A future Outlook: Web based Simulation of Hydrodynamic models

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ABSTRACT

Despite recent advances to present simulation results as 3D graphs or animation contours, the modeling user community still faces some shortcomings when trying to move around and analyze data. Typical problems include the lack of common platforms with standard vocabulary to exchange simulation results from different numerical models, insufficient descriptions about data (metadata), lack of robust search and retrieval tools for data, and difficulties to reuse simulation domain knowledge. This research demonstrates how to create a shared simulation domain in the WWW and run a number of models through multi-user interfaces. Firstly, meta-datasets have been developed to describe hydrodynamic model data based on geographic metadata standard (ISO 19115) that has been extended to satisfy the need of the hydrodynamic modeling community. The Extended Markup Language (XML) is used to publish this metadata by the Resource Description Framework (RDF). Specific domain ontology for Web Based Simulation (WBS) has been developed to explicitly define vocabulary for the knowledge based simulation system. Subsequently, this knowledge based system is converted into an object model using Meta Object Family (MOF). The knowledge based system acts as a Meta model for the object oriented system, which aids in reusing the domain knowledge. Specific simulation software has been developed based on the object oriented model. Finally, all model data is stored in an object relational database. Database back-ends help store, retrieve and query information efficiently. This research uses open source software and technology such as Java Servlet and JSP, Apache web server, Tomcat Servlet Engine, PostgresSQL databases, Protégé ontology editor, RDQL and RQL for querying RDF in semantic level, Jena Java API for RDF. Also, we use international standards such as the ISO 19115 metadata standard, and specifications such as XML, RDF, OWL, XMI, and UML. The final web based simulation product is deployed as Web Archive (WAR) files which is platform and OS independent and can be used by Windows, UNIX, or Linux. Keywords: Apache, ISO 19115, Java Servlet, Jena, JSP, Metadata, MOF, Linux, Ontology, OWL, PostgresSQL, Protégé, RDF, RDQL, RQL, Tomcat, UML, UNIX, Windows, WAR, XML