



## Event-driven Processing of Earth Observation Data

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Earth Observation data has become available and obtainable in continuously increasing quality as well as spatial and temporal coverage. To deal with the massive amounts of data, the WaCoDiS project aims at developing an architecture that allows its automated processing. The project focuses on the development of innovative water management analytics services based on Earth Observation data such as provided by the Copernicus Sentinel missions. The goal is to improve hydrological models including but not limited to: a) identification of the catchment areas responsible for pollutant and sediment inputs; b) detection of turbidity sources in water bodies and rivers. The central contribution is a system architecture design following the Microservice architecture pattern: small components fulfil different tasks and responsibilities (e.g. managing processing jobs, data discovery, process scheduling and execution). In addition, processing algorithms, that are encapsulated by Docker containers, can be easily integrated using the OGC Web Processing Service Interface. The orchestration of the different components builds a fully functional ecosystem that is ready for deployment on single machines as well as cloud infrastructures such as a Copernicus DIAS node or commercial cloud environments (e.g. Google Cloud Platform, Amazon Web Services). All components are encapsulated within Docker containers.

The different components are loosely coupled and react to messages and events which are published on a central message broker component. This allows the flexible scaling and deployment of the system. For example, the management components can run on physical different locations than the processing algorithms. Thus, the system supports the reduction of manual work (e.g. identification of relevant input data, execution of algorithms) and minimizes the required interaction of domain users. Once a Processing Job is registered within the system, the user can track the status of it (e.g. when it was last executed, if an error occurred) and will eventually be informed when new processing results are available.

In summary, this work targets to develop a system that allows the automated and event-driven creation of Earth Observation products. It is suitable to run on Copernicus DIAS nodes or on dedicated environments such as a Kubernetes Cluster.

In our contribution, we will present the event-driven processing workflows within the WaCoDiS system that enables the automation of water management related analytics services. In addition, we will focus on architectural details of the Microservice oriented system design and discuss

different deployment options.