

## **B2B PLATFORM FOR EDUCATION CENTRE INTEGRATION**

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**Abstract:** As the volume of B2B (Business-to-Business) transactions done over the Internet steadily increases, pressure is put on the companies to adopt themselves to the new way of trading. Such a case can also be seen at educational institutions. We propose a specialized B2B platform for integration of educational centers – an educational marketplace. This platform tries to provide a media for integration of all educational information produced by not just universities, but also other institutions. For that reason, the platform maintains a global catalogue of course descriptions, academics and resources and also unified access point for the virtual digital libraries and course contents, with unified information delivery - anytime and anywhere.

**Keywords:** virtual university, digital libraries, marketplace, peer-to-peer, P2P.

### **1. Basic B2B**

The introduction of the “e” into the world of business led to the development of many new business and/or computer categories. E-Commerce, e-Business, e-procurement are only a few. Doing business in the electronic way is no more a fashionable thing, but a way to survive in today’s market economy. A special emphasis is given to the electronic commerce activities involving interactions between different vendors [1], known as Business-To-Business. These interactions include support for creation, negotiation and transaction of business processes between vendors [2]. However, these interactions hide many problems, such as acquiring and storing information, finding and filtering information, securing information, auditing access, cost management and financial instruments, and so on. Coping with them is the driving force for every B2B platform or specifications.

In the area of finding and filtering information, the biggest problem in the B2B interaction is the heterogeneity of the information. From the consumer point of

view, the best way to find information concerning products is to use language and terminology familiar to the specific product. On the other side, the diversity of vendors produces versatile terminology, even in the same product category.

There are two approaches toward solving this problem, one based on standardization and another based on integration.

Using standardization means agreeing upon common vocabularies and protocols by every participating partner. This requires active participation of every party engaged into the process and leads to highly improved communication. A well-established common protocol is the ICE (Information and Context Exchange) [3]. It manages and automates the establishment of syndication relationships, data transfer and results analysis. Several frameworks are also proposed, among them most important being:

- UN/SPSC (United Nations Standard Products and Service Codes) [4]
- RosettaNet [5]
- CBL (Common Business Library) [6]

Another approach toward resolving the heterogeneity is using integration. It is based on mappings between semantic components, which can be done through product schema integration, web sources integration and database integration. With the advent of XML (eXtensible Markup Language), the trend is to adopt tree-structured product schemas because DTDs (Document Type Definition) that define the structures of XML documents are tree-like structures. A very important feature of the integration is that it should be fully automatic, thus providing seamless transition towards integrated solutions.

The new technologies have an enormous influence on B2B technologies. The development of the e-Services is one of the technologies that bring the most to the B2B. This is due to its' well-defined interfaces and accessibility via a wide range of information appliances in a plug-and-play manner. Other technologies influencing the B2B are the peer-to-peer Internet platforms. They provide a simple example of how plug-and-play interoperability as well as self-organizing systems might be achieved in a decentralized setting.

It is projected that the most important role in the development of the B2B information interchange will be played by the emerging technologies. Technologies like ubiquitous and mobile computing, m-payment and m-commerce will bring a new light in the business world.

One technology that has shown itself as priceless to the B2B is web services technology. Web services are designed as interfaces that describe a collection of operations that are network accessible through standardized XML messag-

ing [**Error! Reference source not found.**]. Services themselves are described using WSDL (Web Service Description Language) [**Error! Reference source not found.**]. A special registry, named UDDI (Universal Discovery, Description and Integration) [**Error! Reference source not found.**] is designed to catalog service descriptions. The communication with the services is achieved through another protocol, SOAP (Simple Object Access Protocol) [**Error! Reference source not found.**].

## **2. B2B platform for Education Centre Integration**

In this paper, we try to map some of the previously mentioned B2B technologies, into the education market, through a B2B-like platform for integration of educational institutions. This platform ties to match supply and demand of courseware in the state-wide education industry, while providing a media for integration of all educational information produced by not just universities, but also other educational institutions (private and public, primary and secondary schools, evening lecture centers, etc.). The published information is used for maintaining a global catalogue of course descriptions and general info, academics and resources. Since libraries and teaching material stores are a crucial component in the work of each educational centre, unified access point for the virtual digital libraries and course contents is also maintained via this platform. The main reason to implement a standardized module structure and inter-module communication is unified information delivery - anytime and anywhere - based on the preferences of the user.

The web service technology will be the foundation of the proposed system. The education oriented web services will provide:

- Course information (course descriptions, content and announcements)
- Academics profile (teacher proficiency)
- Resource management information (availability of laboratories, classrooms, equipment)
- Library information
- Research and project management

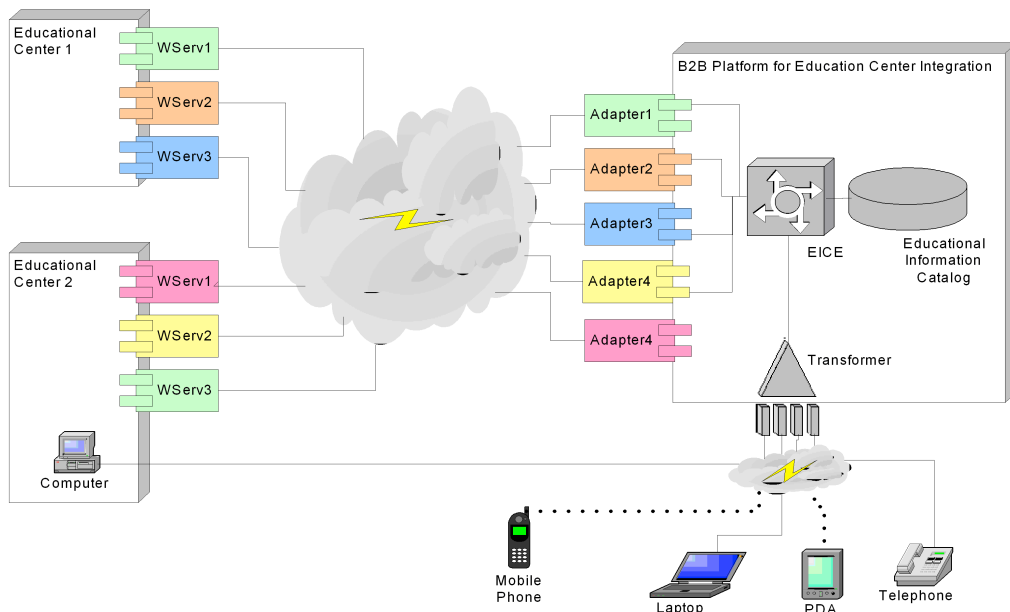


Figure 3: Schematic overview

As can be seen on the global schematic view of the system presented in Figure 1, this system consists of the following major components:

- Educational Information Catalog
- Educational Integration Central Engine (EICE)
- Integration adapters
- Transformers

The **Educational Information Catalog** will be organized as a standardized database of educational information, containing descriptions of the offered educational web services, such as courses and library information. It is important to stress that the actual content of the courses and library inventory will be held at the institutions offering them. This enables peer-to-peer access to various resources once they are found and addressed out from the information held in the catalog.

Important features of each record concerning courses in this catalog will be the course rating, reputation and endorsement. Recording of such parameters is done for establishing a simple method for quality assurance. For every course rating marks will be given. This will establish a network of comparable courses held at different institutions. These marks can be used to get a comparative

value for each of the institutions holding courses. Using learners' reviews or endorsements from other institutions one will be able to judge the reputation of each education center.

Main duty of the **Educational Integration Central Engine** (EICE) will be the maintenance of an UDDI registry of the offered educational web services. Having this information, it will provide search facilities, both on the registry and on the services themselves. The results can be used by the consumers to find the best courses and content available using the ratings from the catalog. It will also provide mechanism to connect and transfer information from the consumers to the services and vice versa. The information presented by the EICE will be in a standardized form, enabling consumers to manage their way in the education market.

The information catalog has to be filled for the first time. This is handled by the Educational Integration Central Engine when it receives a new web service registration request. Upon the occurrence of such request, the EICE gathers details on the type of service, authentication codes and if it has authorization, it will include the offered information inside the catalog.

The actual connections from the EICE through each individual service will be performed through **integration adapters**. They will pass parameters to the web services located at the education institutions and retrieve information from them. Once they retrieve this information, it will be adapt to the standard form recognizable by the EICE for storing in the catalog.

The consumers' connection to the EICE will be done through information **transformers**. Transformers use an automated routine to present application GUI in a client acceptable format and to accept, transform and forward user input to the EICE. The EICE client-view layer will be built around a XML-based GDL (GUI Description Language) which will enable transfer of information with the client in various recognizable formats.

### 3. Problems and future work

From our own experience, the major technical problem to deploy such a system will be the acceptance of common standards for the educational web services. Various institutions use different ways to present their courses, library info and resource plans. In order to be able to do that, most of these institutions have their own specialized, custom-built information systems and will be highly reluctant to introduce new processes in their existing organization of work. This system has to be transparent enough and well automated to ensure no extra deployment costs are incurred on the participants' side.

The further development of this system will see adopting new technologies (streaming media, Multimedia Messaging Services, etc.) to the system. This will be giving the users more possibilities to learn anytime and anywhere.

#### **4. Conclusion**

Nowadays, the education industry is more developed than ever. Thousands of institutions and companies offer various types of training sessions, courses, classes and lessons. Most of their appearance and quality is regulated by prospective laws of the countries involved but is still subject of internal decisions and mechanisms. This results in a sea of information on available courses, tracks, lecturers and teaching materials, each with their own specifics, positive or negative. While this is generally good and is competitively evolving, things can sometimes get rather confusing. Objective choice among institutions offering same or similar programmes and curriculum cannot be made. One is never able to find the learning materials one needs, instead is flooded with materials that are useless most of the time.

The B2B concept platform in education centre integration attempts to solve some of these problems by means already used with success in e-business. The completeness of success of this solution relies on several factors among which the most important one is the willingness of educational centres to participate in the project. Since the whole idea is most comparable to a statewide course information marketplace it should not be a real problem to convince educational institutions that opening to the market will serve them more benefits than staying out of it.

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