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Web-Based Geoprocessing: Future Directions

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The rapid evolution from monolithic desktop GIS applications with tightly coupled geodata to service oriented Spatial Data Infrastructures with independent, interoperable and distributed Web Services has changed the GIS world fundamentally. Nevertheless, existing Spatial Data Infrastructures are only focused on data retrieval and visualisation. In order to proceed in the direction of Spatial Information Infrastructures, it is evident to process the data. This aspect of processing geospatial data has not been completely addressed in Spatial Data Infrastructures yet. Processing via classic desktop GIS applications is still the predominant paradigm, even though computational power and network capacities are constantly rising and new paradigms such as Cloud Computing are emerging.

Standards play a key role in this context to ensure interoperability among heterogeneous services especially if they interact with each other. The Open Geospatial Consortium (OGC) has developed several standards for this purpose. In particular, the Web Processing Service Interface (WPS) is the most promising standard to address geoprocessing in a standardized manner. Current standardization efforts in this direction are reviewed.

Besides, this paper presents future directions for the transition from a desktop driven to a web-based driven Geoprocessing landscape. In particular, it is shown how Geoprocessing Services in conjunction with Cloud Computing methods can be utilized to process large datasets in a scaleable and on-demand fashion. Different Cloud Computing architecture patterns are compared for this purpose and a performance comparison given on the basis of a concrete scenario from Geospatial domain.

In addition, the chaining of such web-based and cloud enabled Geoprocessing Services to complex service chains is presented. It is shown how distributed Geoprocessing Services from heterogeneous environments and with different processing capabilities can be aligned in a workflow due to the use of Open Geospatial Consortium standards. Moreover, such workflows can be exposed again via standardized interfaces to become a building block of higher level workflows.

Further implications and directions of web-based Geoprocessing Services in the Model Web are discussed.