EarthServer
Big Earth Data Analytics

Project Summary: EarthServer is establishing open access and ad-hoc analytics on extreme-size Earth Science data, based on and extending the rasdaman Array DBMS. Database query languages serve as c/s interface for "mix & match" access to multi-source, any-size, multi-dimensional spatio-temporal data and their metadata, across all Earth sciences – in short: Big Earth Data Analytics. These interfaces are strictly based on OGC (for geospatial information) and W3C XQuery (for metadata) standards.

Started Sep 2011, runtime 3 years, 5.38m EUR budget (7m US$).

Coverages: A coverage [ISO 19123] is a "space-time varying phenomenon". Coverage data are gathered in massive, rapidly growing amounts and variations, such as: 1-D sensor time series; 2-D maps; 3-D x/y/t satellite image time-series and x/y/z exploration data; 4-D x/y/z/t climate & ocean data.

WCS & WCPS

Coverages can be served via OGC WCS (Web Coverage Service). The WCS suite of standards establishes a modular set of extensions around a Core facilitating n-D spatio-temporal subsetting (trim & slice). One of these extensions is the OGC WCPS (Web Coverage Processing Service) Language, an n-D ArrayQL enriched with geo semantics and flavored along XQuery.

The following example [Baumann, Geoinformatica 2009] is "From MODIS scenes M1, M2, and M3, the absolute of the difference between red & nir, in HDF-EOS - but only those where nir exceeds 127 somewhere inside region R":

Rasdaman is WCS and WCPS reference implementation.

OGC

The Open GeoSpatial Consortium (OGC), in collaboration with ISO, develops standards for geo-spatial and location based services. Some coverage standards:

P. Baumann (ed.): WCPS Language, OGC 08-068r2
P. Baumann (ed.): WCP 2.0 Core, OGC 09-110r3
P. Baumann (ed.): GML 3.2.1 Application Schema – Coverages, OGC 09-146r2

RTD Goals: +++ Extend support from arrays to coverages +++ databases & in-situ integration +++ data (WCPS) & metadata (XQuery) query integration +++ Federated query processing +++ Cloud parallelization +++ GIS integration +++ n-D visual clients, from mobile to immersive VR +++ Advance OGC standards

Lighthouse Applications: Six services are being established, together covering all Earth sciences, each a mix of at least 100 TB of in-situ and imported data.

Developer Partners:
- rasdaman
- EOX
- Fraunhofer
- Jacobs University
- Consiglio Nazionale delle Ricerche

Advisory Board: ESA | IEEE | OGC

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