

B2C and B2B Process Nature Influence in Their Exception Appearance

DOVILĖ VOJEVODINA, GENADIJUS KULVIETIS

Information Technologies Department
Vilnius Gediminas Technical University
Saulėtekio 11, Vilnius, LT-10223
LITHUANIA

<http://www.vgtu.lt>

Abstract: - E-business technologies are getting one of the most important tools competing in the market and seeking success and innovations in business. Any business results are getting dependent on the results they gain from their e-business. That makes any company to decide which type of e-business relationship (B2C or B2B) to choose to support with their client. This also depends on the business strategy of this company. Using e-business technologies companies expect quick and qualitative contact with clients. Still, the quality of this solution depends on many aspects, but the main is application reliability, timely information and fast result delivery. The medium for these applications is Internet and it is not always reliable through all the engagement process. This paper is dedicated to the nature of B2C and B2B e-business application exceptions and their distinctions in handling them in a user friendly way.

Key-Words: - Business process, Workflow, Exceptions, Exception handling, B2B, B2C.

1 Introduction

The main purpose of any e-business is to bring together clients/partners and companies/suppliers into one medium with a vision to improve business relationships and performance. The main instrument in any business is timely and qualitative information. In this context, e-business enhances information demands giving people proper tools, in this case, internet and internet technologies. These technologies can slightly differ if used for B2C (business-to-consumer) and B2B (business-to-business) cases. The definitions of B2C and B2B are given in Definition 1 and Definition 2.

Definition 1 (B2B) B2B application focus on using the Internet and/or extranet to improve business-to-business partnerships and transform inter-organisational relationships [8].

Definition 2 (B2C) B2C application is for serving customer needs as they exchange information, goods and services over the Internet [2].

Basically e-business applications consist of many tasks, which purpose is to generate and manage information and supply the right people with this information. The chain of performing these tasks or the need of outside system integration into e-business application also depends on e-business type. B2C and B2B applications are both modelled using workflow technologies (the definition of workflow is given in Definition 3), which main distinction is inter-organisational relationships, which are most common in B2B applications. The other difference is user interface. In B2C applications users' access needed information simply through the web pages. In B2B,

the special internet applications are build for business partners, which gives special and selected information for every partner separately (sometimes such applications can even be installed as local/offline systems at partner place).

Definition 3 (Workflow) The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules [5].

Still, to this day, all internet technologies lack the reliability and trust of the consumer. These aspects focus on two main problems: (1) internet connection reliability (performance and correct information presentation) and (2) the lack of real world situations management in systems (unpredicted business cases, ad-hoc workflow management). Such cases are usually called workflow or business process exceptions (the definition of exception is given in Definition 4) and mostly managed/solved on-demand. For this moment, all of the existing workflow management systems lacks of these features, because they usually depend on business context and specifics.

Definition 4 (Exception) Any business activities that can not be executed in a predefined manner is referred to as an exception [9].

Once again, we should notice that these exceptions are different in B2B and B2C as technologies for processing these processes differ and raise different exceptions. We should not forget also the business process specifics which also forms distinct situation for exception emerging. Here we raise the

assumption, that in order to deal with exceptions in B2C and B2B, we should treat them as separate business cases and think of separate solutions. This is the main purpose of this paper, to identify the differences of B2C and B2B exception handling.

2 Main differences of B2C and B2B

As pointed above, though B2C and B2B serve the same purpose – to make the business more successful, they have slight differences which point to different projections of them on technologies.

B2C applications are accessed through the thin client (usually internet page) and user can directly reach needed information from the business logics application (see Figure 1.). This business logic application can present information to the client/user from different applications, which information transmission is processed in the backend of the system. Due to the information demand, it can be transmitted to the business logic application constantly/online or use time to time synchronisation mode. In such cases all participating applications have their own databases for temporal or constant data storage.

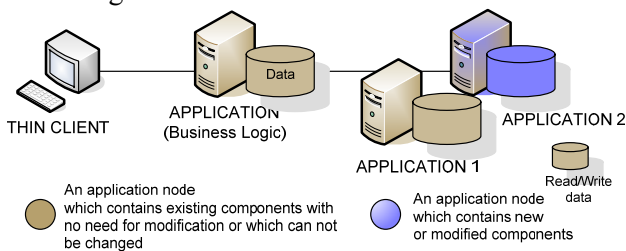


Fig. 1. Business to Consumer model conception.

Speaking of B2B applications, information is reached through the application on both nodes (partner and company/consumer) (see Figure 2). These applications can be used using Internet connection or be installed as separate applications on the partner computer. In such case, information needed for offline using must be stored on local disk (or data storage device) and transmitted for merging from time to time to the main company/consumer server.

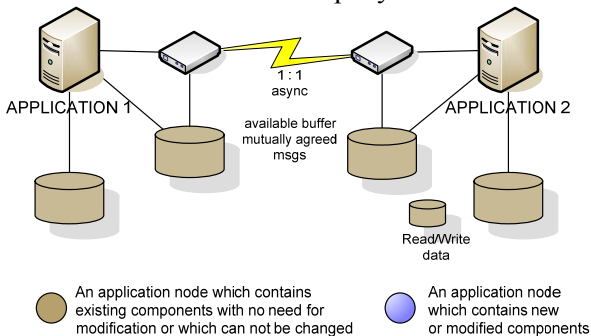


Fig. 2. Business to Business model conception.

During the replication of this data, information is checked for validity and uniqueness, so that replication data would be completely new or changed with a purpose to minimise the replication time and amount and to lessen network loads.

One of the main differences between B2C and B2B are purchase cost, frequency and number of customers. These factors are more of human factor nature and points to real world/ad-hoc decision making subtlety. B2B is of wholesale nature so here we have cost and client number as main business factors, which dictate business demands and supply. B2C is simple one person shopping, who concentrates on small items and very often. In this case, cost is not always the risk factor, but quality, satisfaction or even delivery time.

Table 1. Main B2C and B2B distinctions.

Involved parties	B2C (business – to – consumer)	B2B (business – to – business)
Buyer/Seller Relation	1 – 1	1 - many
Product Source	Non Intermediary Based	Non Intermediary Based
Evolution Level	Publishing	Triggering
Functional Integration	Single Function, no integration	Multiple, partially integrated functions

Table 1 depicts main factors, which influence the used technologies and system differences. As it can be seen, main differences are in information presentation and gathering points [4].

3 Architecture differences

Before speaking of the key problems, rising in B2C and B2B applications, we should point to the main differences between applications architecture.

B2C application architecture does not differ from simple client-server application architecture; where client is internet user, connecting to the system thought the web using secure connection. As B2C applications can involve third party applications for sensitive data exchange (like internet payments using transactions to bank systems), the customer in this case can use various security features for protecting its personal data (like PKI). The e-business application usually resides on company side and presents needed information and services thought the web application server, which should reside in

demilitarised zone, with a purpose to protect company's applications from intruders.

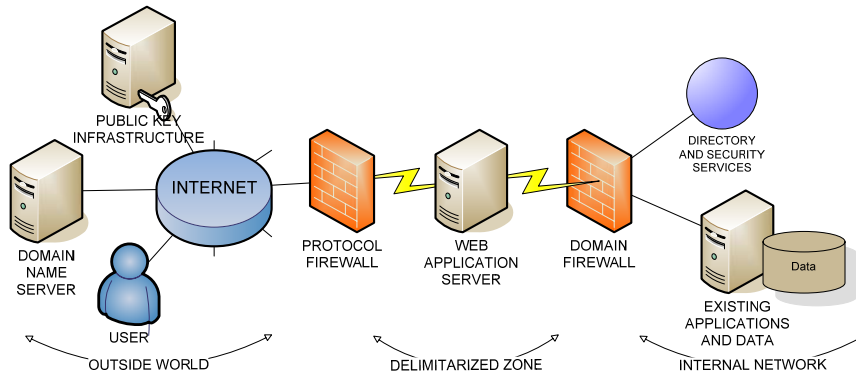


Fig 3. Business-to-Consumer Application Framework for e-business architecture.

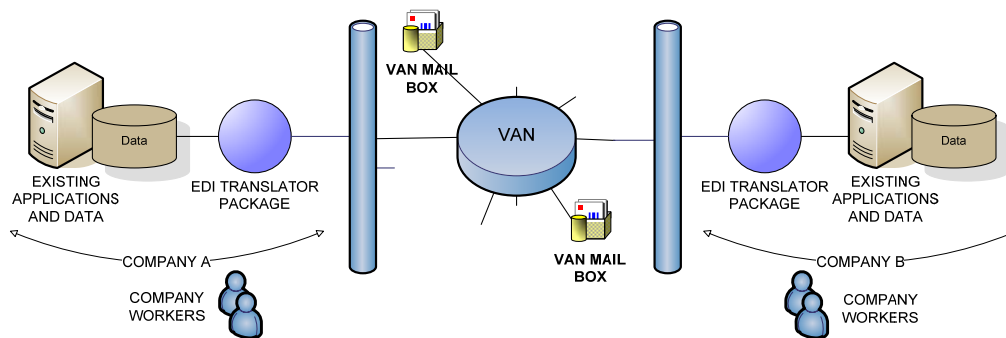


Fig 4. Business-to-Business Application Framework for e-business architecture.

B2B applications transform inter-organizational relationships and are dedicated for partnership. They can be used to exchange information between businesses and for collaboration, sharing information and knowledge between businesses for mutual benefit [2]. In other words, B2B application architecture is more of external communication mechanism nature. As in this case information is exchanged between two similar systems which serve the same purpose and are of inter-organisational relationship type. They exchange information using messages, which carries needed data for process execution. B2B applications also use secure connection to the main business application server and usually does not limit with encrypted usernames and passwords (usually e-signature or e-certificate technologies are used).

Summarising, we can point that the main B2B exception lot rises from inter-organisational relationships and deals with different manufacturer workflow management systems, which exchanges information using only messages. In B2C the main exception source, rising from architecture level, is network access performance and application data refresh problems.

4 Exception differences

Generally speaking of e-business exceptions nature, we can notice that the reasons of exception emerging are quite the same in B2C and B2B - unpredicted real world situations. Though the triggers and spots of exception emerging are different and this points to different exception handling methods.

Business activities, which cannot be executed in a predefined manner and cannot reach their desired outcomes, are referred to as exceptions. As e-business applications are generally built using workflow methods, it requires specification of both, normal process flow and possible variations due to exceptional situations that can be anticipated and monitored [10]. Seeking to better understand the dependencies in exceptions and their nature, we will use exception classification which later can be detailed with B2C and B2B exception features. We separate two types: failures and exceptions. Failures are corresponding to exceptions which rarely impact business goal, just technologies.

Failures can also be divided into [11]:

- Basic failures – corresponding to failures at the system level (e.g. DBMS, operating system, or network failure); and
- Application failures – corresponding to failures of the applications invoked by the Workflow Management System (WFMS) in order to execute a given task. This kind of failures sometimes tends to become exceptions.

These types' failures are closely related, since basic failures can cause application failures. The failure itself is not considered an exception, because it is usually a system failure and can be ascribed to an infrastructure level exception. The failure itself usually is a result of some core exception and must be solved through the core issue, rather than at the business process level.

Failures are usually the main cause of B2C exceptions (sometimes B2B) as simply internet technologies fail to achieve the task, like commit transaction. It is more relevant to the B2C as this type users connects as thin client and uses only internet connection for performing tasks. B2B clients are more secure in this place, as they use applications for connection and transmitting data, which are capable of storing vital information.

Exceptions can be grouped into:

- Expected exceptions, which are [11][12]:
 - Workflow exceptions – related to starting or finishing tasks;
 - Data exceptions – related to workflow data change;
 - Temporal exceptions – time related exceptions;
 - External exceptions – related to external events.
- Unexpected exceptions can be classified as [3, 13]:
 - Useful exceptions – a “key to effective and flexible” processes, usually easily handled;
 - Unanticipated exceptions – the result of an unexpected, infrequent and non-repetitive event.

In essence, expected exceptions cannot be called true exceptions, simply because they do not impact the final goal of the business process – a method of handling them is already defined using workflow rules, which allows achieving the final goal. Here we have a very slim line between exception and rule because; as soon as exception is identified and included into the workflow graph it becomes a rule. And vice versa, the predefined workflow rule sometimes can turn into exception if all the factors are not taken into account. This part of exceptions, expected exceptions, have more to do with

performance issues (the correct and timely information supply), which are more subscribed to B2C exceptions.

Still, expected exceptions tend to appear more often in B2C than B2B simply because of the application complexity. Many expected exceptions are raised between different workflow engines or databases which use separate partners, as transmitted data can not reach the destination simply because of the failing/missing link between them,

Useful exceptions are always identified / solved during the build-time. The dedicated process graph is supplemented with special branches, which would be used during the initiated process instance should the need arise. These are predefined exceptions. This part of exceptions is quite rare.

The very nature of B2B is inter-organisational communication. The unanticipated and unexpected exceptions are usually corresponding to B2B exceptions and are of inter-organisational nature. They are the most dangerous to the business goals as they are difficult to catch, because the main information link between partner and company connecting them and the process is passed through the public internet and can be influenced by the unexpected outside factors (like connection reliability, malice damage, partner or company inside unpredicted factors).

Useful exception are called in such manner because of their contribution to the process optimisation and perfection, as every such exception is pointing to the hole in process logics, construction of software tools. Though this exception type can lead to fatal business results (if not detected in time), still sometimes they can serve to a good purpose.

5 Exception handling differences

Speaking of any exception, the most important characteristics is the place of exception, which usually points to causes of its emergence. That means, to handle an exception, one has to know where it occurred, why it occurred and how to solve it. In other words it is exception detection, diagnosis and resolution [14, 15, 16]. Still, not less is important to detect the exception in any stage for any involved business participant (client, partner, company worker). And here the talk usually goes about e-business application performance and the capability to supply users of any nature with friendly and comprehensible information.

Detection phase always starts from the model of correct behaviour, both for entire system and for each individual component. This model must be drawn

such, which achieves business process goal and is considered ideal process model.

Diagnosis phase is used to determine which methods or tools should be used to solve unacceptable situation. In this phase exception specifications can be processed, which are generally made in the detection phase. The results later are used to make the exception handler specification. For the systems efficiency exception handler should be generated by the autonomous process or system, which could have an exception and exception handlers' knowledge base. In this way, information and solutions are collected all the time and reused if possible in the future. This would shorten exceptions handling time and cost, which are critical for every business process model. In generally, exception detection and diagnosis needs a lot of precise and timely information, so this information can be also stored using ontology. It can be used to describe the ideal business process model in the terms of the ontology, so that it clears communication between system developers and domain experts. In the ontology-based case management there are used three phases: abstraction, retrieval and adaptation. Each phase uses different specialized ontology to represent exception case, or to retrieve similar cases or to adapt the existing cases. Use of ontology clarify and frame business process terminology and logic, so that the exception handling can be achieved more precise.

Exception handlers are usually modelled as autonomous processes and are always enacted in the place of exception occurrence, not appearance. These processes can implement three different types of actions: masking, propagation and recording [14]. These actions can be used separately or together. The exception process can ignore the exception, modify the process according to changed data and record the situation for the future reuse. Also exception process can retry corrupted task, execute appropriate workflow recovery operation or modifications.

Having such a general algorithm for exception handling, we can identify distinctions between B2C and B2B processes. The main structural difference between these process systems is that B2C uses direct Internet connection to the e-business application and B2B connection is system to system. In both cases we need workflow engine and business logic applications, and in both cases it is better if exception handling application is separated from them.

Speaking of B2C exception handling we can notice, that main business logic, workflow engine and exception handling applications can use the same storage devices and have only slim lines between these components as B2C application include all necessary components needed for process realisation.

Still, B2C exception handling application should be separated from main business application and only have slim links with this application. In B2C usually there is no other business application integration and it uses thin client for connection. That means exception handling information databases can be located together with exception handling system components as they do not require separate security insurance or secure connections to them from external networks or systems. So in this case we have only integration between workflow management system (which realise B2C business process) and exception handling application (which generates exception specification, checks for symptoms in predefined taxonomies and looks for proper existing handlers).

The only necessary and useful information, which workflow management system can present is workflow instance history data, because unexpected exceptions occur only in workflow instances. That means during process run-time. Build-time exceptions are more like process cases and are managed in simple design matters, so here we should have a constantly running history data check procedure which must evaluate the correctness of it, using ideal process model and its input/output data specifications.

B2B exception handling is a bit more complicate as here we have system to system architecture which sometimes must have complex and unique integrations between them. In B2B processes, the inter-organisational relationships points to many factors which must be taken into consideration, because two or more different consumer workflow management system can participate in one business process and exchange information only using messages, which are the main insurer of the correct behaviour of each of these systems.

Having several different workflow engines we even more need to ensure that exception handling application will be able to deal with the exceptions, which rise in each of these engines. That means, we need to ensure that exception handling application will not be dependent on any workflow engine specifics or use particular workflow management system syntax or data exchange methods. But still we have to ensure, that each separate workflow engine will be able to reach already existing exception definition and handling specifications.

So in B2B exception handling case, we must separate workflow management system, exception handling application and exception relevant data storage so that they could be reached by any of them even from outside network or system connections and

share/reuse already gathered exception handling knowledge.

In so doing we can ensure that inter-organisational relationships are not burdened with additional procedures of exception detection or exception data merging/transformation for other workflow engines. The other important factor is, that we ensure main business application security and availability of necessary exception handling data on time. The B2B exception handling application itself can be located on company side or on each partner side, if they use distinct workflow engines for connection with main business application.

5 Conclusion

Generally speaking, B2B and B2C application performance insurance is the same important from any user point of view. Usually, constructor's main task is to identify the lot of differences between these business processes and choose right technological instruments, used to realize these processes into internet existence and supply users with reliable e-business.

These research points to, that the main differences reside in user and business application connection link as here we have inter-organizational link (in B2B) and direct internet link (in B2C), which points to particular technologies usage. Of cause, here we have a lot of exceptions rising from the chosen technologies. The types of exceptions can be influenced not only by these connections types, but also by internal technology architecture and construction. As exceptions always influence the business decision, goals, trust of client, company prestige, the main system constructor task is also to ensure needed and newest information supply for user. And this task points to some differences in B2C and B2B exception handling.

Existing workflow management systems are perfect in achieving common business goal, but have difficulties in dealing with ad-hoc and real world situations. Still, with some technological influence these systems can be adapted to solve B2C and B2B exceptions.

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