (GIS) while following the OpenGIS "Simple Features Specification for SQL". MapServer is an Open Source development environment for building spatially-enabled web applications.

The user interfaces were easily developed using PHP (configured to work with MapScript module), following a modular strategy and an object oriented pattern in order to get an easy extension of the prototype. The PHP MapScript [6] module is a PHP dynamically loadable module which makes MapServer's MapScript functions and classes available in a PHP environment. The ISO TC-211 standards was taken

into account in the database design and in the presentation interface development: its aim is to specify geographic information, methods, tools and services for data management. The direct readout system integrated in the prototype is part of a ground station which captures, pre-processes and archives data transmitted by different remote sensing satellites.

The developed prototype is currently operative with a system for direct readout from NOAA satellites which consists of the antenna and the telemetry system for tracking satellite passes and capturing raw data. After the acquisition a pre-processing sequence is automatically activated to convert raw data to calibrated, geo-referenced images and produce the quick-looks. The pre-processed images and the quick-looks are then sent to a storage ftp server and to a web service in charge of cataloguing the images.

The back-end application was developed as a web application and contains the following end-users functionalities: 1. the user can search the data on the catalogue using a graphical interface and using geographic search criteria; 2. the user can navigate through quick-looks in a GIS-like interface, with the possibility to add administrative boundaries, towns, streets, points of interest, etc.; 3. the user can then download his final product.

This experience demonstrates the versatility of the mentioned Open Source components in building different applications for Earth Observation systems, especially in small scientific institutions that are interested to develop low-cost applications for data/product distribution, with the aim to facilitate collaborative projects. The planned future developments will regard: i) a more complex infrastructure having the capability to manage data coming from different remote sensing data sources; and ii) an automatic activation of the data processing chain, for monitoring critical thresholds and providing an alert in case of possible critical situations.

The developed prototype is available at the URL: http://oracolo.le.isac.cnr.it/mpcf/RS.

[1] The Open Geospatial Consortium, Inc., [http://www.opengeospatial.org/] [2] ISO/TC 211 Geographic information/Geomatics [http://www.isotc211.org/] [3] Postgres SQL. [http://www.postgresql.org] [4] PostGIS. [http://www.postgis.org] [5] University of Minnesota MapServer. [http://mapserver.gis.umn.edu] [6] PHP MapScript [http://www.maptools.org/php_mapscript/]