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VERCE, Virtual Earthquake and Seismology Research Community in Europe, a new ESFRI initiative integrating data infrastructure, Grid and HPC infrastructures for data integration, data analysis and data modeling in seismology

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Research in earthquake and seismology addresses fundamental problems in understanding Earth's internal wave sources and structures, and augment applications to societal concerns about natural hazards, energy resources and environmental change. This community is central to the European Plate Observing System (EPOS)—the ESFRI initiative in solid Earth Sciences. Global and regional seismology monitoring systems are continuously operated and are transmitting a growing wealth of data from Europe and from around the world. These tremendous volumes of seismograms, i.e., records of ground motions as a function of time, have a definite multi-use attribute, which puts a great premium on open-access data infrastructures that are integrated globally. In Europe, the earthquake and seismology community is part of the European Integrated Data Archives (EIDA) infrastructure and is structured as "horizontal" data services. On top of this distributed data archive system, the community has developed recently within the EC project NERIES advanced SOA-based web services and a unified portal system. Enabling advanced analysis of these data by utilising a data-aware distributed computing environment is instrumental to fully exploit the cornucopia of data and to guarantee optimal operation of the high-cost monitoring facilities. The strategy of VERCE is driven by the needs of data-intensive applications in data mining and modelling and will be illustrated through a set of applications. It aims to provide a comprehensive architecture and framework adapted to the scale and the diversity of these applications, and to integrate the community data infrastructure with Grid and HPC infrastructures. A first novel aspect is a service-oriented architecture that provides well-equipped integrated workbenches, with an efficient communication layer between data and Grid infrastructures, augmented with bridges to the HPC facilities. A second novel aspect is the coupling between Grid data analysis and HPC data modelling applications through workflow and data sharing mechanisms. VERCE will develop important interactions with the European infrastructure initiatives in Grid and HPC computing.

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