EVALUATING SENSOR OBSERVATION SERVICE IMPLEMENTATIONS

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Abstract

The Open Geospatial Consortium (OGC) Sensor Web Enablement initiative (Percival, et. al. 2006, and OGC, 2008) is showing signs of maturity. One such sign is the development of software implementations of given OGC standards. We are aware of four implementations of the Sensor Observation Service (SOS) specification. We consider this quartet of implementations in the context of three observation scenarios and assess for each implementation the software architecture, perceived ease and flexibility of deployment, completeness of implementation against the standard, and some preliminary benchmarks of performance. Since they are integral to a SOS, we also comment on O&M (Observations and Measurements) and SensorML implementation.

We discuss the relative advantages and disadvantages of each implementation and point to challenges we experienced in working with these various Sensor Observation Services.

The four Sensor Observation Services are as follows:

SOS Implementation Name	**Organisation**	**Website**
52North SOS	52north	http://www.52North.org
Deegree SOS	LatLon GMbH	http://www.deegree.org
PySOS	OOSTethys - combined Southeastern Universities Research Association (SURA) and Marine Metadata Initiative (MMI) project	http://www.oostethys.org
MapServer SOS	Open Source Geospatial Foundation/ University of Minnesota	http://mapserver.gis.umn.edu/

We deployed these services on Linux servers, against PostgreSQL/PostGIS databases containing live feeds of 1) weather variables from over 270 South African Weather Services automatic weather stations; 2) active fire observations from MODIS aboard Terra and Aqua for South Africa; and 3) acid mine drainage water quality data from six multi-sensor pods in the Krugersdorp Basin west of Johannesburg. These observation streams are used in live systems and represent non-trivial sensor applications. They each include multiple sensors and sensor platforms and millions of observations distributed over time and space. These observations reflect some of the different ways SOS implementations may need to be deployed into the field in response to different sensor modalities. We benchmark them using a SOS client under development as part of the Python OWSlib open source software library

initiative (http://gispython.org/).

We notice that each implentation varies with respect to implementation approach - key differences lie in degree of abstraction away from database systems, choice of programming language and approaches to the creation and processing of XML. Further, implementations vary in how rigidly a database structure is specified, with implications for flexibility. We note that the SOS implementations are reasonably simple to install and configure, but vary in the level of effort required to access and then provide sensor data at the requisite interfaces. The implementations are also shown to vary in completeness against the SOS standard, though this is shown to be less limiting than may be assumed, for the core requirements of our application scenarios could be met by each implementation. We also considered that some implementations had a perceived focus on a particular sensing requirement, e.g. in-situ, point based sampling.

References

Percival, G. and Reed, C., 2006. OGC Sensor Web Enablement Standards. Sensors & Transducers Journal, Vol. 71, Issue 9, September 2006, pp 698-706

Open Geospatial Consortium, 2008. http://www.opengeospatial.org/ogc/markets-technologies/swe, retrieved 01/12/2008