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An Cloud-native Architecture for Near-Real-Time Monitoring of Floods

Arne de Wall, Albert Remke, and Benedikt Gräler
52°North Initiative for Geospatial Open Source Software GmbH, Münster, Germany

The deployment of Sentinel 1 and 2 data through the European Earth Observation Program Copernicus offers new opportunities for satellite-based flood event monitoring. The open and free data is available in a high spatial and temporal resolution, which enables large-scale monitoring of flood events in near real time. However, the automated derivation of time-critical information from large volumes of satellite and in-situ data is a complex task that requires the management and maintenance of a high-performance infrastructure. It has to be taken into consideration that due to the episodic nature of flood events, the complex calculation of flood masks is not continuous and thus creates a very irregular load situation for the infrastructure.

Cloud computing platforms in combination with the processing of Satellite data have gained increasing attention in recent years. The European Commission has also launched an initiative to develop Copernicus Data and Information Access Services (DIAS) that facilitate the processing of Copernicus data in a scalable processing environment close to the data. Those platforms are a good option to optimize the required processing workflow for flood monitoring, since they provide many possibilities to schedule and elastically adjust the number of resources, leading to a cost-effective resource utilization.

The German research and development project SenSituMon aims to develop and evaluate solutions for fully automated cloud-based flood event monitoring based on Sentinel data and additional in-situ data. One of the goals is the development and validation of innovative architectural concepts that provide all the prerequisites for the realization of an operational and cost-effective service offering for the automated monitoring of flood areas. To do this, the developed infrastructure applies novel cloud computing patterns and technologies to automate the processing flow and optimize resource utilization.

This talk presents the current results of the SenSituMon project. It will provide a comprehensive overview of the general architecture pursued in the project and highlight the concepts and patterns of big data processing such as kappa architectures used to enable efficient near real-time processing of satellite and in-situ data for the purpose of flood monitoring. The operational infrastructure leverages the cloud environment of Mundi Web Services, a cloud-based Copernicus DIAS platform that provides access to Copernicus data near the Open Telekom Cloud's processing facilities. Attendees can expect a first glimpse on how the SenSituMon infrastructure was implemented in the cloud environment of Mundi Web Services.

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