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# Grid metadata management for Earth Science

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The next generation of climate modeling researchers will face a critical challenge, i.e., dealing with increasingly complex simulation models and huge quantities of related datasets, which are already too massive for current storage, manipulation, archiving, navigation, and retrieval capabilities. From the data grid perspective a key element to discover, manage and access huge and distributed amount of data will be the metadata handling framework. While from the grid data handling perspective several solutions are already available and can be adopted, for metadata management centralized solutions are usually proposed. What we propose for the management of a distributed ES production activity is the Grid Metadata Handling System (a data grid solution leveraging distributed and P2P data grid services focusing on metadata management and access). From our point of view, centralized solutions are not feasible and are not able to address availability, scalability, robustness and efficiency at such large scale. Despite the classical approaches, data-grid-enabled solutions are able to greatly address scalability (users, data, etc.), transparency (access, integration, presentation) and efficiency (performance). The Grid Metadata Handling System we propose is able to provide both access to and integration of metadata stored in different and widespread data sources providing a strong data virtualization layer in grid. Moreover we must take into account that (i) such a technological solution for distributed metadata management leverages on standards, emerging specification, etc. (ii) supports role-based management (based on VOMS), which increases flexibility and scalability (iii) provides full support for Grid Security Infrastructure, which means (authorization, mutual authentication, data integrity, data confidentiality, etc.); (iv) is based on P2P grid protocols/services, fully addressing interoperability, data integration and transparency. Finally we also propose the GRelC Data Grid Portal solution which allows users to

search, browse and display metadata, providing a high level of transparency.