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JGrass a GIS system which copes with hydrology and geomorphology

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JGrass 3 (http://www.jgrass.org) is a full featured GIS system distributed under the LGPL3 license, and based on the Eclipse/uDig 1.2 platform (http://www.refractions.net/products/udig/). It inherits all the features of uDig (User friendly Desktop Internet GIS) that regard the treatment of vector features, web services, data base connectivity, and exploit the capabilities of the most recent GeoTools (http://www.geotools.org). To this platform, JGrass adds the capabilities to master raster data in GRASS and other raster format supported by the new GeoTools libraries, and interface most of the GRASS 6.* modules. Differently from other commercial an non commercial systems, it also manage netCDF-CF data, and, through this format, multitemporal data of various types. This is deemed necessary to efficiently deal with hydrological, and hydrogemorphological simulations. At present, JGrass includes more than fifty model components for most of the tools commonly required for terrain analysis, river network, flood forecasting, hillslope stability. Moreover it includes two major modeling effort, i.e. the distributed hydrological model GEOtop (http://www.geotop.org), and the semi-distributed hydrological model NewAGE. These, in turn, bring further modeling components for meteorological data interpolation, snow modeling, subsurface flows, surface flow. Models are embedded in JGrass as OpenMI 1.4 (http://www.openmi.org) and, more recently, also OMS3 (http://javaforge.com/project/1781) components.

The modeling by components paradigm allows for a tight coupling between models and GIS (where the exchange of data between model and GIS is fully automatic) but preserves the freedoms given to modelers by a much more loose coupling, and keep the programming overhead close to the normal programming practice. Finally, time-series and vectorial features are managed by an embedded SQL geographic database (H2 spatial, http://www.h2database.com/) where the appropriate tables are set up. For more professional, server side, data mastering can be implemented in a remote database with Postgresql/PostGIS (at http://www.postgresql.org/ and http://postgis.refractions.net/, for the time series and vectorial data) a though a customized Ramadda (http://www.unidata.ucar.edu/software/ramadda/) server for the raster data. JGrass itself is part of a ecosystem of GIS tools for enhancing the productivity of the scientist and professional in the field, including BeeGIS and GEOPaparazzi (http://www.beegis.org) for field survey. This contribution describes the rational of the choices made, also in comparison with other option, either from a practical than a conceptual side, and show some cases of the platform at work.