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Chapter VIII

An Environment for Managing Enterprise Domain Ontology

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ABSTRACT

With the advent of the Internet and electronic commerce, future business services will be jointly offered by autonomous and collaborating units or software agents within or across company boundaries through negotiation and information exchange over a distributed data network. The key is to have collaborative information systems that help with access to information, support decision making and aid in task execution. Although the information systems may already exist to provide the necessary data, currently they often cannot inter-operate to support across boundary business services. Since these so-called legacy systems represent a considerable investment and maintenance overhead there is a need to adapt them to new business environments. This chapter proposes an ontology management environment, a methodology and a suite of tools to support legacy information system integration.

INTRODUCTION

Modern organisations have produced a plethora of often-isolated information systems. These systems have embodied essential company information, represented large investment and become quite reliable over the years. However, the power of those information assets has largely not been realised because of the high cost to integrate them. This situation is going to change for both commercial and technological reasons.

The modern global marketplace has become increasingly competitive. Large companies face severe competition from smaller, more agile companies offering a limited range of products to selected customers. To remain competitive, large enterprises must be able to continuously monitor market demand, quickly respond by providing products, services and information to local market needs, rapidly introduce new technologies and dynamically modify business methods. This calls for an organisation's ability to maximise the value it gains from its information assets throughout its operations by improving the quality of its decision making.

Technology advances in the fields such as the Internet and agents have paved the way to electronic commerce. Future business services would be jointly offered by autonomous and collaborating units or software agents within or across company boundaries through negotiation and information exchange over a distributed data network. The success of electronic commerce relies on dynamic and open-interoperable information systems. For example, in supply chains, manufacturers, distributors, and retailers collaborate to provide seamless end-to-end processes for customers. They need to exchange a variety of data and information including product descriptions, contracts, billing information, order status, resource profiles, complaints etc. This requires the underlying heterogeneous information systems to inter-operate across enterprises. As technology makes supply chains more dynamic (e.g. Web EDI) and commercial pressures increasingly reduce times-to-market, an infrastructure must be developed to support dynamic information exchange.

The existing information systems need to be brought into this new environment. On the one hand these so-called legacy systems represent a considerable investment, contain valuable information, and are mission critical to the day-to-day business operations. On the other hand, currently it is difficult to meaningfully exchange information they contain about products, services and customers when there is semantic heterogeneity between the information systems of different enterprises. For example, people in different places often use various terms to refer to the same or similar products. What is even worse is that the same term may be used to refer to different products. A machine-processable vocabulary with clear semantics must be defined. Only then will it be possible to dynamically find relevant data sources based on contents and to integrate them as need arises.

The semantics of diverse information sources are captured by their ontologies, i.e., the terms and the relationships between them. In tightly coupled applications, the intended meaning of a term is often implicit, thus relying on developer's mutual agreement. In an open environment mutual agreement is hard to come by if not impossible. Thus it is crucial for the vocabulary, which is used to describe the domain model, to be specified and maintained in such a way that other systems can process them with minimum human intervention. That is the task undertaken by ontology research that has now attracted attention from both academe and industry (Uschold and Gruninger, 1996).

To develop a machine process able ontology (vocabulary) is hard. The semantics of a term varies from one context to another. Ideally we need an approach that reduces the problem of knowing the contents and structure of many information resources to the problem of knowing the contents of domain specific ontologies, which a user familiar with the domain is likely to know or understand easily. We believe that ontology engineering would be a major effort of any future application