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An infrastructure for the integration of geoscience instruments and sensors on the Grid

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The Grid, as a computing paradigm, has long been in the attention of both academia and industry[1]. The distributed and expandable nature of its general architecture result to scalability and more efficient utilisation of the computing infrastructures. The scientific community, including that of geosciences, often handles problems with very high requirements in data processing, transferring, and storing[2,3]. This has raised the interest on Grid technologies but these are often viewed solely as an access gateway to HPC. Suitable Grid infrastructures could provide the geoscience community with additional benefits like those of sharing, remote access and control of scientific systems. These systems can be scientific instruments, sensors, robots, cameras and any other device used in geosciences. The solution for practical, general, and feasible Grid-enabling of such devices requires non-intrusive extensions on core parts of the current Grid architecture. We propose an extended version of an architecture[4] that can serve as the solution to the problem. The solution we propose is called Grid Instrument Element (IE) [5]. It is an addition to the existing core Grid parts; the Computing Element (CE) and the Storage Element (SE) that serve the purposes that their name suggests. The IE that we will be referring to, and the related technologies have been developed in the EU project on the Deployment of Remote Instrumentation Infrastructure (DORII[1]). In DORII, partners of various scientific communities including those of Earthquake, Environmental science, and Experimental science, have adopted the technology of the Instrument Element in order to integrate to the Grid their devices. The Oceanographic and coastal observation and modelling Mediterranean Ocean Observing Network (OGS[2]), a DORII partner, is in the process of deploying the above mentioned Grid technologies on two types of observational modules: Argo profiling floats and a novel Autonomous Underwater Vehicle (AUV). In this paper i) we define the need for integration of instrumentation in the Grid, ii) we introduce the solution of the Instrument Element, iii) we demonstrate a suitable end-user web portal for accessing Grid resources, iv) we describe from the Grid-technological point of view the process of the integration to the Grid of two advanced environmental monitoring devices.

References

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[2] Istituto Nazionale di Oceanografia e di Geofisica Sperimentale. URL: http://www.ogs.trieste.it