A Web-based Visual Programming Language for geo-processing using WebAssembly.

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date	June 11, 2021

Within the domain of Geomatics, geodata experts often would like to take some geo-dataset, and process it for a specific use case. This "geoprocessing" is most often done natively on a desktop by using a library like CGAL or a tool like QGis. On the web, "Geoprocessing Services" exist which offer server-side geoprocessing.

The aim of this research will be to explore a new method: geoprocessing in a browser, client-side. This could be very beneficial for many use cases. Instead of having large, preprocessed datasets, geodata can be processed on demand from the source. If a user is only interested in a small area of the source dataset, this could save vast amounts of time, storage space and computational resources. Users can also tailor this process to their exact specifications, and they will never have to install anything except a web-browser.

A web application like this poses several technical challenges. This research aims to not only define these challenges and offer solutions, but to also implement said solutions and put them to the test. The two main challenges are that this environment would have to be both very performant, as well as user friendly to non-geoprocessing experts.

To offer a performant web application, WebAssembly will be considered. WebAssembly is a type of binary that runs in web browsers. It can be used to take an existing C++ geoprocessing library, and to publish it in a way anyone with a browser can run it at near native speed.

To offer a balance between user friendlyness and, lets say, 'computational control', this thesis will explore the creation of a web-based Visual Programming Language, or VPL. It will position itself in the footsteps of tools like Save Software's FME, McNeel's Grasshoper, Ravi Peter's GeoFlow, and SideFX's Houdini.