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SEMANTIC WEB TECHNOLOGIES IN UNIT-NET[1] INFRASTRUCTURE FOR ELECTRONIC DATA INTERCHANGE

Ermolayev, V. A.

Dept. of Information Technologies,

Zaporozhye State University,

66, Zhukovskogo st., 69063, Zaporozhye, Ukraine, tel/fax:+380 61 264 17 24,

E-mail: eva @zsu.zp.ua

Electronic Data Interchange (EDI) is the computer-to-computer exchange of highly structured business data between one application and another within a distributed organization or a community of legally autonomous organizations. In our case, the community is formed by the universities and state organizations of Ukraine. The most serious complication influencing the architecture and the implementation of a software Infrastructure for EDI (IEDI) is caused by the fact that the members of the community possess and process the information which is semantically heterogeneous. The tutorial will present the use of Semantic Web technologies which in their combination help to overcome the challenge of semantic heterogeneity in UnIT-Net project. UnIT-Net is the open network of Ukrainian Universities willing to disseminate their best practices in IT-based University Management and to provide their Information Resources (IRs) to other members for querying and further analysis.

The tutorial is structured around the IEDI Reference Architecture[2] and outline Semantic Web technologies used in its design and demonstration prototype implementation. More precisely, IEDI is the multi-layered distributed information system comprising the software servers, services, components and tools for providing intelligent ontology-driven information retrieval from distributed, heterogeneous, legally and physically autonomous IRs in the organizational framework of the National Higher Education System. The genre of the IEDI falls down to the distributed Intelligent Information Retrieval (I2R) domain within the broader area of Intelligent Information Integration (I3). The research activities within this domain have been intense in the past decade, especially within the Information Society Technologies Key Action Line of the EU FP5 and, recently, FP6 as well as under the umbrellas of similar national and international research frameworks.

The solutions for IEDI are not aimed to broaden the horizons of the current state of the art in I3 or, more specifically, in I2R. The task is to design the software prototype to demonstrate the feasibility of the ontology-driven approach to distributed I2R and, further on, to EDI between the Universities and the State Bodies at National level. Existing Semantic Web framed technologies used in IEDI are Web Ontology language (OWL), RDF Query Language (RDQL), Semantic Web enabled Web Services framework, and several tools: Protégé Ontology Editor (Stanford KSL), Ontology Negotiation Tool (under development in UnIT-Net). The concept and the architecture of IEDI use some novelties which, in their combination, distinguish IEDI from the predecessors. IEDI Ontologies are specified in W3C emerging de facto standard language OWL. Ontology-driven query formulation and transformation is used for query processing. The semantics of a structured IR (e.g., RDB) is formalized by means of a semi-structured Ontology Specification Language (OWL). Web Service technology is used for IR wrappers implementation.

The mainstream approach of IEDI is to exploit the hierarchy of ontologies as the means to overcome semantic heterogeneity between different IRs through the manually performed IR registration. Manual IR registration is a the merge and the alignment of the IR Ontology (IRO) to the IEDI Mediator Domain Ontology (MDO) performed in negotiation between respective ontology engineers. MDO is than used as the enabler for the automatic query processing. These queries are formulated by an IEDI user in the terms of MDO and are automatically decomposed and rooted to the wrappers of the registered IRs. Tutorial will demonstrate the functionalities of IEDI in IR registration and Query Processing scenarios by a walkthrough example.

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[1] **UnIT-Net**: IT in University Management Network. TEMPUS/TACIS MP JEP 23010-2003, http://www.unit-net.org.ua/.
[2] **Ermolayev, V., et al.**: The Infrastructure for Electronic Data Interchange. Reference Architecture Specification. Version 1.0. UNIT-NET Deliverable No D2.2.D.1. URL: http://www.compscipreprints.com/comp/Preprint/eva/20040228/1