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**E-COMMERCE SOLUTIONS BASED ON THE EDI
STANDARD**

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MALL2000 is a project funded by the European Commission under the INCO Copernicus Program. The aim of the project is to design, develop and implement an Electronic Commerce environment, providing a set of business-to-business services, training and consultations to SMEs in Eastern and Western Europe.

The purpose of this paper is to present an e-commerce solution based on UN/EDI standards. Also we describe a technology for using classification schema to model the objects in a brokering process.

Overview of EDI (Electronic Data Interchange). The main aim of this overview is to give a general description of EDI, its perspectives and integration with the new technologies. We also want to show the practical use of system EDI in such new field like the e-commerce. EDI works by providing a collection of standard message formats and element dictionary in a simple way for businesses to exchange data via any electronic messaging service.

Today in the field of business there is a huge amount of paper documentation that is created. The idea of EDI [2] is to standardize these documents and to present them in form that is suitable for computer processing. The main feature that distinguishes EDI system from the other systems for electronic data exchange is that EDI is interdepartmental system for electronic exchange of documents and it uses strict standards for creation of electronic documents. Generally, a system for electronic data exchange is a system that is developed within the frame of one corporation or enterprise, where the exchange is implemented with RDBMS.

E-commerce. The E-commerce offers big possibilities to develop an existing business or to plan and organize a new one. The main idea of E-Commerce is to extend physical business transactions with electronic business transactions using the Internet. E-commerce is a means of enabling and supporting such changes on a global scale. It enables companies to be more efficient and flexible in their internal operations, to work more closely with their suppliers, and to be more responsive to the needs and expectations of their customers. It allows companies to select the best suppliers regardless of their geographical location and to sell to a global market.

E-commerce also provides a way for the merchant to connect his customers, vendors, suppliers and employees all over the world. He can enable his business or organization to reach an infinite number of customers over the Web, seeking out potential markets that were once outside the traditional boundaries of his business.

One special case of electronic commerce is electronic trading, in which a supplier provides goods or services to a customer in return for payment. A special case of electronic trading is electronic retailing, where the customer is an ordinary consumer rather than another company. However, while these special cases are of considerable economic importance, they are just particular examples of the more general case of any form of business operation or transaction conducted via electronic media.

Mall2000 – e-commerce solution based on UN/EDI. The West-East Trade web site implements an Electronic Commerce environment, which provides a set of business-to-business services, training and consultations to small and medium enterprises (SME) in Bulgaria, the Czech Republic and other CEE countries for business contacts with partners in the European Union. The Mall2000 system provides information base, tools and a set of core services allowing system administration and management.

There are different types of users of Mall2000. They can be classified into four main categories – Visitors, Subscribers, Advertisers and Providers. Different types of users are allowed to use different subsets of the services offered by the mall.

The core services of MALL2000 can be classified into the following general categories: Users and Products management, Search and Navigation, Brokering, E-commerce help, News and Newsletters, Document Handling Service, Education Service and Marketing Services

MALL2000 is a typical Web-based client/server (three-tier) application, where all the services are provided through the MALL2000 server(s), and all clients (subscribers) have access to them by using mainly the standard Web browser. The server part consists of three main modules (layers) – *Web interface* for the clients (*Web Server*), *Data base module (Data Base Server)* and *Common Gateway Interface Module (Common Service Organization – CSO*, in our case) which makes the connection between the Database Server and the Web Server (User's Interface).

The Brokering service. The most important feature for every e-commerce solution is the “Brokering”. The service that provides matching of classified into particular business areas requests and offers, realized by combination of human and automatic support.

The architecture we use for the Mall2000 system is based on so-called namespaces or ontologies. An ontology defines a hierarchically structured namespace of real-world concepts. With the help of an ontology we define that cherries are sub-concepts of fruits. Additional information about the known concepts is included to implement the appropriate language mappings to achieve multi-lingual description. This ontology approach is based on the standards UN/CEFACT, measurement unit systems, ISO, etc.

The UN through UN/CEFACT (Harmonized Commodity Description and Coding System for the Coding of Goods and Commodities – HS) [1] supports activities dedicated to improving the ability of business and trade organisations, from all economies, to exchange products and relevant services effectively. Its principal focus is to facilitate international transactions through the simplification and harmonisation of procedures and information flows.

The odds of the HS are that it is adopted by Customs administrations worldwide, provides accepted descriptions of products and groups of products for multipurpose nomenclature for transportable goods. HS is designed to allow further subdivisions beyond

the six-digit level and it is used by more than 170 countries and Customs or Economic Unions as the basis for Customs tariffs and trade statistics (over 98% of world trade).

Example HS coding example:

Section I ANIMALS & ANIMAL PRODUCTS

010000 LIVE ANIMAL

010100 LIVE HORSE, ASSES, MULE, HINNY

010200 LIVE BOVINE ANIMAL, COWS

010300 LIVE SWINE

010400 LIVE SHEEP, GOAT

010410 SHEEP, LIVE

...

020000 MEAT AND EDIBLE MEAT OFFAL

020001 MEAT COOLED

020100 MEAT OF BOVINE FRESH / CHILLED

The Brokering Example. To illustrate how this works in Mall2000 environment [3] we consider the brokering of offers/requests that heavily relies on the multi-lingual features present in the Mall.

Offers. Consider a Bulgarian farmer that is about to sell ten tons of cherries to Western Europe. He enters the mall and selects (Offers → Products → Agricultural → Fruits). This happens in his native language, of course. Based on the known sub-concepts of fruit ontology, a list of fruits is presented to the user, which allows her to select cherries. This list is presented in the Bulgarian language since for visual representation the Bulgarian language mapping is chosen. The form contains other information about the amount of fruit to sell (e.g., weight, the time-out of this offer, additional contact information such as location where this fruit is currently stored, etc.).

It is important to notice that this offer is represented in the database using the known concepts without any notion of the language the offer was specified in. Every information that was input using selections is directly transferred to the underlying concepts. Only unstructured information that cannot or does not need to be translated is stored without transformation.

Requests. Users that fill in request forms select these in a similar manner. It should be noted that requests are typically subsets or variants of the corresponding offers, since in most cases requests represent patterns offers must match. The concrete offer that matches a request may contain additional information that is not a subject to matching. In our example the information about the current location of the fruits may probably not be a subject to matching, because this would need a geographic matching capability which is not considered to be offered by the Mall. On the other hand it may be feasible in a request to specify a weight range that is of particular interest the offer must match.

Performing Matches. In the brokering engine matches are solely done on the basis of concepts as defined in the ontologies and namespaces. Cherries in an offer match cherries in a request. Additionally the specified constraints (such as minimum weight in a request) must be satisfied.

Beyond matching identical concepts cherries could equally well match fruits. This enables users to request super-concepts of offers as well. A basic requirement to enable

this matching is a careful definition of the concepts and the associated information that is to be supplied by offers and requests.

The General Role of the Ontology. Mall2000 uses its so-called *ontology* in order to model the information space in the business-to-business e-commerce problem domain of Mall2000. At the beginning the role of the ontology was seen merely in the implementation of the brokering service. As time went by, the initial idea of the ontology progressed through several stages of evolution and currently its purpose and role is more or less envisioned in the following areas:

- The ontology is used to **model real-world business entities** that are identified in the problem domain and are considered significant in the context of Mall2000. The most common example for such entities, are the different types of products and services that can be offered or requested in the brokering service. Listed below are some important points about the way entities are modeled in the ontology:

- Entities are classified into categories (e.g. products vs. services).
- Entities are modeled along with the relationships that exist among them (usually generalization relationships).
- Entities are described, in terms of the data that is considered significant and needs to be tracked.
- Entities are modeled in different languages and therefore the final model can be considered multi-lingual.

- In the brokering service the modeled product and service entities are **used as a basis for building models of offers and requests.**

- As a multi-lingual model, the ontology is used to implement **multi-lingual user interface for some Mall2000 services**, the most common example being the brokering service.

- The ontology enables **precise searching, filtering and match-making capabilities of the brokering service** to be implemented (Some of these features are not considered for implementation in the first prototype of the system).

- The ontology is used to model the **business types of subscribers**. This is achieved by associating companies with entities (concepts) in the ontology related to their business type. Usually, these are product and service concepts.

When we say “Mall2000 Ontology” we actually mean a set of separate ontologies, each of them being made up of a hierarchy of concepts, which, as already mentioned are multi-lingual models of real-world business entities. Currently, we designed two ontologies – one for products and one for services. The former models types of products that can be offered or requested in a business-to-business e-commerce environment. The latter, models types of services that can be offered or requested. Each product/service type is described using a concept in the corresponding ontology.

It is impossible to model all the possible entities in all areas of business. Therefore the Mall2000 ontologies are focused on particular business domains and market sectors.

So, in summary, we can say that the ontology approach provides common means for multi-lingual modeling of any real-world business entities that are considered significant for Mall2000. The natural use of this approach is in the brokering service.

REFERENCES

- [1] UN/CEFACT, RECOMMENDATION 30, Harmonized Commodity Description and Coding System for the coding of goods and commodities, 1999.
- [2] <http://www.unece.org/cefact/>, UN/EDI standard definition.
- [3] <http://we-trade.org>, Mall2000 Web site.

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РЕШЕНИЕ ЗА ЕЛЕКТРОННА ТЪРГОВИЯ БАЗИРАНО НА EDI СТАНДАРТ

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MALL2000 е проект финансиран от Европейската комисия под INCO Copernicus програмата. Целта на проекта е да се проектира, изгради и имплементира среда за електронна търговия, осигуряваща набор от “бизнес към бизнес” услуги, обучение и консултации за малки и средни предприятия в страните от Източна и Западна Европа.

Целта на тази статия е да представи решение за електронна търговия базирано на UN/EDI стандарт. Представена е технология за използване на класификационна схема за моделиране на обектите в брокеринг процес.