ADAR, an Advanced Data Archive for Earth Observation

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The constantly increasing technical capabilities of Earth Observation (EO) satellites, downloading terabytes of data from many different sensors with increasing resolutions, and the pressing request by end-users for access to information and services deriving from acquired data, instead of access to the raw data, require new storage and access methods and techniques for the EO Archive Systems.

The large increases in computational power and network bandwidth/connectivity, the emerging concepts and standards (e.g.: CCSDS OAIS, ESA Versatile Archive initiative, XML), and the advanced technologies (e.g.: new storage media, GRID, middleware) are very attractive in particular for regional archives of Payload Data Access Systems in order to provide a unified (and distributed) access to space application data.

The Advanced Data ARchive (ADAR) project is an ESA/ESRIN Research and Technology Development activity, aimed at investigating and testing possible solutions permitting to cope with the key challenges described above. In particular, the ADAR project is meant to define the architecture of a future EO Archive Facility through analyses and studies, and to demonstrate the feasibility of its key elements by the implementation and test of prototypes.

In particular the ADAR projects concerned with:

- Very Large Storage and Long Term Archiving: to preserve petabytes of Data for more than 20 years and accept foreseeable technological evolutions with almost no software development.
- Heterogeneous Data: to handle, provide to users and exchange with other facilities (i.e. ingest, archive, maintain, preserve, search, retrieve, recondition) Heterogeneous Data (i.e. structured/unstructured multi-media, multi-discipline EO related data, products, information and knowledge in computer compatible format).
- Service Management: to permit easy integration of services, even resource demanding ones, and to execute them with high performance and automatic monitoring and control for example for, very fast data ingestion, extraction of information from large quantities of EO data, generation (also in real-time) and fast distribution (also on-line) of products, creation of multi-temporal, mutli-sensor, interdisciplinary combination products.
- Open architecture: to support co-operation with peer or interconnected entities (e.g.: for data exchange or for more complex and complete services), easy integration into evolving networks for content provision, internal modularity, scalability and re-configurability.
- Automation/Autonomy: to enable cost reduction and high availability.
- Transition for Current Facilities: to identify the best path for a smooth transition of existing archives to the new ADAR architecture.

The ADAR project time span is about 18 months from spring 2002. This paper presents the preliminary results obtained in the first phase of the project.