Implementing and Adopting ebXML formatting of Business Transaction in Bangladesh

By Sanjid Rahman

ID: 14341005

Supervisor

Dr. Mohammad Zahidur Rahman

Chairperson and Professor

Department of Computer Science and Engineering

Department of Computer Science & Engineering

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BRAC University, Dhaka, Bangladesh

Declaration

I do hereby declare that the thesis titled "Implementing and Adopting ebXML formatting of business transaction in Bangladesh" submitted to the Department of CSE of BRAC University in partial fulfillment of the Bachelor of Science in Computer Science and Engineering. This is my original work and was not submitted elsewhere for the award of any other degree or any other publication.

Date:

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Supervisor: Dr. Mohammad Zahidur Rahman

_____

Sanjid Rahman

Student ID: 14341005

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ABSTRACT

The objective of this study is to identify drivers that guide the development of business integration of any degree from small to medium to large corporations. While the electronic interaction has been dominated by EDI (Electronic Data Interchange), this paper describes a much more convenient and flexible technology, ebXML (Electronic Business eXtensible Markup Language). The problem of electronic business technology is approached by examining how ebXML adoption has evolved, what the benefits and costs of ebXML integration are, and what technologies should be used. The paper provides the best effort to implement the procedure of procurement in PHP in order to acknowledge the significance of the protocol as well as grow the motivation to contribute to the ebXML community. The study will also show the significance of standardization in business integration in a country like Bangladesh which has merely just stepped into the globally prospective industry of e-commerce. At first we identify, implement, incorporate and adopt ebXML integration through a viable and efficient tool and mechanism. After that, we examine the scope and possibilities of ebXML integration in Bangladesh

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CHAPTER ONE

INTRODUCTION

Business transactions are the exchanges between businesses and their clienteles with whom they do business. Transactions can be very simple, like buying a toy, or extremely complex, like taking a long time and involving many companies or agencies. New technologies and management approaches are developing around the organization of business transactions. For any business transaction to occur we need communication. Before the advent of electronic technology, this procedure has only been done in through verbal communication or using pen and papers. Overtime, when telephones and fax machines came into existence, the front-end communication started to happen more conveniently. This might have made the entire process simpler, but the human race pushed forward. Ever since the internet, technology started to improve drastically. Within a very short time frame, more advanced tools started to dominate the global industry. The modern processes not only made the front-end communication easier, but also the back-end implementation and storage automated. Any delay for transfer of information has since then been minimized. Due to the invention of advanced tool, it has been minimized to such an extent until no involvement of pen and papers were required. Even the request for a product did not have to leave the computer of the supplier. Nonetheless, it was still a very huge task since there were many sides to this level of communication. Due to this, there has been a need for a set of rules or protocols. These rules and protocols were needed to be the same as how it would be in a machine-less world. They also had to be absolutely accurate because otherwise, we get back to the same problem of updating information manually. For instance, if quotation for a transaction from a supplier is transferred electronically to the client but the client has to manually update information in an Excel file, the process is not very effective, let alone be efficient. The real challenge for electronic industry appeared to be to tackle the margin of error and human involvement in the process.

Despite all these challenges, the most successful automatic implementation of the entire business transactions has been built under the Electronic Data Interchange model (EDI). Ever since the late 1980's, through simple implementation of data processing, data communication and business protocols, EDI has been providing a fast and safe method of business communication. For a very long time this protocol has dominated the ecommerce industry. However, the coding involved in this mechanism proved to be very complex and difficult to apprehend while implementing. Even the mere process of locating information from an EDI code required a specialist. It is until later, that it was realized that a more inexpensive and easily transferable protocol could be implemented to make business transactions easier.

eXtensible Mark-up Language (XML) has drastically changed the way manipulation, transfer and storage of data is perceived. The clear and direct representation of data has left an impact in the business world as well. By the joint initiative of United Nations Centre for Trade Facilitation and Electronic Business (UNCEFACT) and Organization for Advancement of Structured Information Standards (OASIS), a much more flexible and easily understandable implementation of business protocol was brought to light; Electronic Business XML (ebXML).

Objective:

The objective of the thesis is to provide a
- Provide a background of existing principles and protocols of ebXML
- Establish the relevant tools for ebXML
- Provide a guideline and feasibility of implementation in Bangladesh

Thesis Outline:

- Provide a background of electronic business in section 2
- Compare and Contrast the existing technologies with ebXML in section 4
- Implementing with simple techniques in section 5
- Feasibility Study of ebXML in Bangladesh in section 5

CHAPTER TWO

BACKGROUND

E-commerce:

The definition of e-commerce is business conducted through the use of computers, telephones, fax machines, barcode readers, credit cards, automated teller machines (ATM) or other electronic appliances (whether or not using the internet) without the exchange of paper-based documents. It includes activities such as procurement, order entry, transaction processing, payment, authentication and non-repudiation, inventory control, order fulfillment, and customer support. When a buyer pays with a bank card swiped through a magnetic-stripe-reader, he or she is participating in e-commerce.[4]

2.1 Types of e-commerce:

- C2C – Customer to Customer (for example, eBay)
- B2C – Business to Customer (for example, retail services to customers)
- B2B – Business to Business (for example, wholesale services to retailer)
- G2G – Government to Government (for example, Inter-Ministry transactions)
- G2C- Government to Customer (for example, Income Tax)
- G2B- Government to Business (for example, Value Added Tax)

2.2 B2B – Business to Business (primary domain of concern):

B2B transactions are essentially trading between firms (and not necessarily confined to between businesses and consumers) are usually characterized by relatively large volumes, competitive and stable prices, fast delivery times and often on deferred payment basis. In simple terms wholesaling falls under the B2Bdomain and retailing falls under the

B2Cdomain. It is because of the uniform and repetitive transaction in B2B, a flexible, dynamic and plug and play application is very useful to tackle the redundancies.

2.3 Scenario of e-commerce in Bangladesh

Bangladesh, over the recent years has boomed drastically in the telecommunication industry. Even where proper infrastructure is not available, the technology of telecommunication has been able to penetrate. However, association of telecommunication with the commercial domain barely ever takes place let alone be automated. Nonetheless, though underrated, Ready Made Garments industries had to at least seek refuge to the shelter of the internet to arrange for buyers [8]. In fact, any wholesale company has been basking under the umbrella of internet for electronic communication. It is vital to recognize these facts because once the integration between producer and the seller is established, the rest of the process of transaction is very repetitive which is best implemented electronically. It is only recently that websites like bikroy.com has been introduced into the market for ease of C2C transactions.

Nevertheless, Bangladesh has proven itself to be promising when it comes to initiatives taken from the government. With the popular propaganda of "Digital Bangladesh" and the 'digitalization' of major government tasks like processing of National ID Card, manufacturing inexpensive laptops to reach out to the poverty-struck population,

CHAPTER THREE

LITERATURE REVIEW AND TECHNICAL OVERVIEW

Electronic business is certainly a solution. But is it true only at face values? Is it necessary to adopt it simply because it is "the-new-in-thing"? Should it be adopted whenever there is an opportunity for it?

Chiu [5]clarifies that although a lot of sectors can be electronically managed, it is only justifiable to give B2B the foremost priority, because repetitive transaction can be best facilitated automatically. In C2C or B2C transactions, the scenarios change for different transactions. That is where it is redundant not to use machines for automated computation, storage and transfer.

Carrasco [2] argues that although EDI is the most widely used business communication model used in the current status quo, it is still very complex and labor intensive. Mapping and reengineering to add a new partner into the private network. EDI works under a very technical and detailed syntactical protocol. The private network on which it runs involves very high transactional costs. It also requires dedicated services of infrastructure maintenance and training and retaining of programmers with sophisticated skills.

Eijk [1] asserts that (potential) users of ebXML are in eBusiness, eGovernment or eHealth integration. Despite the high fund allocated for EDI by its relevant corporations, given such prospect, ebXML will be able to survive and dominate in the long run on principle basis itself.

While, in the context of Bangladesh, Afroza[8]argues that despite millions of businesses all across Bangladesh poor infrastructure and high maintenance cost inhibits growth in the B2C e-commerce in Bangladesh. It is easy to identify, hence, that B2B transaction is largely prevalent. I choose to deduce from there that also due to the low installation and maintenance cost of ebXML, it is practical and justifiable to implement ebXML in all sectors of the nation.

3.2 Prospect in Bangladesh

Feasibility

Although not very well established yet, e-commerce is a trending concept in Bangladesh. Cellular networks and smart phones penetrating every nook and corner of the nation is the most valid evidence that the general population has accepted internet to facilitate their lives. Moreover, there are numerous small and medium organizations (private, governmental, non-governmental) that greatly contributes to the economic sector of the country. Given the principles of ebXML, Bangladesh is one of the most optimum environments for ebXML to operate in. Since political interference of the EDI industry has not yet reached the heart of Bangladesh, it can be conclusively deduced that with proper implementation of the ebXML protocol, (especially the repository) it is not far from now that ebXML will be the business solution for a lot of Bangladeshi organizations with only decent computer and an internet connection.

Necessity

With the slogan of "Digital Bangladesh" in the heart, the nation of Bangladesh would be a niche for the inexpensive implementation of ebXML. With more and more multinational companies entering and dominating the economic opportunities of Bangladesh, implementation of a self-reliant business solution would be able to overcome this in the short run. In addition, more importantly, since the concept of ebXML and its flexible nature is also transferable to G2G, G2C and G2B interactions, this will largely reduce the bureaucratic red-tape prevailing in Bangladesh. With an automated monetary system for contract based jobs from the government as well as for the transfer of documents in the intra-department and inter-department communication of the Government of Bangladesh, the entire process will not only be more efficient and effective but also certainly be more transparent and credible.

3.3 Electronic Data Interchange

The most dominating Standard of Business Communication in the current status quo has been EDI/EDIFACT (Electronic Data Interchange) which implements business processes.
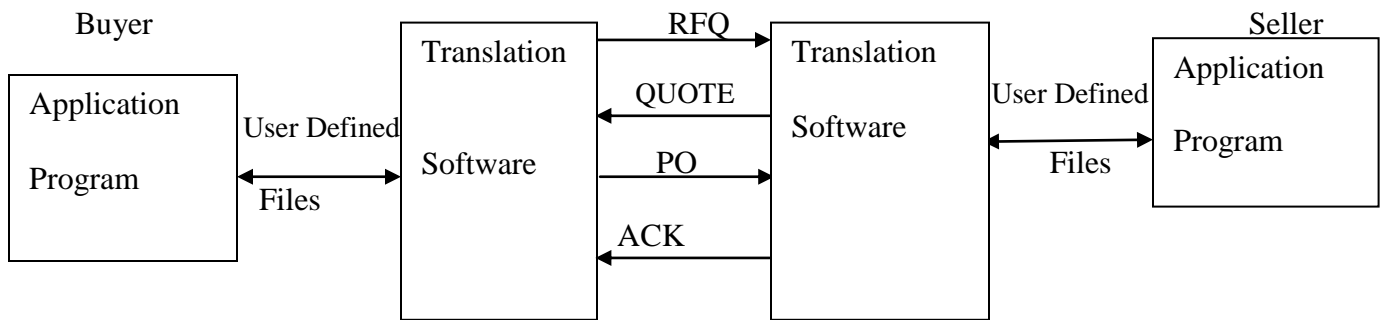
```
Buyer                                    RFQ                              Seller
┌──────────────┐          ┌──────────────┐──────→┌──────────────┐   ┌──────────────┐
│ Application  │ User Defined│ Translation │       │ Translation │ User Defined│ Application │
│              │←──────────→│             │←QUOTE─│             │←───────────→│             │
│ Program      │   Files    │  Software   │  PO   │  Software   │    Files    │  Program    │
│              │            │             │──────→│             │             │             │
└──────────────┘            │             │←─ACK─ │             │   └──────────────┘
                            └──────────────┘       └──────────────┘
```

Figure (3a): Data Processing and EDI

Data processing is one of the core tools which is required to implement EDI. It allows the EDI operation to gather information that is occupant in a user application and transforms that data into a format which is recognizable to all other user applications that shares the same interest in using the data. In the EDI environment, data processing handles both incoming and outgoing data, as illustrated in the above figure. The user defined files are files which are produced by a business application. These files need to be translated into X12 format. The translation software that maps the elements of a user defined file into the ANSI x12 or EDIFACT format. While translation is the implementation of mapping the actual transfer of information is involved in the:

-RFQ: Request for Quotation
-Quote: Quotation
-PO: Purchase order
-ACK: Acknowledgement

The transfer of documents must involve, but not necessarily confined to those mentioned above.

This virtual mode of communication allows efficient transmission of data, automated data entry, validation and compliance which is a very lengthy process in and around itself. Since EDI started off by providing platform to exchange these simple documents likes purchase orders and invoices electronically mainly to eliminate manual data entry errors, the introduction of willing smaller sponsored enterprises in the internet-business community required an evolution of the process. The process needed to be more intelligent to incorporate the myriad of small companies since EDI is strictly bi-lateral.

Nonetheless, this does not make the EDI protocol obsolete. The investment already made is too high to ignore and the benefits for the big companies and enterprises in terms of reduced transactional costs, reaction time, high level of security. The contribution of EDI for implementation of a business transaction model needs to be kept intact.

3.4 Shift towards ebXML

The Electronic Business eXtensible Markup Language ebXML can be defined as a set of business oriented specifications implemented with the ease of representation of the XML that together enable a modular framework. It is not mutually exclusive of EDI. It uses the basic communication principles of EDI to implement the actual transaction process. It still follows the strict standard rules and protocols that have been intrinsically established by the EDI protocol. However, the representation of data in XML is much simpler, understandable and conveniently transferable. The involvement of XML in business communications reduces time-frame for implementation. Furthermore, since coding in ebXML is far more straightforward than EDI, it does not even require specialists to produce, manipulate and store processes in the XML syntax. Carrasco [2] rectifies that XML being a protocol that enables a cost effective real-time info exchange for all parties involved, it clearly differentiates XML from the traditional EDI and other legacy solutions, where information movement between companies is predominantly through batch transfers (to optimize huge transactional costs).Moreover, it adds the processes from a deeper root.

ebXML set of specifications includes the following enable electronic trading relationships between business partners and integrate new technologies: [5]

1. Communicate data in common terms (Core Components Technical Specification)
2. Register and provide eBusiness artifacts and services (ebXML Registry Services and Registry Information Model)
3. Configure technical contract between business partners (Collaboration Protocol Profile and Agreements)
4. Provide secure and reliable transport (ebXML Messaging Service)
5. Enable business processes (ebXML Business Process Specification Schema)
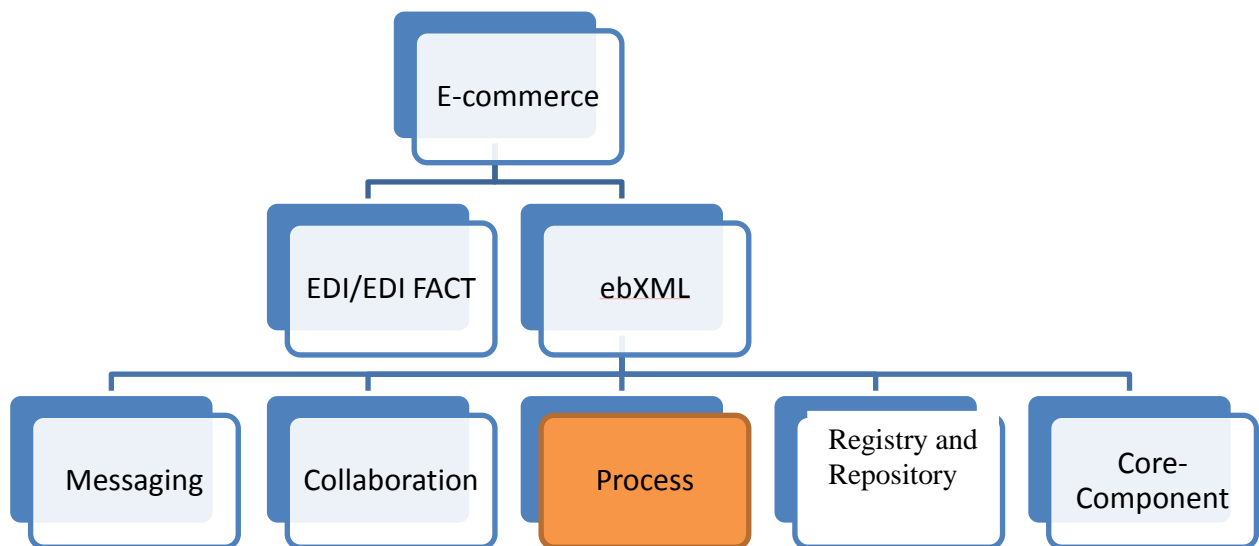
Figure: (3b): ebXML step and contribution made in this thesis (in orange)

CHAPTER FOUR

METHODOLOGY AND WORKFLOW

4.1 The processes

1. The query returns the set of process required to register to the ebXML system

2. The Local System is built conforming to step 1

3. The Local System is made global by uploading back to the ebXML registry

4. Companies already registered look up other registered companies as per need

5. The transacting companies must then agree on Terms and Conditions

6. Only then is can business transaction take place
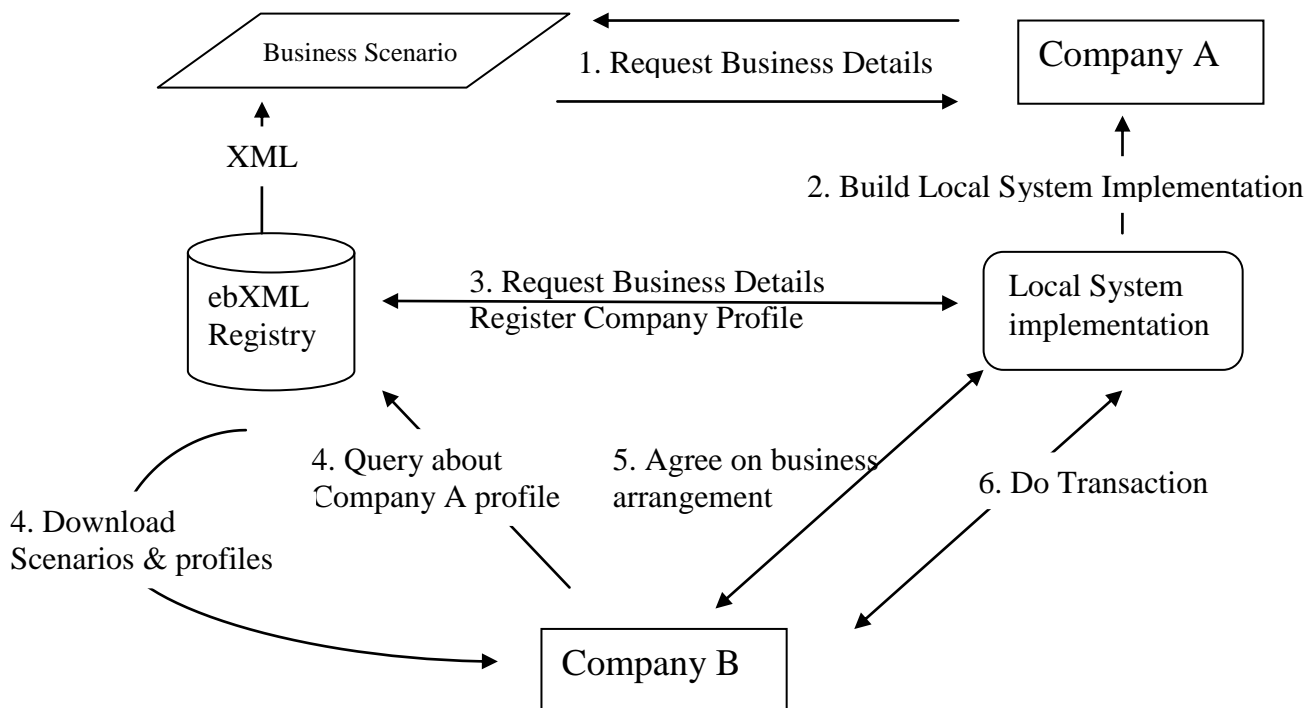
Figure: (4a): ebXML scenario

4.2 Problem we seem to overcome using the ebXMLmodel

Billions of dollars have been invested on an EDI platform currently in use by major players within the industry and the general market. Today, there is a significant availability of EDI solutions for small businesses, but the high transactional volume criteria persist. These EDI solutions for small businesses are done through the integration of SMEs (Small-to mid-size enterprises) into private networks. In some cases, big companies are willing to pay their smaller partner's connection and maintenance costs to reap the benefits of EDI. This way they can leverage their existing investment in EDI, streamline communications and cut transactional costs.

Carrasco [2] clarifies that one of the big benefits of XML in e-commerce is that it is going to level the playing field and let smaller companies, that don't have EDI, communicate with larger companies. A good path to follow will be to use the new XML technology combined with the EDI business knowledge acquired along the years to reach small/midsize markets with a more flexible and yet somehow, proven technology and at the same time still benefit from the existing EDI networks and partnerships. A gap exists between EDI and XML, but it can be bridged with the use of efficient translation software that allows bi-directional XML/EDI conversion. It is only after this intermediary, ebXML can replace and prevail completely.

CHAPTER FIVE

SYSTEM MODEL AND IMPLEMENTATION

The diagram below shows the breakdown of the classes involved in an ebXML business transaction. The two companies here company 1 and company 2 each have their own attributes. The ebXML registry is the connecting class that helps them find each other from the requests sent by each. When two companies agree on the terms and conditions they can begin transactions on their own. The transaction class helps them with this feature along with the product class.
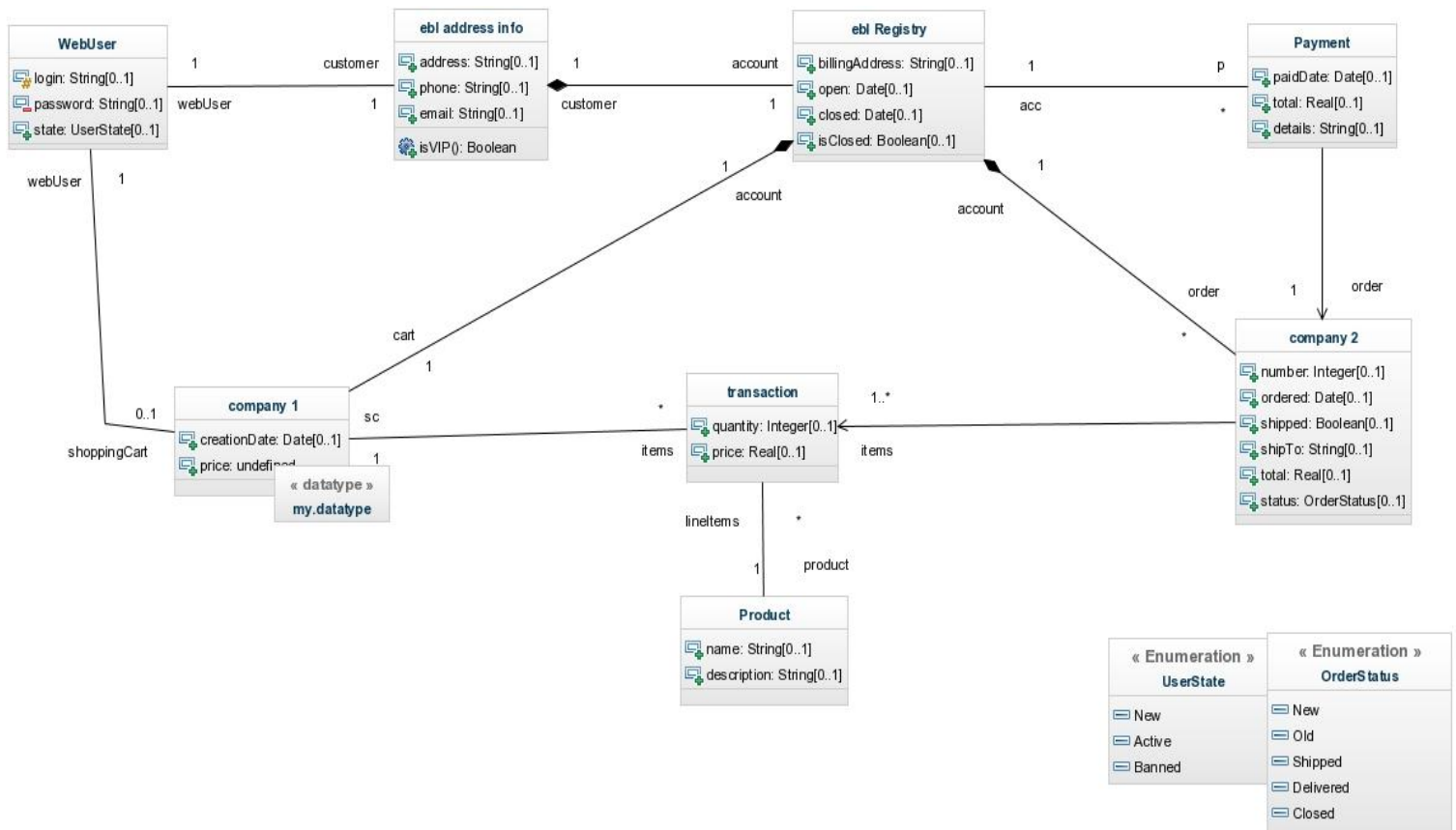
Figure (5a): ebXML Class Diagram

This diagram below shows the breakdown of the sequence of messages involved in an ebXML business transaction that passes objects for this use case over time. Here company 1 conveys the message and gets registered in the ebXMLregistry.It then returns a value shown with the dashed line to the ebl repository. When the company gets registered it then sends out implementation detail to the actor in this case the company 1.Then company 1 performs findProduct method call and if it matches with the company's product it sends out the company name and replies to the company 1 with the preferred company's product information.
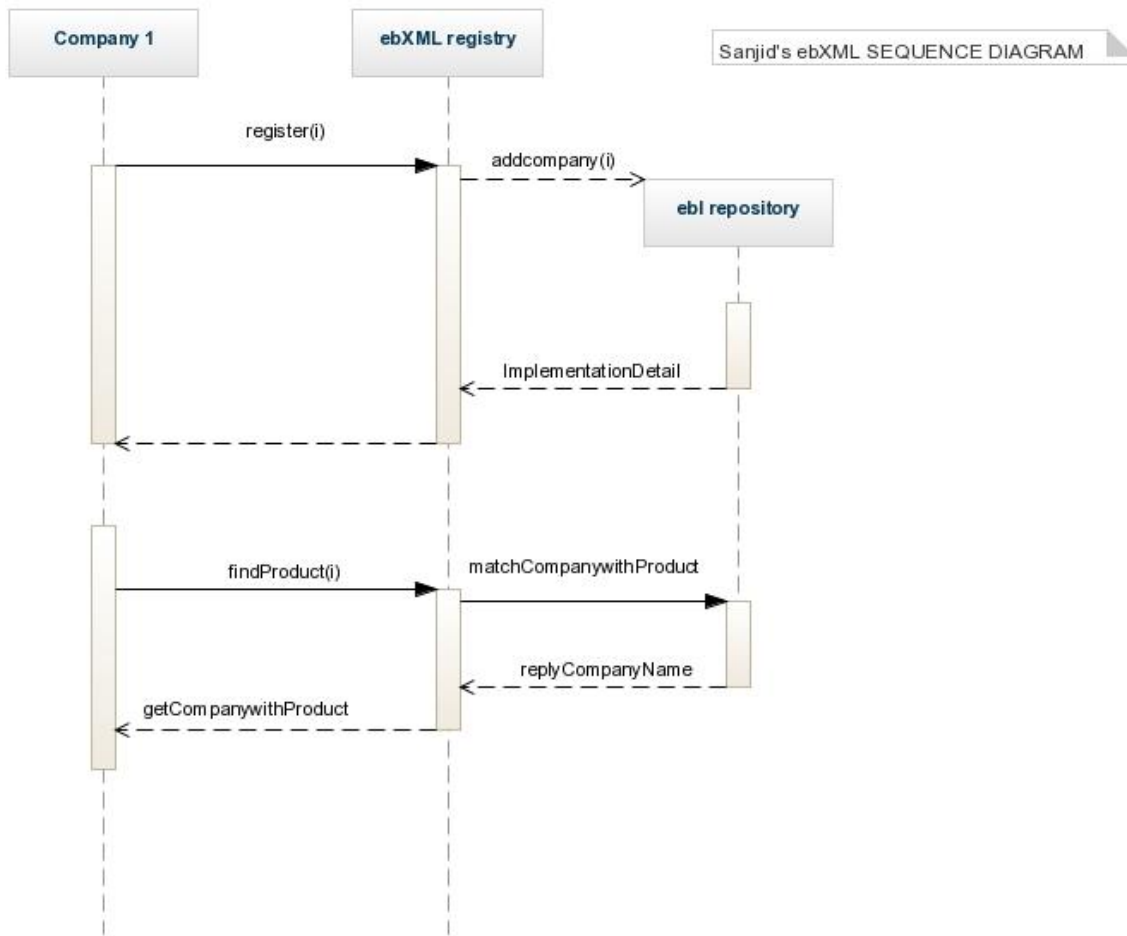
Figure (5b): ebXML Sequence Diagram

The below mentioned diagram illustrates the user's interaction with the system and depicting the specifications of the ebXML business transaction. There are 3 actors in here the user interaction occurs in the following manner. Firstly the company 1 registers its company. Both the companies have an include relationship with the ebXML registry which performs a major piece of system functionality which are processing of company details and return values of matching profiles.

After getting implementation details, company 2 can now search products using the search function which includes search by product and search by company and returns the preferred values.
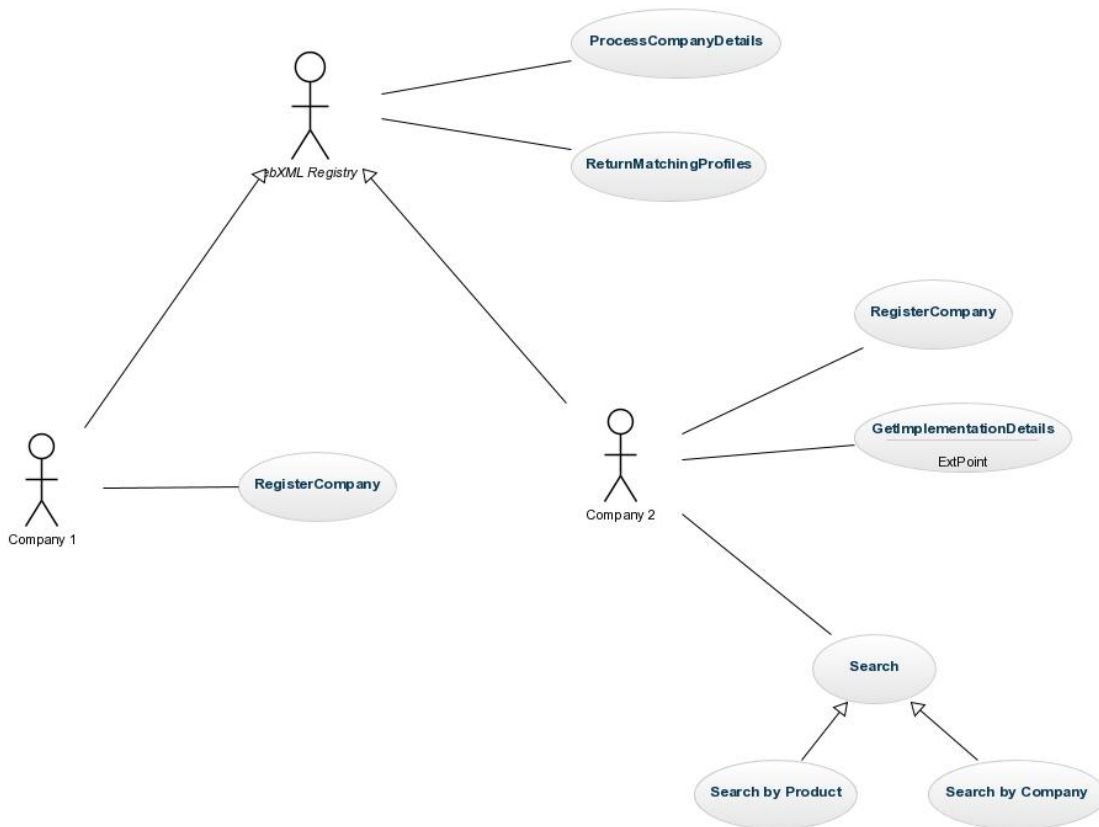
Figure (5c): ebXML Use Case Diagram

5.2 Implementation

The four most important documents associated with business transaction has been implemented the under ebXML model; request, quotation, purchase order and invoice. This is step 6 of the Figure (5.1) in topic 5.1. This sensible description of data, with the correct applications can be made available in any platform. In this paper, PHP: Hypertext Protocol is used.
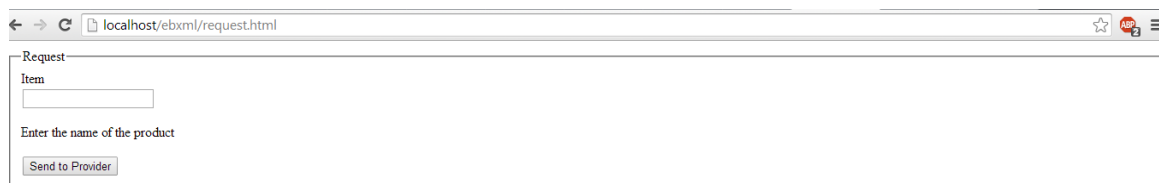
ANALYSIS

Figure 5.2(a), 5.2 (b), 5.2 (c), 5.2 (d) shows code of the forms necessary during the communication between the transacting entities.

All these forms implements "POST" methods (an example for "Request" form is given in Appendix B which are supposed to deliver the information to the XML document in Appendix A for each transaction that takes place. For each successful transaction between two companies, a new child node, <Transaction> is completed within the <Transactions> node. The working principle of this procedure is described below:

Figure 5.2 (a): Request

The figure shows the request sent from the buyer to the seller for one or a specific set of products.
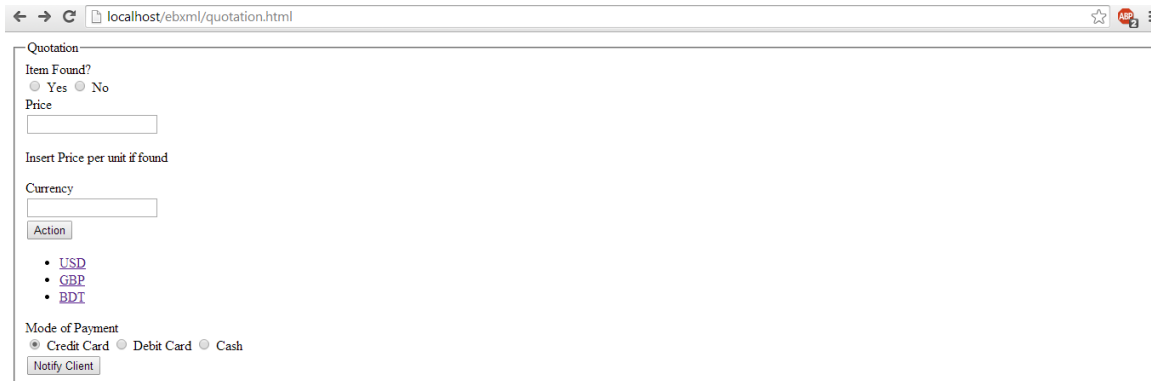
Figure 5.2 (b): Quotation

If available, the seller sends the relevant and necessary information strictly confined within the ebXML system back to the buyer. Such information include: price per unit, currency of payment, mode of payment.
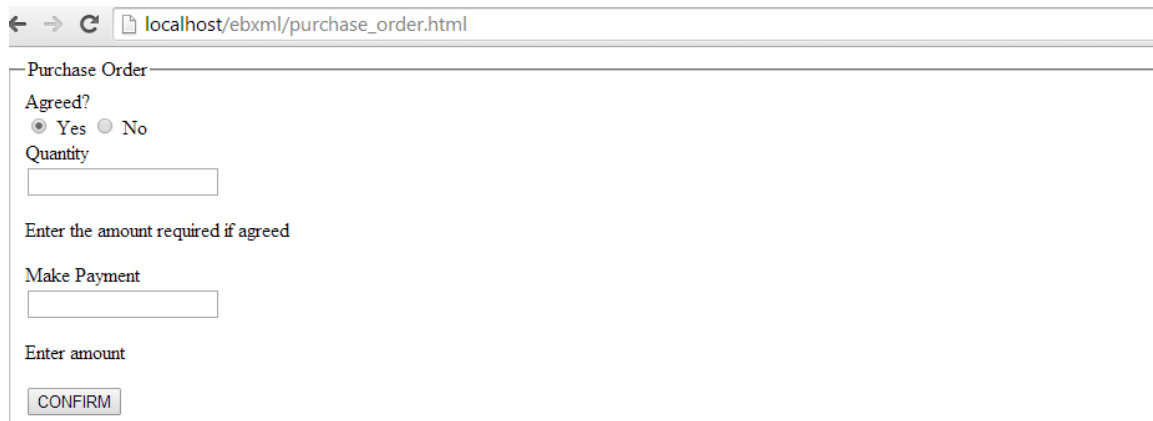
Figure 5.2 (c): Purchase Order

If the conditions are amiable to the buyer, he/she places an order for the asked products. A more specific information, however, is to provide the number of units which is then used to calculate the bill that will follow. If situation is as such, the buyer may be also wish to or may be required to make payment by now (in full or in advance).
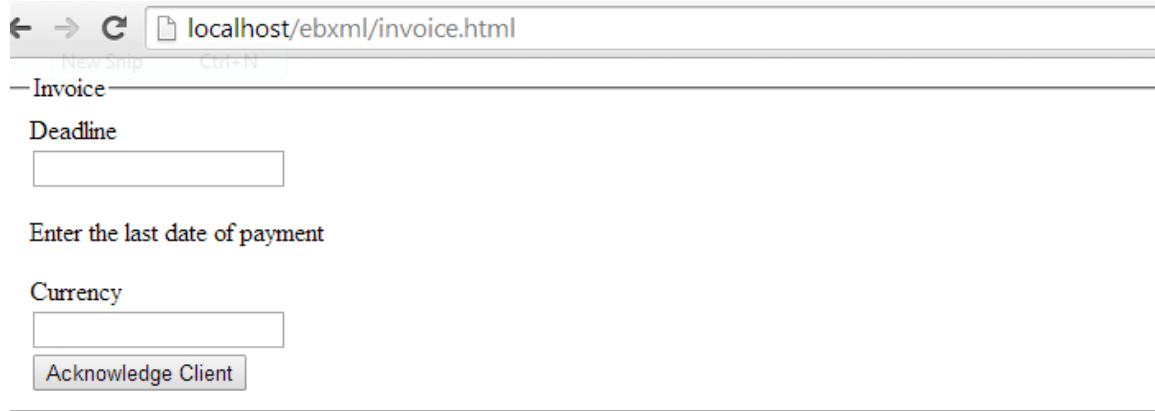
Figure 5.2 (d): Invoice

The seller acknowledges the buyer's confirmation to purchase the product and provides information such as the last date of final payment.
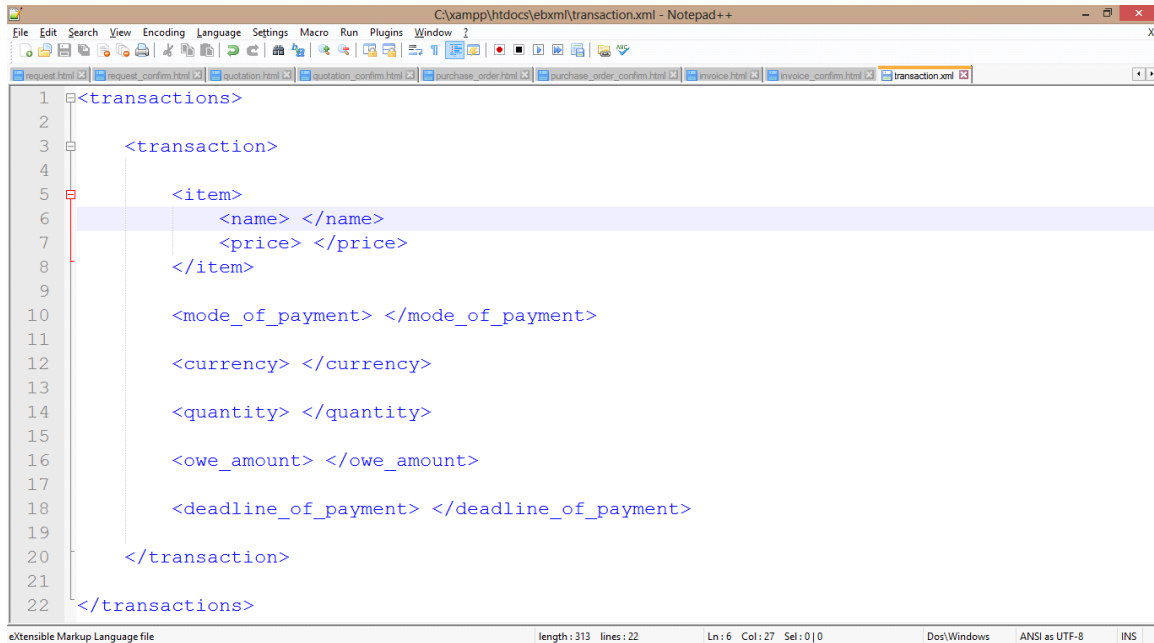

The fact that these forms can be implemented with such ease shows how the knowledge of ebXML is conveniently transferable across any platform. And this is how the concept and the working principle of ebXML complements EDI but yet, is still distinctly ahead of it. Experts involved with ebXML say that the technology is valuable because it provides the only globally developed open XML-based standard built on a rich heritage of electronic business experience. It enables parties to complement and extend current EC/EDI investment and expand electronic business to new and existing partners, while facilitating the convergence of current and emerging XML efforts. [6]

Figure 5.2 (e): Transaction:

Any other language and this figure would have appeared very sophisticated. This figure clarifies that ebXML is simple, especially in back-end. The figure shows the entire process of the business transaction in layman terms. Such structural convenience is uniquely in-built in the ebXML technology.

Although the PHP implementation produces results, and the resulting XML document can be transferred for communication and transaction, all the protocols of ebXML altogether would be better implemented by a more matured language.

CHAPTER SIX

FUTURE WORK

A simple PHP implementation would not allow us to go large-scale with the ebXML approach. The

6.1 Tool to be used

The framework: AXIS

Axis stands for, it's Apache EXtensible Interaction System - a fancy way of implying it's a very configurable SOAP engine.

Axis is essentially a SOAP engine -- a framework for constructing SOAP processors such as clients, servers, gateways, etc. The current version of Axis is written in Java.

Axis is the most appropriate software for the implementation of ebXML because:

a. it is a framework for JAVA programming which comprises of the relevant libraries

b. it implements Simple Object Access Protocol which can parse XML documents on the way out and also on the way in so new functions are not necessary.

CONCLUSION

With regard to organizational factors, larger companies and companies with higher skills are not the only ones that adopt e-business functions although they are more willing than their small and medium counterparts. What makes matters worse is that, the dominating nature of the large companies, inhibit the "intrusion" of new penetrations. If necessary, these large companies are even willing to pay substantial amount to daunting small companies just to ensure that they remain in the vicious cycle of obsolete EDI. With some effort in the short run, however, the adoption of ebxml and its proper implementation, enterprises of any size will be capable of utilizing the e-business paradigm due to its platform independence and plug and play functions. The idea is to study such prospects in detail to seek to eliminate largely prevalent bureaucratic red-tape in the current status quo. The impact is largely becoming pervasive in Bangladesh as well. It is not wishful thinking because; it already falls under the tide of the "Digital" mentality the nation is looking forward to attain.

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APPENDICES

<div align="center">

Appendix A

</div>

```xml
<?xml version='1.0'?>
<transaction>

        <item>
                <name> Antibody </name>
                <price></price>
        </item>

        <mode_of_payment></mode_of_payment>

        <currency></currency>

        <quantity></quantity>

        <owe_amount></owe_amount>

        <deadline_of_payment></deadline_of_payment>

</transaction>
```

```php
<html>

<head>

<title> Thank You </title>

<?php

if (isset($_POST) &&isset($_POST["textinput"])) {

        $product = $_POST["textinput"];

        echo $product;

}

echo 'java';

//$doc = xmldocfile("transaction.xml");

//$transaction = simplexml_load_file('transaction.xml');

$doc = new DOMDocument();

$doc = load('transaction.xml');

$transaction = $doc->root();

$item = $transaction[0]->children();

echo $name[0]->content;

?>

</head>

<body>
```

<p>Your input has been registered </br></br>

Please await response

</br></br> Thank You</p>

</body>

</html>