



Advancing A Services Oriented Architecture for Sharing Hydrologic Data

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The CUAHSI Hydrologic Information System (HIS) is an Internet-based system that supports sharing of hydrologic data. HIS is composed of three major components. HydroServer is a software stack for publishing time series of hydrologic observations on the Internet as well as spatial data using standards-based web feature, map, and coverage services. HydroCatalog is a centralized facility that catalogs the data contents of individual HydroServers and enables search across them. HydroDesktop is a client application that interacts with both HydroServer and HydroCatalog to discover, download, visualize, and analyze hydrologic observations published on one or more HydroServers. The HIS is founded upon an information model for observations at stationary points that supports its data services. Within HydroServer, the CUAHSI Observations Data Model (ODM) provides community defined semantics needed to allow sharing information from diverse data sources and is implemented as a relational database model for persistent data storage. The CUAHSI WaterOneFlow Web services have been designed to publish hydrologic data stored in an ODM database or other hydrologic data repository using standard Web service protocols and a standard data transmission markup language called WaterML. WaterML underlies machine to machine communication of hydrologic data. CUAHSI HIS WaterOneFlow Web services scale from centralized services supporting access to national datasets such as the United States Geological Survey's National Water Information System (NWIS) and the United States Environmental Protection Agency's Storage and Retrieval System (STORET), to distributed data services that allow individual researchers or organizations to establish their own HydroServer and publish their own data. Indeed, users wishing to share or publish their data through CUAHSI HIS may do so by establishing a HydroServer at their institution. WaterOneFlow Web services are registered with the central HydroCatalog, where their metadata are harvested and become searchable and accessible through centralized data discovery and access tools available there. A significant value of Web services derives from the capability to programmatically access the data that they publish from client software. HydroDesktop is an open source Geographic Information System client application that facilitates discovery of and access to hydrologic data from WaterOneFlow web services. This allows users to work with data from national and academic sources in a community defined format and using the same semantics, almost as though it was on their local disk. HydroDesktop also includes an extensible plug-in interface that enables developers to extend the data discovery, download, and visualization capabilities of HydroDesktop by coding specific data analysis, processing, or modeling functionality as a plug-in. Examples include a HydroR plug-in that has been developed to interface HydroDesktop with the R statistical computing environment and the HydroModeler plug-in, which extends the capabilities of HydroDesktop to include component-based modeling using OpenMI. This paper provides an overview of the technology and tools developed as part of the CUAHSI HIS to enable community sharing and publication of data.