

# Research and Implementation of E-commerce Platform Based on .NET Framework

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**Abstract**—E-commerce is a kind of commercial activity which adopts electronic form under the condition of open Internet. It has become an important life style. So there is an urgent need for more and more enterprises to develop an effective E-commerce platform. In this work, an E-commerce platform based on .NET has been put forward. It illustrates the commonly used functions of E-commerce system, introduces a system enclosure, gives the designing ideas of different layers and raises the main technological problems of the system. This platform has achieved the normal capabilities of E-commerce. Practice has proved that this kind of E-commerce platform can meet the need of some common enterprises, thus it is a practicable solution.

**Index Terms**—E-commerce, Dot NET framework, orders, cache, membership

## I. INTRODUCTION

Nowadays, transacting business through E-commerce platform has become an important business trading way in modern society. E-commerce has been applied to literally every aspect of our society. The requirements of users are variable, different methods are in need of realizing E-commerce, even the deployment platforms are different. The JSP, ASP, HTML and other traditional scripting language has become unable to meet the needs of designing a complex system, even if it has been realized, the coupling between codes, the configuration environment and system deployment dependency fall far short of various requirements of users. It is a highly skilled work which demands good conception of beauty and much professional knowledge of the program designers. However, it is difficult to fulfill the needs in reality [1].

The .NET Framework is Microsoft's comprehensive and consistent programming model for building applications that have visually stunning user experiences, seamless and secure communication, and the ability to model a range of business processes. It includes a large library of coded solutions to prevent common programming problems and a virtual machine that manages the execution of programs written specifically for the framework. The .NET Framework is a key Microsoft offering and is intended to be used by most new applications created for the Windows platform. The coded solutions that form the framework's Base Class Library cover a large range of programming needs in a number of areas, including user interface, data access, database connectivity, cryptography, web application development, numeric algorithms, and network

communications. The class library is used by programmers, who combine it with their own code to produce applications. Dot NET-based E-commerce has become more and more enterprises' favorite choice.

Based on the above analysis, an E-commerce platform has been developed by making use of dot .net framework. This paper discusses the main business needs for this platform, the system framework, the design of some main layers and some main techniques used in the system.

## II. THE ANALYSIS OF THE BUSINESS OF E-COMMERCE PLATFORM

E-commerce refers to the commercial activities without direct contact by making full use of simple, convenient and low-cost telecommunication. Through the exploration and analysis of some most visited e-shopping websites and some practical market research find that E-commerce platform must have the following functions:

**Commodity Management:** This module mainly includes commodity category management; commodity adding, modifying deleting, inquiring; commodity inventory management, commodity comment browser as well as other management functions.

**Order Management:** This module mainly includes the purchase of merchandise, order generation, automatic delivery and orders modification. Here the order generation is the kernel module of this system, which put the information acquisition and processed data into database after every order instantiation it aims at tracking each transaction

**Customer Management:** It is the pivotal step in designing an on-line shopping website, and mainly used to manage the general information as well as the status of the vast numbers of registered members by putting their information into database. After registration, users can log in to shopping online websites to do shopping under their name and password.

**Forum Management:** It is very important for a good E-commerce website to provide customers with effective ways of communication. This E-commerce platform has designed a full-fledged forum for users to communicate.

**Decisions-making support:** Most of E-commerce websites only provide online transactions functions. However, on this platform, users are provided with a wealth of functions assisting decision-making, and much useful information useful to making decisions can be achieved through the analysis of many sales databases,

such as the charts of sales of goods, the shopping tendencies of specific customer base etc.

**System Maintenance:** This module is mainly used to do the maintenance of some general information of the users and manage users' privileges and database security in order to ensure the safety of the system by preventing unauthorized users' from causing damage to the program intentionally or unintentionally.

**Payment Interface Management:** This function must be realized for E-commerce systems, which is mainly about all major banks interface. But only interface is provided, the specific implementation requires users to achieve a second development.

### III. SYSTEM ARCHITECTURE[2]

#### A. Overall System Architecture

Layered application designs are extremely popular because they increase application performance, scalability, flexibility, code reuse, and other benefits. In the classic three tier design, applications break down into three major areas of functionality: the data access layer, the business layer and the presentation layer. Inside each of these tiers there may also exist a series of sub-layers that provide an even more granular break up the functional areas of the application. Figure 1 outlines the three tiered architecture in our platform [3].

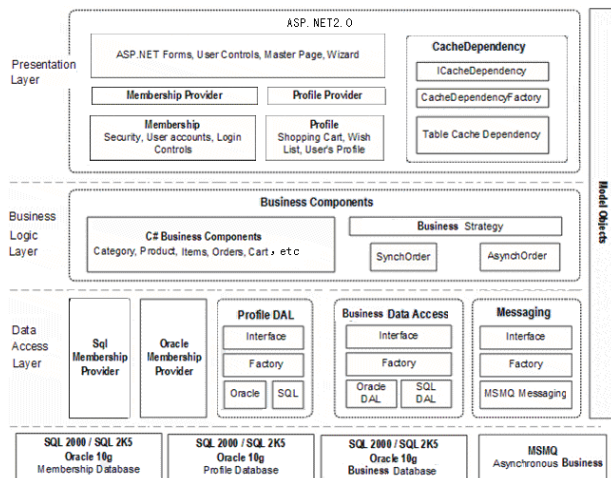


Figure 1. System Architecture

**Data access layer (DAL):** the data access layer manages the physical storage and retrieval of data. In short words, it is to perform Select, Insert, Update, and Delete of the data table.

**Business logic layer (BLL):** As the essential part of the whole system, it maintains business rules and logic. The relevant design of business logic tier is associated with the unique logic of E-commerce, such as merchandise inquiries, making orders; adding merchandise to shopping carts etc. If it involves access to databases, then transfer the data access layer.

**Presentation layer:** the presentation layer houses the user interface and related presentation code. In this layer, ideal system status should not include the business logic. The logic codes in the presentation layer are only relating

to the interface elements. The platform is designed by making use of ASP.Net, therefore, it contains many Web controls and relating logic.

#### B. The Design of Data Access Layer

In data access layer (DAL): The DAL Interface is used to abstract the data access logic, with DAL factory functioning as factory module for data access layer object. Currently, when it refers to DAL Interface, some support SQL Server DAL and some support the specific Oracle Implementation of Oracle DAL. Model module includes data entities object. The detailed modules structure chart is shown in the following figure:

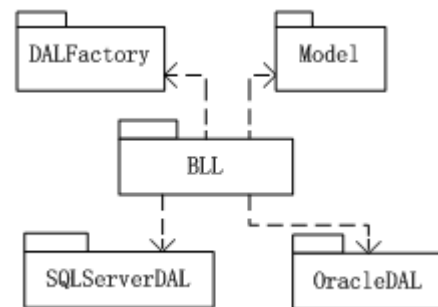


Figure 2. the Module Structure of Data Access Layer

As shown in above figure, the data access layer fully applies the "interface-oriented programming" idea. The abstracted IDAL module disengages from the dependency on the specific database, making the entire data access layer fit to database migration. DALFactory module specializing in creates DAL object make easy access to the business logic tier. SQLServerDAL and OracleDAL modules both realize IDAL interface module, which contains the logic in database Select, Insert, Update and Delete operations. Because of different types of databases, the database operating is different, so is the code.

#### C. The Design of the Business Logic Layer

BLL, containing the core business and rules of the whole system, is the kernel module of the business logic tier. All business logic is encapsulated in the layer such as commodity management, order processing, product inquiries, user management, message management, website notice management etc. In order to improve the readability, maintainability of programs, different relevant business logic is placed in different dlls. In business logic tier, except the data access layer, there is no direct access to databases. The called relationship is shown in Figure 3:

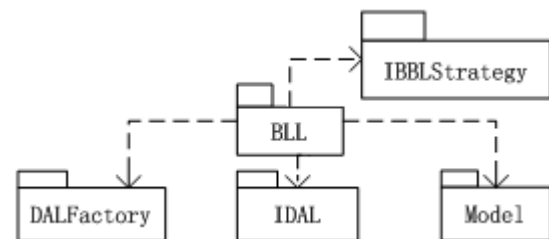


Figure 3. the Module Structure Chart of Business Logic Layer

Please pay attention to the data access business call in the chart, which is done with the interface module IDAL. Now that it has nothing to do with the specific data access logic, the relationship between the layers is loosely coupled. If the specific implementation of the Data Access layer needs to be modified, the business logic tier isn't affected as long as the definition of interface IDAL is not involved, because the specific implementation of SQLServerDAL and OracalDAL has no connection with the Business Logic Tier.

#### D. The Design Of the Presentation Layer[4]

The asynchronous processing is introduced in our E-commerce platform. Lots of business (such as Insert Order) strategy can be divided into synchronous processing and asynchronous processing, which differ much in strategies. But for the caller, the interface used is exactly the same, so we have designed IBLL Strategy module. In processing business logic, or the business operation is verified, the abstract principle can be adopted. By using interface or the abstracted type, the dependency on specific business can be avoided. For some simple and hardly unchangeable business logic is put into BLL, both the specific and the abstracted ones are not separated from each other strictly according to modules. Thus the complexity of the system is simplified, but also can meet the needs of the system.

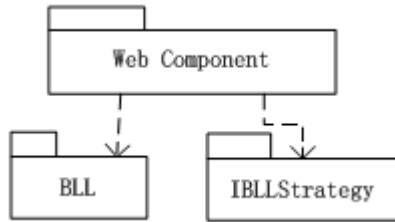


Figure 4. the Module Structure of Presentation Layer

In Figure 1, Auxiliary modules are introduced to many layers, such as messaging module of data access layer using at the asynchronous insert of orders, adopting the technology of MSMQ (Microsoft Messaging Queue). The presentation layer CacheDependency provides cache function.

### IV. THE DESIGN OF DATABASE SYSTEM

Good database design is a key factor to complete an information system. The platform developed in this paper has more than 50 tables including basic database, such as merchandise, customers etc.; transaction database, such as shopping cart, orders etc.; system data; some code tables, such as table shown the types of merchandise etc; forum database. Because of limited length of this paper, detailed description of these tables is not shown here.

### V. KEY TECHNOLOGY

#### A. Permissions Management Strategy

Access control strategy is the main strategy of network security defense and protection. Its main task is to ensure network resources not be accessed and used illegally. The

common access control strategy includes MAC, DAC, RBAC, among which RBAC has neutrality, and it has been widely used in systems operating, database and network control and so on. It has become the NIST standard [5] in 2004. Based on the idea of RBAC, using asp.net in the membership and role component, this E-commerce platform achieves a flexible users permissions management mechanism.

ASP.NET membership enables you to validate and manage user information for your Web application. It provides functionality for validating user credentials, creating and modifying membership users, and managing user settings such as passwords and e-mail addresses.

Role management helps you to manage authorization, allowing you to specify the resources users in your application are allowed to access. Role management lets you treat groups of users as a unit by assigning users to roles such as manager, sales, member, and so on.

We use membership to define users and passwords. Then use role management to define roles and assign membership user IDs to those roles.

#### B. Strategy of System safety[6].

If unknown users can access your Web application, the odds are almost certain that malicious users will try to gain unauthorized access to your application. An important part of developing a more secure application is to understand the threats to it. Microsoft has developed a way to categorize threats: Spoofing, Tampering, Repudiation, Information disclosure, Denial of service, Elevation of privilege (STRIDE). Based on STRIDE, we enforce the safety of the platform from the following aspects:

- (1) Auto back up data by the system;
- (2) Keep files for our web application in a folder below the application root;
- (3) To restrict access to users who are authenticated, we use the ASP.NET authentication strategies;
- (4) Guard against malicious user input, such as filtering user input to check for HTML tags, encoding HTML to turn potentially harmful script into display strings;
- (5) Access databases securely, such as never create SQL statements by concatenating strings that involve user input. Instead, create a parameterized query and use user input to set parameter values;
- (6) Keep sensitive information safely;
- (7) Use cookies securely;

#### C. the Use of Cache

As a B2C E-commerce platform, the visitors' experiences must be taken into consideration. If Web server fails to respond timely due to the large amount of data, delays the result of query of pages and data, the loss is great. Definitely, it is very terrible. Therefore, the entire system behavior is extremely important in system architecture design.

The characteristic of SqlCacheDependency was successfully introduced in this system, which has implemented SQL Cache Invalidation for the corresponding cache of the data tables like Category,

Product and Item. When the corresponding data table changes, the technology- can remove the corresponding item from the cache. Thus the system can process cache much better than before. The central point to implement this technology is SqlCacheDependency category, which derives from the CacheDependency one [7].

#### *D. the Implementation of Personalization*

Personalization service is a kind of targeted service, which is realized according to users' settings. The relevant information are offered and recommended to users so as to meet their needs by collecting, collating and categorizing resources through many different channels. Generally speaking, personalization service is breakthrough to the traditional passive service mode. By making full use of various resources, it actively conducts full service to fulfill the personalized needs of users. [8].

In ASP.NET, the personalized data access and use can be easily achieved. Here are the basic principles:

(1) Personalization configuration combines information with individual user and stores information in persistent formats;

(2) A variety of the information of users can be managed through personalized configuration (anonymous users, Window Certification users and Form authentication ones) without creating and maintaining their own databases;

(3) ASP.NET instantiates the Profile Common category according to configuration and it can be visited at any location of application program.

In this system, the profile function provided by .NET is fully used, so various kinds of personalized management have been achieved like website backgrounds, customer greetings, shopping cart and so on.

## VI. CONCLUSION

E-commerce is booming and more attention will be paid to response speed of website, the security of customers' data, stability and cost of system operating by future E-commerce enterprise class.Dot NET framework is a magic weapon for enterprises to set up E-commerce platform.

The E-commerce platform under discussion in this paper enjoys possess the rigid structure, logical clearness, and small coupling between layers, by fully using technical advantages of .NET framework, applying the tiered technical design system. This system can well adapt to system maintenance, scalability, it has a perfect competence distribution mechanism, excellent system security arrangement, users' rich experience and considerate personalized services. The platform has been practiced successfully in several enterprises' E-commerce websites. Practice has proved that it is a workable platform. How to introduce the latest achievements in the aspects of decision-making support is our next research project.

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