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An open software framework for Web Service-based geo-processes

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This article presents an open (java-based) software framework to provide web-based geo-processes
compliant to the OGC Web Processing Service (WPS) interface. The framework is hosted under an open source license (GNU GPL) at the open source initiative 52°North (www.52north.org).

The idea
Nowadays sufficient capabilities for web-based geo-processing become available in terms of computer power and network bandwidth. Web-based geo-processing is promising due to build complex geo-processes by integrating distributed functionality from different sources. For example a complex process chain for cartographic generalization (Foerster and Stoter 2006), which incorporates some basic (e.g. topology
analysis) but also specialized processes (e.g. simplification), could integrate functionality hosted all over the world based on a distributed web-based approach. Such an approach towards geo-processing improves knowledge sharing between users amongst other aspects (e.g. maintenance, scalability & availability). To enable such a scenario, which addresses the need of interoperable geo-processes on the web, the OGC came up recently with a specification about a Web Processing Service (WPS) as a discussion paper (OGC 2005).

The specification
This specification describes three mandatory operations: GetCapabilities (provides service metadata), DecribeProcess (provides metadata about the designated process) and Execute (triggers the designated process on the service). It also describes additional features for chaining processes, data pulling via URL-references and long-term transactions. All the client-service communication is based on HTTP and XML.

The software framework
As there is such a specification the next step is to provide an open software framework for the WPS, which supports the developer and provider of such

geo-processes to provide these geo-processes according to this specification. This framework had to be extensible for all kinds of geo-processes and had to provide a simple mechanism to deploy these geo-processes. This was the driving force during the development of the framework at 52°North.
The framework had to be extensible in two ways: For the various kinds of geo-processes but also for the different data handlers. This separation of concerns within the framework enables the process developer to concentrate on the main task of process developing and not to worry about appropriate data handling. By now the framework incorporates data handlers for different versions of GML and also GeoTiff. The deployment of the geo-processes as well as of the data-handlers is eased by providing dedicated interfaces and automatic embedding of these components into the framework during runtime.
The software framework is fully Java-based and available under open source license (GPL). It implements the current version 0.4.0 of the specification and has been applied within different projects inside as well as outside 52°North (Sensor Web Enablement, cartographic generalization).

The future plans
Our aim is to enhance the framework for more sophisticated client-service communication mechanisms to enable asynchronous communication. In general, the integration of other Web Services as for instance for data access is very promising. Additionally members of 52°North will participate within the further specification work of the WPS at OGC.
All these aspects will lead to a more comprehensive framework, which enables finally to build a Web Service architecture for geo-processing.

Links
52°North website: www.52north.org
WPS framework documentation:
https://www.incubator52n.de/twiki/bin/view/Processing/52nWebProcessingService

References
[Foerster and Stoter 2006] Foerster, T. & Stoter, J., Establishing an OGC Web Processing Service for generalization processes, ICA workshop on Generalization and Multiple Representation, http://ica.ign.fr/Portland/paper/ICA2006-foerster_stoter.pdf.
[OGC 2005] OGC (2005), OGC OpenGIS Web Processing Service, OGC discussion paper.

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