

Standards-Based Services for Big Spatio-Temporal Data

With the unprecedented increase of orbital sensor, in-situ measurement, and simulation data as well as their derived products there is an immense potential for getting new and timely insights - yet, the value is not fully leveraged as of today.

Incidentally, such spatio-temporal sensor, image, simulation, and statistics data in practice typically constitute prime Big Data contributors.

In view of such data "too big to transport" the quest is up for high-level service interfaces for dissecting datasets and rejoining them with other datasets - ultimately, to allow users to ask "any question, anytime, on any size" enabling them to "build their own product on the go".

The notion of coverages has proven instrumental in unifying regular and irregular grids, point clouds, and meshes so that such data can be accessed and processed through a simple, yet flexible and interoperable service paradigm.

Complementing the (abstract) coverage model of ISO 19123 on which it is based, the (concrete) OGC coverage data and service model establishes verifiable interoperability.

The OGC Web Coverage Service (WCS) comprises a modular suite for accessing large coverage assets. WCS Core provides simple data subsetting and encoding whereas extensions add optional service facets up to ad-hoc spatio-temporal filtering and processing on massive datacubes.

The latter is accomplished by OGC's Big Earth Data query language, Web Coverage Processing Service (WCPS).

By separating coverage data and service model, any service - such as WMS, WFS, SOS and WPS - can provide and consume coverages in addition to WCS.

The critical role of coverages for spatio-temporal infrastructures is recognized far beyond OGC: a large, growing list of open-source and proprietary tools support WCS today.

WCS/WCPS implementations host databases beyond 100 Terabyte, heading towards the Petabyte frontier, and WCPS queries have been distributed across more than 1,000 cloud nodes.

This has prompted ISO and INSPIRE to also adopt the OGC coverage and WCS standards, which is currently under way.

The standards observing group of the US Federal Geographic Data Committee (FGDC) sees coverage processing a la WCS/WCPS as a future "mandatory standard".

In this course, we introduce the OGC coverage data and service model with an emphasis on practical aspects and illustrate how they enable high-performance, scalable implementations. Presentation will make use of online available services allowing participants to follow and recapitulate the topics addressed.

In particular, the intercontinental EarthServer initiative will be discussed which, according to independent reviewers, is about to "significantly transform the way that scientists in different areas of Earth Science will be able to access and use data in a way that hitherto was not possible".

Ample room for question answering will allow to understand and assess current state and future directions of Big Geo Data standardization through direct interaction with the standards editor.

% The presenter is editor of the OGC coverage standards, the OGC timeseries coordinate systems, the OGC coordinate system resolver, and Principal Architect of the rasdaman array engine.