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Introduction

B2B Commerce has caught the attention of the IT industry in recent times. It has become the darling of the IT industry because of the huge volume of transactions that are expected to take place in this sector. According to Gartner Group, the total value of B2B transactions exceeded $145 billion in 1999 and it is expected to top $7 trillion by 2004. This amounts to a sustained growth rate of over 120%. Obviously, such high growth will open a lot of opportunities for a wide variety of players in the IT industry starting from product vendors to solution consultants to system integrators to outsourced development shops.

This paper will delve further into one specific aspect of B2B commerce known as B2B Integration. The needs, challenges, solutions and vendor products in this area will be discussed with the goal of identifying how Aptech Limited can capitalize on the new opportunities that are emerging in this area.

Background

B2B Commerce by its very definition implies the conduct of business transactions between two businesses. This is as opposed to B2C in which a Business conducts a business transaction with its Customer. The following table summarizes how B2B and B2C e-commerce differ in fundamental ways.

<table>
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<td>Person to System: Consumer uses browser to connect to a web server hosted by the business.</td>
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Collaborative forecasting
Promotions management
Returns management
Work-in-process tracking
Design collaboration

| Agreement Models | One-sided: The business defines and controls the relationship with the Customer | Peer-to-Peer: Mutual agreement is established and changes are coordinated through both businesses. |

It can be seen from the above table that

- System-to-System interactions are an essential aspect of B2B
- B2B relationships are diverse in content and can be complex
- Reaching agreement among partners is crucial for B2B

In today’s ever-changing scenario businesses are coming under increasing pressure to react and adapt to changing market realities. Hence businesses are depending increasingly more on strategic relations with their partners and suppliers to create value chains that will provide a competitive edge in the market. However, in order to ensure a seamless, consistent customer experience, it requires real-time automation of business processes that span across trading partners. Traditional ways of doing business, such as email, faxes and voice mail introduce delays and require data to be reentered into systems multiple times. Hence, the need for dynamic business-to-business integration, which can automate business processes that encompass a diverse range of packaged, and legacy applications and systems within the corporation and among partners.

**B2B Focus areas**

B2B Commerce typically has its focus in one of these three areas:

- Supply Chain solutions: This is the most common focus for B2B e-commerce. The manufacturing industry in particular shows a great propensity for dealing with a supply chain. The members of these supply chain are organized into tiers some of which are up to 8 levels deep. Tier 1 suppliers generally supply completely assembled components such as engine blocks, transmission systems, tires, etc. to the Manufacturer. Other members who are lower in the supply chain supply sub-components to their higher-level partner in the chain. The lowest member in the chain manufacture components that cannot be assembled such as nuts bolts, pipes, etc. Typical interaction among the members of this supply chain include collaborative planning and forecasting, design collaboration, coordinated manufacturing and coordinated distribution. This kind of supply chain interaction may also be undertaken
by different business units of large enterprises, especially in the case where they have come together through a merger and acquisition process.

- B2C e-commerce backend solutions: A B2C site invariably has the need to interact with other businesses for various purposes such as order fulfillment, catalog updates, pricing, inventory and shipping information. If the B2C site happens to be a aggregator then the problem only worsens since in this case it will have to deal with multiple business entities of the same type. The problem of integrating business processes in this case grows geometrically.

- NetMarket solutions: Marketplaces are generally industry-focused sites that offer a common meeting ground for buyers and sellers. They coordinate interactions among a community of independent organizations for the benefit of their members. They employ mechanisms such as cataloging, auctions and reverse auctions to enable sellers to maximize sales and buyers to minimize procurement costs. These marketplaces therefore have the need to manage and execute various relationships with their vendors including catalog and pricing information, order management, shipping coordination, etc.

Significant differences exist within each one of these sectors depending on industry. Even the differences between competitors in the same industry can be significant. However, the need to link together independent organizations and various information systems is common to all the three areas. The set of technologies that compose this infrastructure have come to be known as B2B Integration (B2Bi).

**What is B2Bi**

Businesses have interacted with each other for the purpose of conducting transactions using EDI for a long time now. However, despite its maturity, the cost of implementing EDI remains out of bounds for more than 80% of all businesses. Small and Medium sized business are therefore taking particular note of B2Bi and the question that naturally arises then is ‘What exactly is B2Bi’? Industry veterans react differently to this question depending on their background.

- B2Bi is EDI

- B2Bi is about agreeing on standard datasets using X12, EDIFACT or XML and then exchanging the data over Value added Networks or over the Internet.

- B2Bi is Application Integration outside of the Enterprise.

- B2Bi is about using middleware and distributed objects across enterprises and hence across firewalls.
• B2Bi is about putting a web front end to your internal applications for the benefit of suppliers, customers and partners.

Each of these responses is correct under certain circumstances. However, B2Bi faces a great number of challenges that are enumerated in the next section.

**Challenges**

Since each business in a B2Bi scenario will manage its own set of applications and users, building applications that span across these organizations is challenging for the following reasons:

**Communication Security and Reliability**

Security is a paramount concern for B2B transactions especially since these are ducted over the Internet. The potential threat of unwanted eavesdropping on business critical information is a scary proposition for most businesses. Hence any B2Bi solution must address security as one of the most important issues before it can gain acceptance in the enterprise. Reliability of the communication link is also a prime concern since a dead link over an extended period of time may amount to insurmountable losses. Even though the Internet is a public network with multi-routing capabilities, the weakest link is the organization’s won connection to the Internet. Therefore B2Bi solutions essentially have to plan for redundancy in this regard.

**Business process heterogeneity**

Different businesses do things differently. The purchasing process in one organization may just involve a single purchasing officer while in another it may involve multiple personnel with a defined workflow between them. Reaching agreement on how to model these processes is therefore a challenging task. B2Bi solutions must respect organizational autonomy in this regard.

**System heterogeneity**

The internal systems that enterprises use for managing their business are inherently different. These range from ERP systems such as SAP and Baan to mainframe based legacy systems to document management systems and web based intranet applications. The technologies in use also vary from message-oriented middleware systems, groupware systems and distributed object systems based on COM, CORBA or J2EE. B2Bi solutions have to integrate with these disparate systems but cannot be tied closely to any one of them.
Data/Information heterogeneity

Different businesses use different data representations for the same piece of information. Therefore a purchase order may look different in one organization versus another. Bridging the syntactic and semantic gaps requires a mixture of transformation capabilities and neutral information representations.

Dynamic Business and Technology Environment

Businesses by their very nature are dynamic. They have to change their focus as a reaction to the changing market conditions. This may also result in a change to their business processes and systems. Inter-organizational agreements are also subject to ongoing change. B2Bi solutions have to address the issue of managing change even though it is a very complex undertaking.

Solution Components

In light of the above challenges, it is clear that any B2Bi solution will have to be secure, reliable, flexible, based on open standards and be able to accommodate change. The four elements common to most B2Bi solutions are:

External Communications

Establishing secure communication channels with business partners is a key component of a B2Bi solution. The two most important aspects of this communication channel are:

Modes of Interaction

The following modes of interaction span the B2B spectrum:

Web based: In this approach a representative of one business uses a web browser to interact with a web server application hosted by the other business.

Data Exchange: This includes EDI over VANS, FTP, email and XML over HTTP.

Direct application Integration: This includes the use of message-oriented middleware for exchanging information. It requires both the organizations to commit to setting up identical infrastructure.

Shared processes: This includes agreement on processes that act on multiple, interdependent sets of messages. Tow companies, for instance, could agree on an order-
management process that specifies how acknowledgements are handled, exception paths for order changes and back orders, and other logic specific to the relationship.

While each of the above modes of interaction have individual merit, the choice of any one of them will depend on the degree of synchronization that the approach enables and the level of independence that it provides. The fitment of the above approaches base on the above two criteria is shown in the chart below.

**Method of Agreement**

The need to establish and manage agreements among participating organizations is one of the most troubling aspects of B2Bi solutions. The need to reach agreement on the use of standards is obvious. These include communication standards such as TCP/IP, DNS, HTTP, etc, Security standards such as S/MIME, SSL, X.509, etc, Document format standards such as RosettaNet, cXML, ebXML, etc and distributed object standards such as COM, CORBA and J2EE. The agreement on standards is only part of the story however. There are situations where the use of standards is either not feasible (not ratified yet?) or not desirable (loss of competitive advantage?). In such cases the individual parties have to formulate their own agreements. Such agreements should cover the following points at a minimum:

- Common data definitions
- Process coordination
- The Scope – National, International, etc.
- Mix of pre-existing standards based agreements and other ad-hoc agreements.
Internal Communications

The internal applications of a business represent the primary sources and destinations for information exchange with partner organizations. These internal applications are typically accessed through the use of APIs. There are five classes of APIs that have emerged over the years. B2Bi solutions have to be flexible enough to use any available API.

Function Call APIs

These are exposed function calls with specific input and output formats generally provided as linkable libraries or remotely invocable calls. Examples include SAP’s Remote Function Calls and JD Edwards’s OneWorld API.

SQL

These are data manipulation languages that can be used for communicating directly with an applications database or central data store.

Messaging APIs

These are interfaces in which one imports and exports files to and from the target system. Examples include SAP’s IDOC/ALE, PeopleSoft’s MessageAgent and IBM MQSeries.

Object APIs

These are component interfaces that are based on the CORBA, COM/DCOM or J2EE standards.

Emulation

This is a technique for programmatically interfacing with an application via its user interface. The technical term for this approach is called ‘screen scraping’. It is a tedious approach and is reserved only for ‘closed’ applications.

Process and Information Coordination

This refers to the ability of B2Bi solutions to manage the sequenced and synchronized movement of information both internally and externally. It is also known as process orchestration. Various approaches are available to enable orchestration including transaction processing, workflow, rules engines, publish/subscribe technologies and custom programming.

System and Information Management

Any B2Bi solution will be composed of various software and hardware components. It will also involve several information components such as partner profiles, data and
process definitions, communications and security settings and user information. B2Bi solutions will have to address all of these issues in a comprehensive manner. Change management is also a key issue for B2Bi solutions since change is an essential component in any multi organizational scenario.

Vendors and Products


BEA Weblogic Collaborate

BEA Weblogic Collaborate is an open standards based B2B platform for the rapid creation, management and integration of online trading exchanges, supply chain management and collaborative commerce initiatives. It is built on the industry leading BEA Weblogic server and is J2EE compliant. It provides the following benefits:

Create e-markets and integrated supply chains quickly, leveraging a powerful and intuitive Java process engine, and industry standards such as J2EE and Extensible Markup Language (XML).

Define and deploy complex collaborations using BEA’s innovative Conversation Management and distributed Business Process Management architecture.

Develop and deploy with confidence using proven BEA security, scalability, reliability, and management features necessary for supporting real-world B2B transactions.

Protect your investment with an open, flexible, and component-based architecture that allows businesses of any size or IT infrastructure to benefit from B2B collaboration.

Harness the power of the industry-leading BEA WebLogic Server, the technology responsible for driving many of today’s most sophisticated e-commerce applications.

Integrate your enterprise from end-to-end with BEA’s comprehensive portfolio of infrastructure and integration products and partnerships.

Support your e-business initiatives 24x7 with BEA enterprise-level services, technical support, global presence, and proven stability.
**IBM Websphere B2B Integrator**

IBM WebSphere™ B2B Integrator enables the seamless connection of enterprise computing systems with those of customers, suppliers, business partners and marketplaces. This software combines technologies from IBM's extensive catalog of integration and transaction software and is based on open XML technology and the award-winning WebSphere software platform for e-business, including the MQSeries family. Some key features include:

- A single solution for all B2B needs, making it easy to get started and scale later.
- Provides a comprehensive, business-process-oriented, B2B application solution, which addresses both private and public processes.
- Offers built-in features for communications, security, configuration and process traceability, which allow for intelligent data transformation, simple data exchange, content-based routing and sophisticated shared process management.
- Provides for the easy integration of multiple partners in multiple time zones, with multiple IT infrastructures, communication channels and security protocols into one B2B solution using a variety of industry-standard open data exchange protocols, such as RosettaNet, OBI and cXML.
- Exploits both message-oriented and object-oriented component interaction models to effectively address the complex requirements arising from integration of business processes and applications within and outside an enterprise.

**Microsoft Biztalk Server 2000**

BizTalk Server 2000 provides the infrastructure and tools required for building successful e-commerce communities. The core of BizTalk Server offers business document routing, transformation, and tracking infrastructure that is rules-based. It has the following features:

**Quickly Orchestrate Business Processes**
Design and build dynamic, distributed business processes with this visual tool. BizTalk Orchestration Designer brings together business analysts, information technology (IT) professionals, and developers in a common design environment.

**Rapidly Generate XML Schemas**
It's easy to create and edit Extensible Markup Language (XML) document schemas with BizTalk Editor.

**Easily Transform XML Documents**
Easily transform one schema into another with BizTalk Mapper—generating World Wide Web Consortium (W3C)-standard Extensible Stylesheet Language Transformations (XSLT) files for transforming documents.
Quickly Establish Trading Relationships
BizTalk Messaging Manager automates the process of setting up trading profiles and agreements to exchange business documents with applications and trading partners over the Internet. This management technology is based on a graphical user interface (UI), and is non-programmatic and easy to use.

Extensive XML Support
All BizTalk Server 2000 document exchange is done in W3C-standard XML. All document transformation is done in W3C-standard XSLT.

Support for Multiple Transports and Protocols
BizTalk Server 2000 supports Electronic data interchange (EDI)—ANSI X12 and UN EDIFACT, Hypertext Transfer Protocol (HTTP), HTTPS, Simple Mail Transfer Protocol (SMTP) and Networked File Shares.

BizTalk Framework 2.0
The first open industry framework for reliable document exchange and routing, BizTalk Framework version 2.0 is compliant with Simple Object Access Protocol (SOAP) version 1.1 and provides exactly-once delivery of documents.

Open Binding Architecture
The open binding adapter architecture allows any developer or independent software vendor (ISV) to build adapters that allow their products to be accessed from BizTalk Server.

Security
BizTalk Server 2000 enables secure communications with trading partners over the Web. It uses Microsoft Windows® 2000 security features including full support for public-key infrastructure, digital signatures, and encryption. It offers support for Secure/Multipurpose Internet Mail Extensions (S/MIME) versions 1.0, 2.0, and 3.0, plus a pluggable architecture for third-party security products.

Document Delivery
Enabled by BizTalk Framework 2.0, BizTalk Server 2000 sends, receives, and queues messages with exactly-once semantics. It supports synchronous and asynchronous interaction.

Scalability
You can cluster BizTalk-based servers as needed to meet demand. The BizTalk Administration Tool handles the clustering and replication of servers.

Robust Document Tracking and Analysis
BizTalk Server 2000 offers easy tracking of documents that pass through the system, which is useful for pinpointing and fixing messaging problems. It integrates with Microsoft SQL Server™ 7.0 online analytical processing (OLAP) tools to perform analysis.
**TIBCO ActiveExchange**

The TIBCO ActiveExchange line of e-business infrastructure products enables secure and real-time commerce transactions directly with other enterprises and through B2B commerce intermediaries. It is made up of the following components:

- **TIB/BusinessConnect™** interconnects systems and processes directly with that of partners, customers and vendors. A special RosettaNet-compliant version of BusinessConnect is available.

- **TIB/BusinessPartner™** is an application that can be distributed to partners, customers and vendors that don't have B2B commerce systems-enabling them to conduct e-commerce as well.

- **TIB/PartnerExpress™** is a browser-accessible application that lets trading partners exchange XML or non-XML business documents or update catalog information. This lets partners more easily participate in the supply chain or marketplace initiatives of the host, which in turn lets that host rapidly increase the size of their trading networks.

**Offerings**

Hexaware has repositioned its offerings to meet the needs of the B2Bi space. We have built alliance relationships with leading B2Bi vendors such as BEA, IBM, Microsoft, Oracle and TIBCO. Alliances with other key vendors are in the process of being built. Partnerships with these key vendors enables Aptech to be in the forefront of knowledge as far as offerings from these vendors are concerned. Aptech is therefore in a position to offer consulting and implementation services in the area of B2Bi.

**Consulting Services**

As part of our consulting methodology we can ‘study’ the current situation, identify processes that can be integrated and formulate a e-business strategy. Thereafter we can design a solution for the customer based on the offerings of our partners. If necessary, we can also develop a pilot implementation that will serve as a proof of concept. The pilot implementation, if accepted by the Customer, may then be followed by a full and complete implementation using our implementation services.

**Implementation Services**

As part of our implementation services, we can undertake the development and deployment of B2Bi solutions for our Customers. Our solutions will be based on the
offerings from our alliance vendors all of whom are leading vendors in the B2Bi space. The requirements analysis phase of our implementation services will help the customer understand how a vendor’s solution can fit into their environment. It will also identify areas of custom development especially in regard to interfacing with internal host systems. Our implementation service is specialized on three fronts:

**Closed Process Integration**

Closed process integration focuses on B2Bi solutions using the products from our alliance portfolio. The two important aspects of this approach include document translation and Business process orchestration. This approach is suitable for medium to high complex integration requirements involving data translation, workflow, business process integration and the use of relevant standards.

**Open Process Integration**

Open process integration is suitable for small integration needs, which are low in complexity. It involves the building of standards based web services and deploying them on the web site. The pertinent standards in this regard include Simple Object Access Protocol (SOAP), ebXML, UDDI (Universal Description, Discovery and Integration) and its associated standard WSDL (Web Services Description language). These web services will expose key business processes of low complexity on the web site itself, which will be accessible to partners, customers and suppliers through the use of SOAP. The web services will be built using Microsoft Dot Net and Sun ONE frameworks.

**Outsourced offshore development**

This service is targeted towards e-commerce Integrators (ECIs). These are system integrators in the US and other countries that have entered the B2Bi space and have a need to outsource some of the development work offshore. Aptech can undertake development work in the B2Bi space from these ECIs on contractual basis and deliver the same through the use of our state-of-art offshore development facilities in Mumbai and Bangalore.

**Positioning**

Aptech’s services in the B2Bi space can be positioned to three kinds of customers:

1. Customers that are seeking supply chain integration solutions, i.e. automotive player such as Bajaj Auto, Ford India, Hyundai motors, etc.
2. B2C sites that are need backend B2B integration services for fulfillment such as fabmart.com.

3. Digital markets and exchanges that need to integrate with new partners or suppliers such as ITNation.com.

4. ECIs in the US and other countries for outsourcing their development.

Conclusion

B2B e-commerce represents a rich set of activities that are more diverse and complex than their B2C counter-parts. Key aspects of B2B include a greater focus on system-to-system interactions (as opposed to person-to-system) and the need to establish and manage information-sharing agreements.

B2B e-commerce solutions address problems such as supply chain integration, backend fulfillment for B2C e-commerce solutions, and NetMarket Maker solutions. These solutions can be further specialized to correspond to the vertical industries that deploy them.

Aptech has positioned itself to be leading provider of solutions and services in the B2Bi space by building alliance relationships with leading vendors in this area.

References

1. White paper on B2B Integration for the New Economy – Active Software
3. Web sites of the various vendors mentioned in this document.