International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 2 Issue 3
March 2015

Business-to-Business Integration using XML

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Abstract—

The practical experience in using B2B integration illustrates the transformative power of business-to-business strategies and also highlights challenges for the future. The project helps the organization owners run their business in an organized manner. It helps the transactions of their data in their business in a smarter and safer way. This paper provides an overview of technical standards and discusses the lessons learned from the standardization efforts, in particular, the things that work and that doesn't. This paper also describes the effort to increase automation of B2B software integration, and aiming to reduce cost. The application aims at being interactive with the users of the application by providing features like conversion between any type of data into XML for easier communications between all the sub organizations, validating and uploading the converted files into any types of database.

1. Introduction

B2B Conversion hub is a tool that enables a common platform for communication between different business organizations or between the sub organizations to help them enhance their business quality and organize their transactions. B2B Conversion hub is a simple tool that converts the file types like .csv, .txt, .xls, .xlsx, .doc, .jpg, .jpeg, .pdf to XML for easier understanding of the data by any software used by the organizations and the same can be uploaded into the database.

Business-to-Business (B2B) integration technology refers to software systems that enable the communication of electronic business events between organizations across computer networks like the Internet or specialized networks. Business events carry business data as such and the sender's intent about what it expects the receiver to do. As business events are mission critical for the success of private, public, and government organizations, their reliable and dependable processing and transmission is paramount.

The concept of data integration between multiple data sources allows data to be exchanged and shared across enterprises. Despite classic Electronic Data Interchange (EDI), data exchange and proprietary text-based data integration scenarios, integration by the use of XML which is considered to have a high impact on future development for achieving B2B transactions.

Database technology is a platform technology that has proven to be reliable and dependable for the management of large sets of dynamic data across a huge variety of applications. In recent years, functionality beyond data management was added to database technology making it a feasible platform for business event processing in addition to data processing itself. New functionality like complex

data types, audit trails, message queuing, remote message transmission or publish/subscribe communication fulfills basic requirements for business event processing and are all relevant for B2B integration technology. This contribution investigates the use of database technology for business event processing between organizations. First, a high-level conceptual model for B2B integration is introduced that derives basic business event processing the requirements. A B2B integration system architecture outline is provided that defines the B2B integration system boundaries, before specific database functionality is discussed as implementation technology for business event processing.

B2B Integration technology provides the integration concepts and architecture that addresses the three forms of integration in a single set of integration concepts and in one single architecture.

Below figure shows an overview of B2B integration technology architecture on an abstract level. It shows that the number of connections required between backend application systems and trading partners is significantly reduced because one component deals with all required connectivity. All components that are specific to a backend application system or a B2B protocol are no longer necessary as separate components, since the B2B integration technology integration combines the functionality with its implementation.

B2B transactions are a significant form of today's commercial activity. The businesses or parties involved in such transactions are called trading partners. Business transactions have two major components: private processes and public processes. Both of these components may be automated

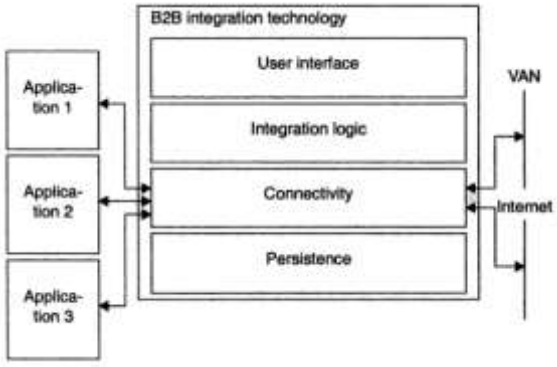

Fig 1. Architecture topology with B2B integration technology

1.1 B2B Transaction Components

.PRIVATE PROCESS AUTOMATION

Private process automation involves automating the trading partners' internal business processes, such as Enterprise Resource Planning (ERP) systems. Trading partners integrate software systems inside their enterprises in a myriad of ways. Because the systems and techniques for private business processes develop uniquely over time for each trading partner and has determined that standardizing this component of automation is not within its scope.

1.1.1 Public Process Automation

The public process is the part of the business process that is visible to both partners. Automating the public business process involves automating the sending and receiving of business documents between partners in a manner mutually agreed upon and understood. Because the trading partners share the business documents and business processes, standardizing the documents and processes facilitates a common understanding of the syntax and semantics of the business processes, which, in turn, facilitates automating the business processes efficiently. The goal of B2B is to establish standards to automate public

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www.ijetsr.com
ISSN 2394 – 3386
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processes and thereby make B2B transactions efficient and economical.

1.1.3 Transformation and Translation

In the general case where the data types of the B2B protocol and the backend application system are different, a more complex operator is necessary. A transformation definition contains a set of transformation rules that extract values of one event (source event) and insert those into the other event (target event). More complex transformations are required, like concatenating values or aggregation of values.

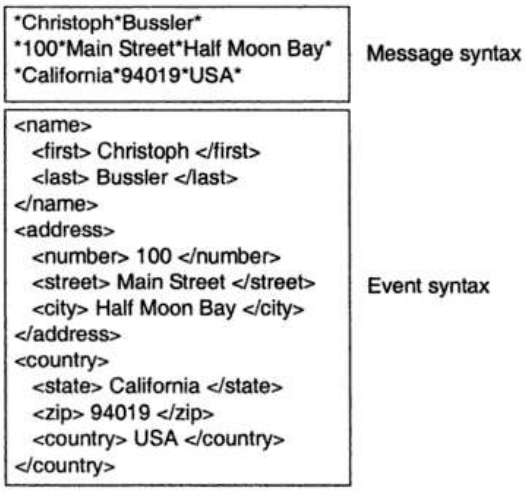

Fig 2. Translation example

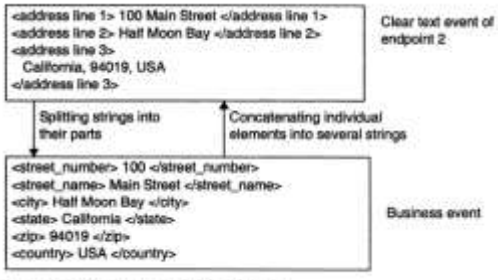

Fig. 2.11. Transformation example for endpoint 2

Transformation of data can happen at three stages: (a) after the business data is extracted and before it is stored in the intermediate storage; (b) after the data is retrieved from the intermediate storage and before it is inserted into the receiving backend application systems; (c) as a separate process that retrieves the data from the intermediate storage, transforms the data and stores the transformed data back in the intermediate storage. The extraction or insertion of data from and into backend application systems does not have to deal with data transformation itself. Below diagram shows the architectural topology of third case.

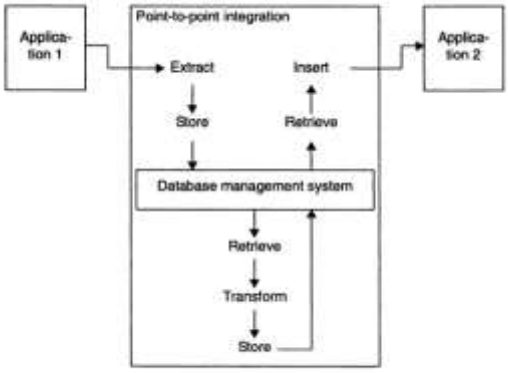

Fig. 1.2. Asynchronous point-to-point integration with a database system as intermediate storage

The below figure shows the architecture topology for several applications. It is very clear that two storages are required for each pair of backend application systems that need to be integrated. The specific integration steps like extract, insert and transform are omitted for clarity.

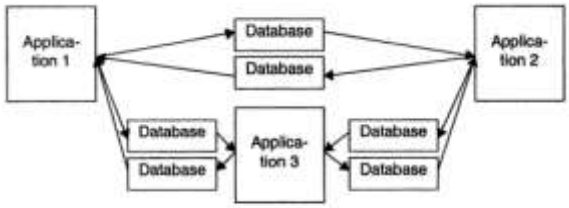

Fig. 1.3. Point-to-point integration of several back-end application systems based on database systems

1.2 Purpose of Paper

The data received from different organizations are in different formats and to integrate them together employees manually enter the data into their software system which helps them to manage all the productions of the product with a

complete overview of the status of the production.

After a detailed study of the existing system and the requirement analysis this proposed system will handle the following:

- A price-focused segment, which has a transactional outlook to doing business and does not seek any 'extras'. Companies in this segment are often small, working to low margins and regard the product/service in question as of low strategic importance to their business.
- A quality and brand-focused segment, which wants the best possible product and is prepared to pay for it. Companies in this segment often work to high margins, are medium-sized or large, and regard the product/service as of high strategic importance.
- A service-focused segment, which has high requirements in terms of product quality and range, but also in terms of aftersales, delivery, etc.
- A partnership-focused segment, usually consisting of key accounts, which seeks trust and reliability and regards the supplier as a strategic partner. Such companies tend to be large, operate on relatively high margins, and regard the product or service in question as strategically important.

B2B Data Exchange product family provides a comprehensive management and monitoring environment for aggregating, exchanging, and sharing data. It supports universal transformation for all data formats, including unstructured data, industry-standard data, XML, and a number of proprietary formats.

- Operate more efficiently and reduce costs
- Rapidly extract and utilize data from any file, document, or message
- Easily process any file format in an optimized, consistent way with Hadoop parsing.

With B2B Data Exchange product family, your company can increase and protect revenue streams with easy and more rapid onboarding of new customers and flexible adjustment to their expanding requirements, all while protecting and enhancing the integrity of your data for improved decision making and maximized operational performance. In the end, your company's business partners and regulatory agencies will have greater confidence in your company, improving its competitive position. Your company will be the preferred partner because your IT organization is ready to accommodate partners' varying requirements.

1.2.1 Convert different formats to one

As data is sent in different file formats it is difficult to collaborate and have a complete overview of all the data in one place and it will be a manual task to read the files and feed the data in the software application that is used to manage the overall production.

Our application can convert all the files formats received form the users into one format that can be read easily by the software system or upload it into a database directly. The uploading of converted xml file into the database depends on the user. The validation is performed by upload mapping which compares the actual file type data into the converted one.

1.2.2 Upload of data with validation into the system

Our Application can upload the files that are converted to XML into a database and validating the input data and ignoring unwanted data.

1.2.3 Tracking of data

The data that was sent or received is being logged into the application, It saves all the

before conversion and the XML file after conversion. It also tracks all the data that was uploaded into the database.

1.2.4 Add/remove/edit organizations

The Administration screen has options for adding new convertors, modifying database details and also deleting an existing organization from the application.

1.2.5 Audit

The Administration screen also provides features for looking into the conversion progress. The Administration has also the right to view log records that is being tracked throughout the application. This feature will be limited based on roles.

1.2.6 Dashboard

Administration can get an overview of the entire system here. Like the files uploaded, data validated. It will also provide an overview of the statistics of their data.

2. PROJECT SCOPE

The low cost of internet-based eCommerce increases the scope of B2B exchanges to touch all the firms irrespective of size, nature of business and relationship orientation.
B2B conversion hub can have major impact on inter-organizational business processes. Following the planning and design of the system business model and infrastructure, a careful plan of how to implement it, how to train employees and how to adapt business processes is the next step towards a successful project.

3. MODULE DESIGN

As B2B companies turn to increasing targeted communications with relevant messages and offers, the role that Analytics and Segmentation play becomes critical to campaign success. B2BMarketing.com has decades of experience in determining targeting and segmentation strategies by a number of methods, including an established analytic methodology.
Segmentation is the "head" of the marketing campaign planning process because once you know who you are talking to, the rest of the process becomes much easier to execute. In the Data Usage for Campaign Planning section of our services, there is a long treatment of our segmentation approaches, and we recommend you go there for more information.

B2B companies are attempting to improve lead generation, sales conversion and sales force effectiveness. For example, many B2B companies are now offering products, services and even service contracts through their websites. Hence, they quickly find themselves in the direct marketing business, with all of its inherent newness and complexity for traditional firms.

Even if they are not in the direct marketing business, B2B companies live in a bewildering multi-channel promotional world. Often, the complexity of the channel overlap is staggering. In such a world, measuring the effectiveness of your sales and marketing efforts is extremely difficult. Two modules are made use of in the integration process. They are Admin and User modules.
The Admin module is used to perform functions like adding a user, deleting entries or records, performing database and other related configurations, adding new conversion types apart from the existing ones.

User Module is a registered user profile which lets to perform operations like uploading the files to be converted, downloading the converted file which will be in XML format, viewing the history of file uploads for converting and downloading the same, configuring the database

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Table 1. Which of the following concepts for b2b integration are relevant for your Enterprise?

Integration Level	Small (1-49 employees)		Medium (50-249 employees)		Large (250+ employees)		Total		Correlation of enterprise size and integration level	
	N	Med	N	Med	N	Med	N	Med	r	p
Integration at the level of Enterprise Resource Planning (ERP) systems (e.g.: SAP iDoc)	19	5.0	13	2.0	25	1.0	57	3.0	-.428*	.000
Integration at the level of data (e.g.: XML, EDI)	18	3.5	10	1.5	27	1.0	55	2.0	-.355*	.003
Integration at the level of business processes (e.g.: Outsourcing of processes)	18	5.0	11	3.0	26	2.0	55	3.0	-.357*	.002
Integration by means of communicative technology (e.g.: RFID)	19	5.0	12	2.5	23	3.0	54	3.0	-.308*	.009
Integration through avoidance of media disruption (e.g.: electronic billing or delivery notes)	20	4.0	14	2.0	26	1.0	60	2.0	-.517*	.000
Integration at the level of the supply chain / supply network	19	5.0	14	2.0	26	2.5	59	3.0	-.292*	.009
Integration through business rules at organizational and operational level (e.g.: SAP business rules)	18	5.0	11	4.0	26	3.0	55	4.0	-.390*	.001
Integration through b2b integration software (e.g.: Microsoft BizTalk Server)	17	5.0	11	4.0	23	4.0	51	4.0	-.238	.051
Integration at the level of services (e.g.: Web Services)	19	4.0	13	2.0	26	2.0	58	3.0	-.309*	.006

N = Number of valid cases, Med = Median (scale: 1="highly relevant" to 5="not relevant"), r = Correlation coefficient (Kendall's tau-b), p = Significance level,
* Correlation is significant at the 0.01 level (2-tailed).

which the output XML file is to be uploaded, and performing the data validation and required data to be uploaded in the database. Upload mapping is used to validate the uploaded data with the converted form.

Function modules are intelligent modules that independently execute the technological tasks and thus reduce the load on the CPU. Functional modules define data types and operations on them by means of equational theories. The data types consist of elements that can be named by ground terms. Two ground terms denote the same element if and only if they belong to the same equivalence class as determined by the equations. The following are the functional modules in the project are CSV Converter, TXT Converter, XLS Converter, XLSX Converter, DOC Converter, JPEG Converter and PDF Converter.
The above mentioned converters are used in the project i.e., the files that are input by the user are accepted in the formats .csv, .txt, .xls, .xlsx, .doc, .jpeg, .pdf. Additional converters can be added based on the requirements of the user.

Uploaders are also used in the integration process to perform the activities such as Database configuration, Upload Maps and checking the Status of the uploaded files.

Database configuration can be performed by both Admin and users. Admin monitors and configures the databases of individual users. The users can maintain individual databases to store the data files that are to be converted and the converted file that are generated in XML format. Upload maps are used to perform the data validation and required data to be uploaded in the database. Upload mapping is used to validate the uploaded data with the converted form. Status stores the value whether the data has to be uploaded to the database or not.

4. SUCCESSES, CHALLENGES, AND THE ROAD AHEAD

B2B has achieved tremendous adoption of its standards in the high-tech manufacturing supply chain over the past three years with more than 30002 documented production implementations and a growth rate of approximately 500% from 2001 to 2003. The standard's broad acceptance in the marketplace is demonstrated by the growing number of B2B-based transactions being conducted, estimated at several billion in annual revenues. The following key decisions that B2B took early in its development have contributed to this widespread adoption:

• Focus on standardizing the public process. Get the business experts to define the business aspects of the business process, and ensure

implementation of the business process by obtaining commitment from the parties involved.

• Define and promote interoperability and conformance of messaging services.

• Create standards with global use in mind.

At this point it is obvious that b2b integration is not limited to the exchange of content by the use of communication standards. Although it may be possible that a basic integration solution between two partners only affects the data level, typically a company has to consider much more aspects when cooperating with others. Strategic plans and decisions have to be made that lead to strategic supply networks exchanging goods and relevant information. Organizational changes are necessary when integrating business processes inter-organizationally. To avoid media disruption, communicative and integrative technologies and services, which need to be supported by state-of-the-art IT, can be used. At the level of information systems, dedicated b2b middleware is available to integrate different data from various heterogeneous systems. Therefore, our proposed holistic approach for b2b integration considers the following six concepts to be crucial.

5. CONCLUSION

B2B has brought standardization of business processes to the XML-based business information exchange over the Internet. The original goal of this standardization has been to reduce cost while allowing disparate trading partners to conduct electronic commerce in a mutually understood way—both syntactically and semantically. It is continuing to further the goal of reducing the cost of implementation and execution of these business processes. As discussed in this paper, making the specification of the business processes more machine interpretable results in fewer manual hours spent in reading. Increased automation further reduces errors and related costs and is currently working on the challenges to making the execution of the business processes more efficient. The goal of making automated B2B integration affordable and accessible to large numbers of small and medium-sized businesses is being addressed by the definition of a services framework, and by standardizing even more aspects of B2B integration.

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