

# Shop<sup>let</sup> and the Personal Market Place model for e-commerce

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## **Abstract**

Electronic commerce is reaching a maturity level but still has barriers to overcome. The paper proposes a new model for e-commerce transactions with the aim to resolve problems related to the infrastructure and resources required from customers and enterprises to enter the e-commerce arena as well as trust. The proposed model provides the framework for standardizing issues concerning interaction and settles the ground for long-term relationships between customers and enterprises. The paper reviews the existing B2C e-commerce models and their major problems, and proposes the “personal market place” model for e-commerce as well as Shop<sup>let</sup>, a prototype implementation of this model.

*Keywords:* B2C electronic commerce, e-commerce barriers and models

## 1. Introduction

From the early growth stages of the World Wide Web, it became obvious that it would bring new opportunities in the business world. As a mean for enterprise promotion through the simple web presence at the beginning and as a new trading channel providing access to the global market, it had an unforeseen impact on enterprises' marketing strategies, creating new visions and expectations of customer impact and business expansion.

These expectations were proved to be fairly optimistic. Early predictions for revolutionary change on contacting business have not yet been met, while recent sales figures show that e-commerce sales, including B2B transactions, count only for 1.5 percent of the total sales in the US [1].

It is generally accepted that although e-commerce technologies have somehow reached a maturity level and most well known enterprises have entered the world of electronic transactions, customers' acceptance remains relatively low. Statistics suggest that only a small subset of those who use the web to browse for products is likely to reach to the final decision of actually purchasing online [2]. Customers' skepticism and lack of trust both to the virtual other party of the transaction and to the security mechanisms used can be considered as the basic reasons for this behavior.

Moreover, in order for e-commerce to have an actual impact on people's shopping habits, it has not only to gain customers' trust, but also to move towards providing more standardized and homogeneous technological solutions, supporting customers to search through the product catalogs of the countless e-commerce portals -a process that makes electronic shopping a rather bewildering process for internet users and potential customers- aiming at the same time to set the ground for long-term relationships between providers and customers. Statistical results [3][4] show that the mostly visited retail sites are those that either have an established brand name or concentrate products and services from different providers.

This paper presents a new model for business to customer (B2C) e-commerce, whose objective is to provide a customer-centered, homogeneous and centralized solution for conducting retail transactions, minimizing the upfront effort required by enterprises to enter the e-commerce arena and establish long term relationships with their customers. Specifically, the model focuses on customers needs to access and use e-commerce services, as well as to enterprises' requirements for expediting their efforts to enter the world of e-business. The model may sanguinely become the basis for standardization of e-commerce transactions.

The paper is structured as follows: Section 2 presents existing B2C e-commerce models and their related weaknesses. Section 3 explains the basic concepts of the proposed "Personal market Place" (PmP) model and section 4 presents Shoplet, the prototype implementation of the model, its basic functionality and the distinguishing features of its architecture. Section 5 concludes the paper with issues related to the practical application of the model and future work.

## 2. Existing B2C e-commerce models for retail transactions

Similarly to traditional commercial activities performed at enterprises' physical storefronts, B2C electronic transactions are made through publicly available e-commerce portals that provide virtual spaces for customers to perform trading activities with enterprises.

Business models used for B2C retail transactions include the virtual storefront and the market place concentrator. The former model follows the physical storefront or retail outlet metaphor, while according to the latter model, information about products and services from multiple providers are concentrated at a central point [5], which is accessed by customers. Both models provide functionalities that support the complete order cycles, including electronic payment and delivery of products.

These models apparently seem to be more than satisfactory, since they support all aspects of traditional commerce through a widely used mean, the World Wide Web, creating a powerful trading channel. However, there are certain weaknesses related to the general acceptance and use of these models, which according to [5], mainly fall into three categories of related aspects: infrastructure, trust and reliability, and regulations. The weaknesses of the above mentioned electronic commerce models are subsequently analyzed in more detail.

**Selling on-line:** The resources needed for the implementation and maintenance of an e-commerce portal that provides an acceptable level of functionality appears to be high, especially for small and medium size enterprises. Only large enterprises have the ability to implement attractive portals with advanced functionality aspects like personalization facilities, engaging content, advanced search capabilities or after-sales support.

Moreover, the brand name seems to play an even more important role in e-business, as it reduces uncertainty and increases trust of potential customers. As it is pointed in [6] “brand names act as substitutes for information gathering by helping online buyers locate specific products and thus reduce search costs”.

Therefore,, it is fairly difficult for small and medium size enterprises to enter and compete in the e-commerce arena through their own virtual storefront.

**Being on-line:** In some developing countries, the available bandwidth for a great number of users remains limited. Given the relatively high amount of multimedia information in e-commerce portals, those users experience the delay and effort required for completing the order cycle, i.e. the process of navigating through the product catalogs, comparing prices, examining and choosing products and finally forming and sending orders.

Another rather neglected characteristic of the majority of online users is their awareness and sensitivity for the protection of their privacy [7]. Users may feel overexposed when being on-line and find annoying the fact that their behavior might be monitored through their clickstreams. Even if this is being performed so as to assist them in finding what they finally want, sometimes it increases customer sense of uncertainty and skepticism.

**Buying on-line:** Although the functionality and overall structure of most e-commerce portals is more or less the same, considerable differences can be detected at their interfaces, as the amount of information provided and processes supported differ subsequently from site to site. This may be justifiable, because of the different vendor implementations and the fact that enterprises need to express their distinctive characteristics through their portal. This lack of homogeneity, though interesting and challenging, could be considered as a problem for inexperienced users, users that try to compare products and prices from different sites, or for users that perform “routine shopping” tasks and consider inspecting information that is not related to their goals rather frustrating.

**Being trustful:** An important-but not yet sufficiently resolved- problem, which is related to the issue of privacy, is the lack of customers’ trust to the other party of the transactions and to the security mechanisms used. The e-commercial environment is considered to be rather risky due to the possibility of opportunistic behavior. Enterprises may exploit the information asymmetry between them and their intended customers [8]. Customers’ uncertainty on such matters could be regarded as a de facto barrier to e-commerce.

### 3. The Personal market Place (PmP) model

The proposed “Personal market Place” (PmP) model borrows aspects from both the virtual storefront and market place concentrator models, being motivated by the weaknesses of these models and by their limited ability to address customers’ concerns effectively.

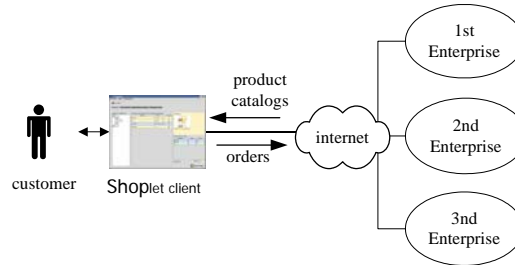


Figure1. The overall “Personal market Place” model

According to the PmP model, each customer has the responsibility and freedom to gather market information from different enterprises and construct his own virtual storefront in his personal space using standard product presentation facilities and interface functionalities. Enterprises have the responsibility to prepare and provide customers with product catalogs. An overview of the proposed model is depicted in Figure 1, where the customer’s virtual storefront is represented as shoplet client.

According to this model, enterprises need not implement their own portal with advanced features, but they have to construct and further maintain their product catalogs, entering the competition arena more easily, exhibiting the quality of their products in relation to the prices they offer.

Customers receive product catalogs and recent updates of product information from enterprises’ server catalogs, or get these catalogs offline in a standard format. In addition, customers can navigate through product catalogs from multiple enterprises via the common interface offered, draw comparisons between products and get the best of the competition with the minimum cost, with no special network bandwidth or platform requirements. Furthermore, the trustfulness of the services offered is increased, reducing the scepticism and the uncertainty of customers to the processing of their personal preferences. This is achieved by the facility provided to users to consult product catalogs offline and prepare their orders to multiple sites with no constant connection to these sites.

Customers come to a symmetric position concerning the exploitation of market information: Customers can inspect and compare products from multiple sites given that enterprises have submitted their product catalogs, while enterprises still can receive customers’ preferences and needs through the completed orders.

The personal market place model reduces the requirements from customers and enterprises to enter the e-business competition arena, while it encourages long-term relationships. Customers choosing to download a product catalog along with other information about the enterprise, it is most likely that they will use this information for more than one transaction. An almost permanent presence of the enterprise to their personal market place is achieved.

By concentrating product information from different retailers and allowing the customer to make transactions using the common processes of the provided interface, the personal marketplace could lead to more efficient order cycles. Moreover, since previously heterogeneous product information is presented in a unified way and the use of price and feature comparison techniques is enabled, customer’s search costs can be significantly reduced. Because of the asymmetry that could be generated between retailers and customers due to low information acquisition costs, some pricing scheme for the users might need to be determined when the model is applied in practice.

It must be noted that PmP is not intended to find general acceptance. It is most likely to be used from particular types of customers: Customers with limited bandwidth, customers with small experience at e-commerce services or internet in general, and customers who use e-commerce frequently for their transactions and would prefer a system that would enable them to form orders directed to multiple sites more efficiently. On the other hand, the model might not satisfy customers who perceive shopping as a leisure activity, enjoy the shopping experience and the navigation to e-shops.

#### 4. Implementing the personal market place model

To attain the strengths of the proposed model we must separate the interface functionality from the business logic. In Shoplet, the current implementation of the PmP model, whose overall architecture is presented in Figure 2, the interface functionality for electronic transactions is provided by a *client application* (Shoplet client), that serves to be a “shopping tool”, through which transactions with *multiple enterprises* can be handled at the same time. The server side application (Shoplet server) implements the business logic. Defining a separate client application with the interface functionality allows customers to connect with enterprises’ servers in a non-persistent way during the order completion cycle, connecting to enterprise servers for submitting the completed orders or for getting updates of product information.

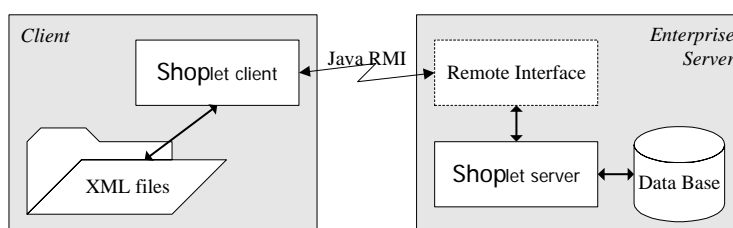


Figure 2. Overall system architecture

Both Shoplet client and Shoplet server are implemented using the Java programming language. The Java Remote Method Invocation (RMI) is used to handle the communication between the two modules. Most communication messages and the information stored to the client side, including the product catalogs, are structured using the extensible markup language (XML) [9]. The database management system used for the implementation of the Shoplet server is Postgres [10]. However, any DBMS for which a JDBC driver exists can be used.

Functional aspects of Shoplet can be paralleled with the functionality provided by today’s market place concentrators, though having the advantage of allowing the customer to choose the participating enterprises. The end user visible functionality aspects, depicted in Figure 3, include:

- management of the participating enterprises and the product catalogs available by each enterprise,
- navigation to product catalogs and formation of orders for more than one enterprises at the same time,
- management of sent orders and
- transparent management of the customer profiles created for each enterprise.

The server side application, operating in terminal mode, is responsible for managing requests concerning product catalogs and customer subscriptions, as well as checking, validating and storing the orders received.

The Shoplet prototype implementation, up to this stage, can handle the whole cycle of retail transactions except from electronic payments. Security issues that yet need to be resolved concern the authentication of the two parties of each transaction and the protection of the confidentiality of the exchanged messages that contain critical information. Either traditional security mechanisms such as SSL or certificate based mechanisms that utilize the

Public Key Infrastructure [11] can be incorporated. In the second case each user must acquire an electronic certificate from a Trusted Third Party in order to be eligible for any transaction. Incorporating both alternatives for each company to choose from would cover most security requirements.

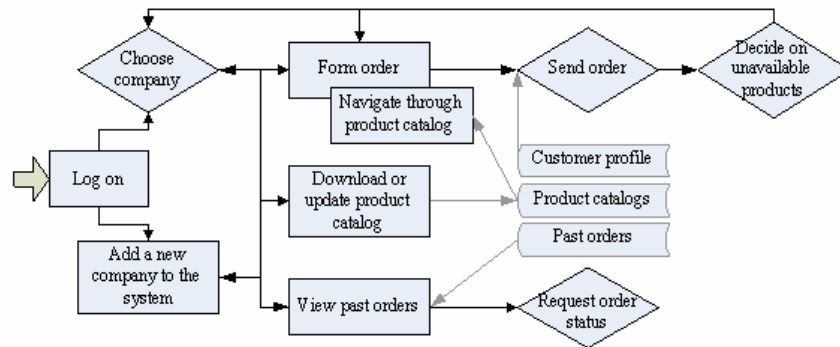


Figure 3. End user workflow with Shoplet client

Distinguishing features of the Shoplet architecture and the rationale for each of them are as follows.

### Distributed system

The system architecture is based on the client – server model where the client, instead of having the passive role of a web browser, is an active application, which is responsible for product catalogs presentation. Shoplet client provides all the necessary functionality for completing retail transactions. The server application is released from the burden of providing functionalities related to transactions, as its role is limited to receiving, checking and serving clients’ database-related requests. Shoplet client-server interoperability is achieved through a specific communication framework that reduces the processing load on the server, since the messages transferred through the network contain only the significant business information.

### Active client application

The end users, instead of accessing enterprises’ e-commerce portals via their web browser, use the Shoplet client application (Figure 4), which must be installed in their personal computer. Shoplet client provides all the necessary functionality for customers to complete e-commerce transactions with multiple sites, pose requests to enterprises’ servers and serve Shoplet server responses.

At first it may seem that users would be unwilling to install one more application to their PC. However, a great number of PCs with internet connection have specialized applications for many different internet services.

Furthermore, considering that some users feel insecure when being on-line, it can be assumed that coming in contact and transacting with enterprises servers through a client application that mainly transfers business information, allows having a greater sense of control over the whole procedure, feeling less exposed to privacy violations than visiting a web portal.

### Transacting with multiple enterprises

Shoplet client allows users to make transactions with numerous enterprises at the same time through its unifying interface. The ability of the Shoplet client to be customized to enterprises’ preferences is kept deliberately limited with the aim to preserve the interface’s consistency and generalizability. Since the user gets familiar with the common interface, the application could be used as a generic “shopping tool” for almost all his e-commerce retail activities. This can be a very convenient solution especially for inexperienced users and for routine shopping activities of experienced users.

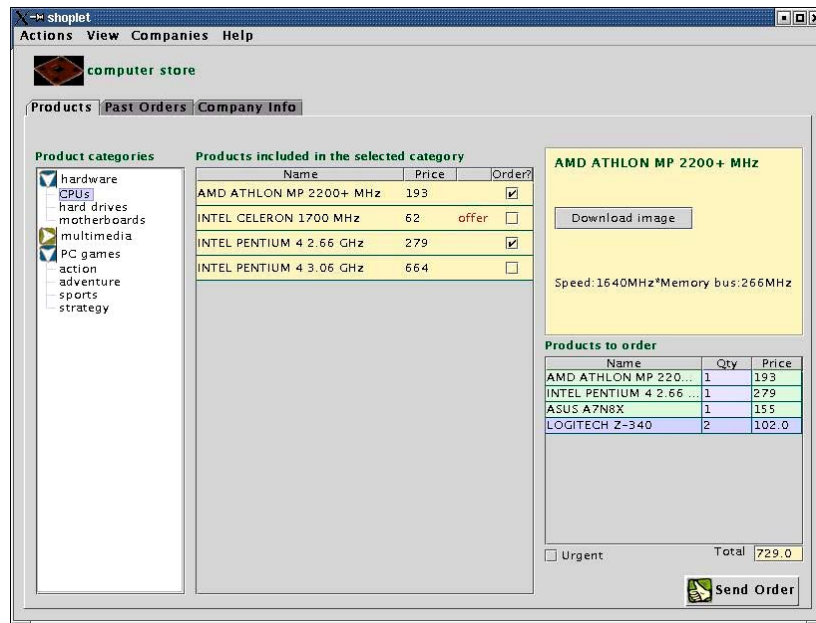


Figure 4. Shoplet client user interface

### Non-persistent connection

For every enterprise that the customer submits her request for product information, the client application downloads time-stamped products' information, which is locally stored and periodically updated. The application saves information about the orders submitted and the profiles created through customer registration to each enterprise, locally.

As business information is locally accessible by the Shoplet client, the whole order cycle - except order submission and server's acknowledgement of order receipt - can be performed off-line. In this way the process of products' catalog navigation and formation of orders is accelerated. Furthermore, by getting product catalogs from multiple sites, customers may inspect and further compare product information. The only disadvantage appearing is the storage space needed for keeping all this information. However, as the cost of storage space is constantly becoming lower, in combination with the facility provided for downloading and storing only selected parts of product catalogs, e.g. prohibit downloading products' high resolution colored photographs, this limitation can be overcome.

## 5. Concluding remarks

The enormous number of electronic shops, in combination with the lack of services' homogeneity and the absence of standard, commonly used control mechanisms for e-commerce transactions, seems to result in making the internet an inconvenient and insecure mean for e-business transactions. From the implementers' perspective, it can be regarded as a fact that "the current electronic commerce technologies rely on much in-house programming activities and are inefficient and lack interoperability. The trend is to develop more standardized architectures and techniques for open electronic commerce services" [12].

The personal market place model proposed in this paper focuses on aggregating the e-commerce services offered by different enterprises in a unifying framework, aiming at offering a homogeneous and standard technological environment for conducting e-commerce activities, offering at the same time the sense of control and security that customers need, especially when they exercise their activities via the world-wide-web. The PmP model proposed in this paper does not intend to offer solutions for all the problems of electronic commerce, and can be seen only as acting in a complimentary way to existing e-commerce

models, intended mainly for small-size enterprises, inexperienced e-commerce services users or users with long term relationships with enterprises performing routine-shopping tasks.

One of the basic barriers of small and medium sized enterprises to enter the e-commerce arena concern the recourses needed for the implementation and maintenance of a live, attractive, competitive e-commerce portal. One of the major implementation implications of the proposed PmP model lies in the client application functionality, which provides the basic features of e-commerce portals. Consequently, the enterprises server implementation gets much simpler and the resources needed for enterprises to adapt to the PmP model can be significantly reduced. It must be noted that even for enterprises who already have a virtual storefront for electronic transactions, the model can be applied and operate together with the existing system, creating one more trading channel.

For adopting the model and using the Shoplet server, the basic technical issue to be addressed is that the enterprises' business information should be defined using the prescribed database schema. Alternatively, existing databases have to be adjusted (e.g. via a wrapper) to the schema required by Shoplet.

Even different implementations of the Shoplet server can be developed (which is the most simple of Shoplet main modules), corresponding to special enterprise norms and policies (e.g. for order acknowledgment and acceptance) with relatively small effort. In this case, the basic issue that must be addressed is the necessity for all server implementations to conform to the model communication framework. Assuming that even different client implementations may be developed, the need of conforming to a common communication framework appears as the basic requirement for achieving interoperability. The standardization of the communication framework can result to numerous interoperable implementations of Shoplet, or customized versions of it, corresponding to various enterprise and customer needs.

Additional functionality that should be incorporated to the system in the future concerns support for secure electronic payments, additional flexibility to product catalog requests e.g. downloading selected parts of the product catalogs, ability for user interface customization and support for interface internationalization. The system can also be adapted to support the whole order cycle, including delivery for digital products.

The functionality of the system could also be extended by the implementation of price and feature comparison techniques, which could be applied relatively easily, as product information from various enterprises is stored locally using common structures. Furthermore, the implementation and use of e-commerce agents for product brokering [13] is within Shoplet future implementation plans.

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