

## Processing of satellite data in the cloud

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### Abstrak

The dynamic development of digital technologies, especially those dedicated to devices generating large data streams, such as all kinds of measurement equipment temperature and humidity sensors, cameras, radio telescopes and satellites Internet of Things enables more in depth analysis of the surrounding reality, including better understanding of various natural phenomenon, starting from atomic level reactions, through macroscopic processes e.g. meteorology to observation of the Earth and the outer space. On the other hand such a large quantitative improvement requires a great number of processing and storage resources, resulting in the recent rapid development of Big Data technologies. Since 2015, the European Space Agency ESA has been providing a great amount of data gathered by exploratory equipment a collection of Sentinel satellites which perform Earth observation using various measurement techniques. For example Sentinel 2 provides a stream of digital photos, including images of the Baltic Sea and the whole territory of Poland. This data is used in an experimental installation of a Big Data processing system based on the open source software at the Academic Computer Center in Gdansk. The center has one of the most powerful supercomputers in Poland the Tryton computing cluster, consisting of 1600 nodes interconnected by a fast Infiniband network 56 Gbps and over 6 PB of storage. Some of these nodes are used as a computational cloud supervised by an OpenStack platform, where the Sentinel 2 data is processed. A subsystem of the automatic, perpetual data download to object storage based on Swift is deployed, the required software libraries for the image processing are configured and the Apache Spark cluster has been set up. The above system enables gathering and analysis of the recorded satellite images and the associated metadata, benefiting from the parallel computation mechanisms. This paper describes the above solution including its technical aspects.