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DATACUBE SERVICES ON A SATELLITE: THE ORBIDANSE PROJECT

Abstract

Project ORBiDANSe (Orbital Big Data Analytics Service) is driving the "ship code to data" paradigm to the extreme: it makes a Cubesat an online Web data service for real time EO acquisition, processing, and retrieval, based on the ISO SQL/MDA (Multi-Dimensional Arrays) standard under adoption. Images get acquired by the on-board camera and geo-referenced via GPS. Access is done via a high-level array query language allowing ad-hoc processing and filtering on spatio-temporal raster data, similar to what standard SQL accomplishes on tuple sets.

On board, such queries are evaluated by the rasdaman Big Array Data Analytics engine. Among others, it supports spatio-temporal queries, hence is truly multi-dimensional. The configuration can be updated/reconfigured in-flight, although emphasis will be put on automatic optimization, including acquisition planning based on incoming queries. In a direct scenario, targeted subsetting/processing of imagery can be downlinked directly to the requesting client, effectively turning the satellite into an image database. In a federated scenario, a client may submit some complex decision support query to a data center; the rasdaman instance there finds out that data are missing and spawns a sub-request to the Cubesat; merges its locally computed results with the Cubesat response into the final result sent back to the user. As rasdaman is already cloud-parallelized, queries can be distributed automatically between ground and space instances.

Overall goal of the project, which is conducted jointly by Jacobs University and rasdaman GmbH, is to achieve a quantum leap in both EO service quality, data availability, and service integration.