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A grid enabled infrastructure for Earth Observation

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The BEinGRID project aims at presenting a number of practical cases to illustrate the current potential of grid computing for changing the way companies and enterprises conduct business. In this context, the DUE GlobAEROSOL service was selected as example of a class of services which require large and near real time data access, and complex processing, to generate global Earth coverage products to respond to emerging science and institutional environmental needs. GlobAEROSOL provides daily data on aerosol parameters by processing the readings from a number of satellite sensors: ATSR-2, AATSR, SEVIRI and MERIS. In particular, it was expected to enable the near real time processing of this data through the use of grid technology, and obtain several other benefits for both users and providers.

Among the possible choices that could be found in the aerospace industry, the characteristics of GlobAEROSOL actually illustrate many of the issues representative of Earth Observation (EO) services. With large volumes of daily input data transferred (25Gb approx.), that need to be timely processed to be relevant to the end users, this processing chain implies a challenge that cannot be ignored. Processing resources need to be scaled and made available, network connectivity has to be guaranteed, and storage elements have to seamlessly absorb and catalogue new products that need to be discoverable and accessed by the different elements. Therefore, a robust production harness is required, able to process (and eventually re-process) the large amounts of data acquired in near real time to perform thorough validation of the algorithms and generate the final products to be distributed.

In order to satisfy the requirements of such experiment, the underlying infrastructure of the envisaged solution was based on GRID-ify: an innovating grid application integration environment that enables the implementation and configuration of composite

services requiring the use of substantial processing and data resources. Coupled with a network of computers, it provides the necessary flexibility for building the necessary application virtual environment with quick accessibility to the large volume of remote sensing data involved, computing resources and generated results. GRID-ify grew on the heritage of the European Space Agency (ESA) Grid Processing On-Demand project (G-POD), which was initially developed to cope with the customary large data volumes characterizing spatial Earth Observation (EO) applications.

GRID-ify is a configurable software application that fills the gap between high performance computing resources and the GlobAEROSOL near real time service. To that end, it binds together a secure and generic content management system, that can be reused in other projects, and a task management engine that enables the instantiation and management of jobs, while permitting their submission to grids based upon different middlewares hiding their differences to the end user. With the constant evolution of grid middleware packages, this last feature is of great importance as it decouples the design of the grid enabled solution from the actual available infrastructure. These characteristics make GRID-ify a great tool for porting existing and new services to the grid, while easing the deployment and migration of the system to different platforms and resource pools.