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The Geoinformatica free and open source software stack

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The Geoinformatica free and open source software (FOSS) stack is based mainly on three established FOSS components, namely GDAL, GTK+, and Perl. GDAL provides access to a very large selection of geospatial data formats and data sources, a generic geospatial data model, and a large collection of geospatial analytical and processing functionality. GTK+ and the Cairo graphics library provide generic graphics and graphical user interface capabilities. Perl is a programming language, for which there is a very large set of FOSS modules for a wide range of purposes and which can be used as an integrative tool for building applications. In the Geoinformatica stack, data storages such as FOSS RDBMS PostgreSQL with its geospatial extension PostGIS can be used below the three above mentioned components. The top layer of Geoinformatica consists of a C library and several Perl modules. The C library comprises a general purpose raster algebra library, hydrological terrain analysis functions, and visualization code. The Perl modules define a generic visualized geospatial data layer and subclasses for raster and vector data and graphs. The hydrological terrain functions are already rather old and they suffer for example from the requirement of in-memory rasters. Newer research conducted using the platform include basic geospatial simulation modeling, visualization of ecological data, linking with a Bayesian network engine for spatial risk assessment in coastal areas, and developing standards-based distributed water resources information systems in Internet. The Geoinformatica stack constitutes a platform for geospatial research, which is targeted towards custom analytical tools, prototyping and linking with external libraries. Writing custom analytical tools is supported by the Perl language and the large collection of tools that are available especially in GDAL and Perl modules. Prototyping is supported by the GTK+ library, the GUI tools, and the support for object-oriented programming in Perl. New feature types, geospatial layer classes, and tools as extensions with specific features can be defined, used, and studied. Linking with external libraries is possible using the Perl foreign function interface tools or with generic tools such as Swig. We are interested in implementing and testing linking Geoinformatica with existing or new more specific hydrological FOSS.