Geophysical Research Abstracts
Vol. 16, EGU2014-2584, 2014
EGU General Assembly 2014
© Author(s) 2014. CC Attribution 3.0 License.

Parallel Processing of Numerical Tsunami Simulations on a High Performance Cluster based on the GDAL Library

Matthias Schroeder, Cedric Jankowski, Martin Hammitzsch, and Joachim Wächter

Deutsches GeoForschungsZentrum, Centre of GeoInformationTechnology (CeGIT), Potsdam, Germany
(matthias.schroeder@gfz-potsdam.de)

Thousands of numerical tsunami simulations allow the computation of inundation and run-up along the coast for vulnerable areas over the time. A so-called Matching Scenario Database (MSDB) [1] contains this large number of simulations in text file format. In order to visualize these wave propagations the scenarios have to be reprocessed automatically.
In the TRIDEC project funded by the seventh Framework Programme of the European Union a Virtual Scenario Database (VSDB) and a Matching Scenario Database (MSDB) were established amongst others by the working group of the University of Bologna (UniBo) [1]. One part of TRIDEC was the developing of a new generation of a Decision Support System (DSS) for tsunami Early Warning Systems (TEWS) [2]. A working group of the GFZ German Research Centre for Geosciences was responsible for developing the Command and Control User Interface (CCUI) as central software application which support operator activities, incident management and message disseminations. For the integration and visualization in the CCUI, the numerical tsunami simulations from MSDB must be converted into the shapefiles format. The usage of shapefiles enables a much easier integration into standard Geographic Information Systems (GIS). Since also the CCUI is based on two widely used open source products (GeoTools library and uDig), whereby the integration of shapefiles is provided by these libraries a priori.
In this case, for an example area around the Western Iberian margin several thousand tsunami variations were processed. Due to the mass of data only a program-controlled process was conceivable. In order to optimize the computing efforts and operating time the use of an existing GFZ High Performance Computing Cluster (HPC) had been chosen. Thus, a geospatial software was sought after that is capable for parallel processing. The FOSS tool Geospatial Data Abstraction Library (GDAL/OGR) was used to match the coordinates with the wave heights and generates the different shapefiles for certain time steps. The shapefiles contain afterwards lines for visualizing the isochrones of the wave propagation and moreover, data about the maximum wave height and the Estimated Time of Arrival (ETA) at the coast. Our contribution shows the entire workflow and the visualizing results of the-processing for the example region Western Iberian ocean margin.

[1] Armigliato A., Pagnoni G., Zaniboni F, Tinti S. (2013), Database of tsunami scenario simulations for Western Iberia: a tool for the TRIDEC Project Decision Support System for tsunami early warning, Vol. 15, EGU2013-5567, EGU General Assembly 2013, Vienna (Austria).
[2] Löwe, P., Wächter, J., Hammitzsch, M., Lendholt, M., Häner, R. (2013): The Evolution of Service-oriented Disaster Early Warning Systems in the TRIDEC Project, 23rd International Ocean and Polar Engineering Conference - ISOPE-2013, Anchorage (USA).