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Server Side Applications And Plugins Architecture For The Analysis Of Geospatial Information And The Management Of Water Resources

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The need for increasingly complex geospatial algorithms dedicated to the management of water resources, the fact that many of them require specific knowledge and the need for dedicated computing machines has led to the necessity of centralizing and sharing all the server applications and the plugins developed.
For this purpose, a Web Processing Service (WPS) that can make available to users a range of geospatial analysis algorithms, geostatistics, remote sensing procedures and that can be used simply by providing data and input parameters and download the results has been developed.
The core of the system infrastructure is a GRASS GIS, which acts as a computational engine, providing more than 350 forms of analysis and the opportunity to create new and ad hoc procedures. The implementation of the WPS was performed using the software PyWPS written in Python that is easily manageable and configurable.
All these instruments are managed by a daemon named "Arcibald" specifically created for the purpose of listing the order of the requests that come from the users. In fact, it may happen that there are already ongoing processes so the system will queue the new ones registering the request and running it only when the previous calculations have been completed. However, individual Geoprocessing have an indicator to assess the resources necessary to implement it, enabling you to run geoprocesses that do not require excessive computing time in parallel. This assessment is also made in relation to the size of the input file provided.
The WPS standard defines methods for accessing and running Geoprocessing regardless of the client used, however, the project has been developed specifically for a graphical client to access the resources.
The client was built as a plugin for the GIS QGis Software which provides the most common tools for the view and the consultation of geographically referenced data.
The tool was tested using the data taken during the bathymetric campaign at the Montedoglio Reservoir on the Tiber River in order to generate a digital model of the reservoir bed. Starting from a text file containing coordinates and the depth of the points (previously statistically treated to remove any inaccuracy), we used the plugin for QGis to connect to the Web service and started the process of cross validation in order to obtain the parameters to be used for interpolation.
This makes possible to highlight the morphological variations of the basin of reservoirs due to silting phenomena, therefore to consider the actual capacity of the basin for a proper evaluation of the available water resource. Indeed, this is a critical step for the next phase of management.
In this case, since the procedure is very long (order of days), the system automatically choose to send the results via email. Moreover the system, once the procedures invoked end, allows to choose whether to share data and results or to remove all traces of the calculation. This because in some cases data and sensitive information are used and this could violate privacy policies if shared.
The entire project is made only with open-source software.