Web Technology in Electronic Commerce

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Bachelor's Thesis

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SAVONIA UNIVERSITY OF APPLIED SCIENCES   **THESIS**
                                                  Abstract

Abstract

The development of the Internet makes our lives more colorful and convenient by its effectiveness and popularity. An example is electronic commerce (also called E-Commerce). There are a number of platforms belonging to e-commerce, such as taobao.com, ebay.com, amazon.com.

The purpose of this thesis was to build a new mode for the secondhand market in Finland. Meanwhile, the business modes, B2C and C2C, were adopted into this research. This is different compared with other platforms, such as TORI.

The requirements for e-Commerce call for the application to be Web based, HTML front-end compatible with a variety of browsers. The entire system must also include the server side, a web server and scripts executed by the server, to handle requests sent from web browsers. A web browser will send HTTP requests to the server side. The server will then retrieve information saved in the database, process it appropriately, and send a reply back to the client side. There are a few alternative scripting languages in the server side, such as PHP, Perl, ASP, ASP.NET, JSP etc. PHP was selected for implementing the Server layer in this demonstrative research for integrating the secondhand shops online in Finland.

As a result, this research resulted in a web application for recycling between people and people, or between people and secondhand stores in Finland.

CONTENTS

1. INTRODUCTION

1.1 Background of the Secondhand Market in Finland

In Finland, most people have a very high environmental awareness. The efficiency is particularly high for some items which can be recycled. Therefore, there are a large number of secondhand markets distributing in each city, and even in villages. For sustainable development, people can select their needed products with an acceptable price in secondhand shops. (Palm & Elander & Watson 2014, 13.)

According to a survey made by nordic textile commitment, it was shown that there are over 800 secondhand markets in Finland, including over 546 commercial secondhand markets. (Palm & Elander & Watson 2014, 43) For some specialized flea markets, they are open for 24 hours. In addition, the indoor and open-air flea markets are up and are hosted by some churches sometimes.

The secondhand market also tends to be a place where entrepreneurs earn their first pot of gold. One example is from Lappeenranta, in southeastern Finland, where a Syrian immigrant opened a local secondhand market in the mid-1990s, mainly to sell cheap goods to Russian tourists, and thus earning the main pot of gold after immigrating to Finland. Ten years later, he has become a businessman who owns three shopping malls with more than 200 staff members.

At present, the secondhand market is also a place which is filled with vibrance and business opportunities in Finland. When it comes to build an online secondhand market, this platform, named as egoods, should be developed with combining e-commerce for the online secondhand market. It is a significant move, because e-commerce not only has changed people's traditional mind since online shopping sprouted, but gives people another new experience of living too. So this research will gradually import all secondhand shops into online marketing in every city.

1.2 Advantages of E-Commerce

E-commerce has been developed a long historical period of time since 1971. Electronic Data Interchange (EDI) was devoted to electronic exchange of business information for trading with international business partners in the 1960's. After that, the clicking browser, both DSL and internet transaction accelerated its innovation and progress. (Charlesworth & Alan 2007) Till now, e-commerce has become a giant which is supported by many ICT management services, such as database service, security service etc.

The potential of e-commerce is to create business value and be aware of its participants of potential benefits as great advantages defined by Salnoske in 1997. Most companies participate in e-commerce for extracting benefit from its advantages. For instance, taobao.com is a Chinese online shopping platform, similar to eBay.com or Amazon.com that is operated in China by Alibaba Group. On Double 11, or Single' Day in 2014, it generated a sales record of RMB57 billion ($9.1 billion) in one day. Table 2.2.1 shows the major benefits.

TABLE 2.2.1. Advantages of E-commerce (Kuzie & Fisher & Scollary 2002)

Advantages	Research/literature
Visible benefits	
Business activity efficiency	Fraser et al. 2000; Lee 2001; Riggins, 1999
automation processes	Fraser et al. 2000; Dan et al, 2001
maintained and expanded customer base	Fraser et al. 2000; Rahul, Biju and Abraham 2001; Turban, et al, 2000
Transformation of traditional market chain	Fraser et al. 2000
Decreased operation costs	Kent and Lee, 1999; Grover and Ramanlal, 2000; Kare-Silver, 1998; Fergusson, 1999
Acquisition of a niche market	Riggins, 1999; Rahul et al. 2001
Invisible benefits	
Improving well-being and education of customers	Whinston et al. 1997; Lee 2001
Competitive advantage	Kalakota et al. 1999; Hoffman et al. 1999; Straub, 2000; Kare-Silver, 1998
Comfortable shopping	Hannon, 1998; Winner, 1997

1.3 E-Platform of the Secondhand Market

The mission of egoods is to make it easy to dig out what customers need. Consumers, merchants, and other participants would be provided by technology and services to conduct commerce or exchanging on egoods. The vision is that it could be aimed at building the future infrastructure of commerce for the secondhand marketing in Finland.

The chief function is that the customer can release the products on the online store or individual market. People can search the products by typing keywords. In addition, people can also enter into the specified city, like their location, where the web page will list all stores located in this city. Simultaneously, the back end service should be provided for the customers who have applied for a store account. In the control panel of the back end service, customers can operate some function blocks, such as scanning products, adding new products, deleting or modifying products and checking orders etc.

During the transaction, an adopted alternative solution that people can make a reservation for holding it within a limited time during the testing process. For extending reservation service, whether people can choose the delivery service supported by the seller.

When it comes to concrete programming and functions, some useful elements are recommended on the e-commerce website in the following sections.

2. OVERVIEW OF DEVELOPMENT ENVIRONMENT

2.1 Web Application Architecture

Web-based applications are usually considered as multiple layer applications. That is because they need to be based with multiple software products or multiple layers. There are four major layers in a web application: the client layer, the web layer, the business layer and the data layer.

The client layer is a web browser. The browser software is mounted on the local computer. The job of the browser is to send requests to the server and then to receive and render HTML, images and cascading style sheets from the server. All modern Web browsers, such as Google chrome and Firefox etc, can execute client-side code. They can all execute JavaScript and code supported by plug-ins such as Flash Player, Silverlight or Java.

All of the other three layers of a web application go into the server environment and taken together, they are recognized as the server stack. There are three server layers. The Web layer is the HTTP server. It receives requests from the client and returns responses. The HTTP server dispatches requests to the business layer, an application server, and the application server interacts with the data layer, the database server. In the world of Apache, MySQL and PHP, these roles are performed by Apache in the Web layer, PHP in the business layer and MySQL in the data layer.

2.2 Development Environment

In the application, the simulating server is built by using AMP (Apache + MySQL + PHP) in Windows OS or Linux OS. It could make up the integrated development environment, WAMP or LAMP. In other words, software AMP installs in Linux OS, called LAMP, similarly for defining WAMP. In brief, the LAMP environment is preferable to the WAMP environment because security and performance aspects. However, It is undeniable that Windows also has its advantages, such as easy using, friendly interface, convenient operation, therefore WAMP is also a good choice for constructing the integrated development environment.

Advantages of AMP:
1.Powerful, Reliable
2.Open Source, Free Software
3.Good Compatibility etc

When the AMP distribution has been selected, the developer need to know some of the benefits of each of them. For example, the WAMP server and the XAMPP server both install on your computer by default using the standard ports for Apache and MySQL services. So it can keep excellent compatibility to some extent. If developer is working with MySQL and PHP by using Dreamweaver for programming, for instance, they have to use port 3306 with MySQL and if the developer use an alternative port, Dreamweaver will be unable to connect to that database.

The WAMP Server and the XAMPP Server set up these software products exactly how Dreamweaver would expect them to be set up and how they are typically set up in a production environment.

2.3 MySQL Features

In this project, the back-end database is supported by MySQL. MySQL is the world's second most widely used open-source relational database management system (RDBMS). (Schumacher & Arjen 2011) It can enable the cost-effective delivery of reliable, high-performance and scalable Web-based and embedded database applications. The key features (MySQL 5.0 reference manual 2015) of MySQL are as below:

"- MySQL is an open source relational database system. The database software could be modified as developers need.
- MySQL is a server/client system. There are a database server and arbitrarily many clients (application programs), which communicate with the server; that is, they query data, save changes, etc. The clients can run on the same computer as the server or on another computer.
- About MySQL security, A privilege and password system that is very flexible and secure, and that enables host-based verification. In addition, Password security by encryption of all password traffic when you connect to a server.
- MySQL server support for large databases. It could contain 50 million records with 200,000 tables and about 5,000,000,000 rows. In addition, it could support for up to 64 indexes per table.
- MySQL is considered as a very fast database program. This speed has been backed up by a large number of benchmark tests.
- etc."

There are quite a number of APIs (application programming interfaces) and libraries for the development of MySQL applications. For the client programming, the languages C, C++, Java, Perl, PHP, Python, and Tcl could be supplied.

The Connector/ODBC (MyODBC) interface provides MySQL support for client programs that use ODBC (Open Database Connectivity) connections. (MySQL documentation e-source) For example, you can use MS Access to connect to your MySQL server. Clients can be run on Windows or Unix. Connector/ODBC source is available. All ODBC 2.5 functions are supported, as are many others.

2.4 Environment Installation

The software AMP can be downloaded freely from the following web sites with Apache, PHP and MySQL. Meanwhile, developer should exactly know the version's difference for compatible issue.

Apache Server 2.4.10: http://httpd.apache.org/download.cgi#apache24

MySQL Server 5.6.21: http://dev.mysql.com/downloads/mysql/

PHP 5.6.3 Stable Version: http://php.net/downloads.php

One of the advantages of installing these software products individually is that if upgrading one element, it is unnecessary to uninstall the others. If the integrated software bundles are used, the user have to uninstall everything and re-install everything when it has to be changed. What is more, individual components could distribute more privileges. The advantage though of the AMP software bundles is that they are very easy to install and get started.

3. FRONT-END SOLUTIONS

3.1 General

Front-end design is the development of those components of web pages that customers see and interact intuitively. (Tree House blog 2014) The first experience of customers relies on whether the user interface (UI) design of the website is friendly and forward-looking. Especially in the new web 2.0 technology era, some new interesting and useful elements in HTML5, such as <section> in semantic elements, <canvas> in graphic elements and <video> in multimedia elements are introduced. (Suni 2010) For improvement, front-end design should present better experience and be more vivid by assembling CSS, Javascript and CMS technologies with HTML.

3.2 Technologies for Front-End Development

Several technologies are possible to be used in developing the front-end of web pages. And the developer should realize which tools are the most suitable for which task. The difference can be seen between a hacked site and well designed and extendible site.(The guardian 2014) As mentioned in Chapter 3.1, the front-end development includes HTML, CSS, Javascript and CMS.

3.2.1 HTML

'The backbone of any website development process is HTML which provides an overall framework' concluded by Google technical document. (Wikipedia 2014) In brief, HTML is a group of markup tags for describing web documents. At present, HTML5 is treated as the latest technology for handling elements such as media files, because it is an an innovative and efficient way.

A web browser can read HTML files and compile them into visible or audible content. The browser does not display the HTML tags, but uses them to determine how to display the information on the page.

The following example is a classic and basic program with "Hello World".

```
<!DOCTYPE html>
<html>
  <head>
      <title>This is a title</title>
  </head>
  <body>
      <p>Hello world!</p>
  </body>
</html>
```

3.2.2 CSS

'CSS (Cascading Style Sheet) controls the presentation aspect of the site and allows the site to have different style and layout' concluded by W3Schools. (HTML Tutorial 2014) Style sheets could be embedded in HTML attributes, or style section. In general, styles are normally saved in external files with ".css" extension. External style sheets enable the developer to modify the appearance and frame layout of a page, just by editing external CSS file. It could make it far more efficient than defining style in HTML on each page.

3.2.3 JavaScript

'Javascript programming language that is used to program the behavior of web pages executed on the browser as unobtrusive rich functionality' concluded by Google technical document. (Wikipedia 2014) JavaScript has been used in the overwhelming majority of modern website, and major browsers on computers, tablets, smart phones and other terminals making JavaScript the omnipresent programming language in history. (Flanagan 2011) It is really useful to have a platform or standard library or API of functions for operating things like functions for each programming language. The JavaScript language defines a API for working with variables, expressions, objects, arrays, functions and classes etc.

Example of JavaScript, which presents how could the images be slid by touching image, based on JavaScript library -- JQuery.

```
// JavaScript Document
<script>
```

```
$(window).load(function(){
        var pages = $('#container li'), current=0;
        var currentPage,nextPage;
        $('#container .button').click(function(){
        currentPage= pages.eq(current);
        if($(this).hasClass('prevButton'))
        {
                if (current <= 0)
                        current=pages.length-1;
                else
                        current=current-1;
        }
        else
        {
                if (current >= pages.length-1)
                        current=0;
                else
                        current=current+1;
        }
        nextPage = pages.eq(current);
        currentPage.hide();
        nextPage.show();
    });
});
</script>
```

3.2.4 CMS

The content of a website can be added, published, edited and managed by CMS (Content Management System) from a central location. As the supplement and the development of network applications, many websites often cannot swiftly track valuable information derived from the business model and the pace of updating, often takes a lot of time, energy and resources to handle with maintenance. When expanding site, internal and external networks have to be integrated, and process become more complicated and even re-building the entire network application. (Content Management System 2014) The concept of CMS has been proposed to finish the issue mentioned above.

3.3　Goals for Front-End Development

Developers complete page of the site for maintenance and front-end performance optimization accordingly. In addition, a qualified front-end development design should have a certain aesthetic capacity and infrastructure capacity, to interact and collaborate with good vision.

3.3.1　Accessibility

While the development of mobile terminals, such as smart phones and tablets, developers have to guarantee that the site shows up constantly in all browsers on all terminals. A responsive layout design can achieve this request by using style sheets in CSS. Bootstrap community publishes powerful framework tools, bootstrap which can be able to implement this for designers. (bootstrap 2014)

3.3.2　Usability

During the past years, information architecture has flourished. The front-end developer who builds the website interacting with the clients, the graphic designer, the back-end developers and product managers. The front-end developer should suggest performance improvements as well as participate in usability testing.

For common users, they can dig out the most useful areas first if information on an SEO-aligned website is typically staged. The content could automatically be accessed along the order of an alphabet by the most users. (Wikipedia 2014)

3.3.3　Performance

To build even faster sites, some elements, such as markup, style and JavaScript, should be both extensible and flexible. With customized content, the scaling performance in rich content sites result from a growing cost. To avoid rising bandwidth costs is the the best interest of the companies by reducing their page size footprint as much as possible.

For most customers, the rendering time is tightly concerning with performance goals by manipulating the HTML, CSS, and JavaScript to ensure that the site shows up smoothly.

4. IMPLEMENTATION OF EGOODS IN CLIENT-SIDE

4.1 Responsive web design

Responsive web design is a channel to web design devoted to characteristic sites to provide an optimal viewing experience with easy reading and re-sizing navigation, panning, and scrolling from monitors to mobile phones. (Marcotte & Ethan 2010) Responsive web design is concerning the concept of developing a website design in an approach that amends automatically the layout according to the user's computer screen resolution. More precisely, it will make the page as the fluid grid system that scales up to several columns when the device or viewport size increases. (Designmodo 2014) For instance, the grid system allows 4 column layout 1300 pixels wide, on a 1000 pixel width screen, that auto-simplifies into 2 columns.

For the development of a responsive website, Bootstrap community publishes a responsive framework, mobile terminal first projects on the web. The source code of Bootstrap framework takes advantage of the two most popular CSS preprocessors, Less and Sass. In this demonstrative work, parts of theme and layout be supported by bootstrap framework. Because the predefined classes are included for modifying layout options, and powerful mixin for generating more semantic layout. (Bootstrap 2015)

Example of Less mixin code, which could be modified as the project needs.

```
// Generate semantic grid columns with these mixins. Reference of Bootstrap.
// Centered container element
.container-fixed(@gutter: @grid-gutter-width) {
  margin-right: auto;
  margin-left: auto;
  padding-left:  (@gutter / 2);
  padding-right: (@gutter / 2);
  &:extend(.clearfix all);
}
```

```less
// Creates a wrapper for a series of columns
.make-row(@gutter: @grid-gutter-width) {
  margin-left:  (@gutter / -2);
  margin-right: (@gutter / -2);
  &:extend(.clearfix all);
}


// Generate the large columns
.make-lg-column(@columns; @gutter: @grid-gutter-width) {
  position: relative;
  min-height: 1px;
  padding-left:  (@gutter / 2);
  padding-right: (@gutter / 2);

  @media (min-width: @screen-lg-min) {
    float: left;
    width: percentage((@columns / @grid-columns));
  }
}
```

4.2 User Interface Design

The user interface design (UID) is the design of a website and other software applications, because the user's experience and interaction is the most important focus. The user's interaction should be as simple and efficient as possible, because it is the goal of the user interface design, in terms of completing user goals, called user-centered design. (Wikipedia 2015) It is essential to understand user needs for designing a good UI. There are some procedures in the UID, some of which are more required upon than others, relying on the project. (Lauren 2015)

4.2.1 Home Page Design

In general, most websites consist of a type of web page, home page as the first page, appearing while opening the website. Although some websites contain only a single page. In the development and design process, the developer must focus on the website's purpose and satisfy the target audience's needs and experience. (Campbell & Jennifer 2014, 76) Because the first feeling is always impressive in many fields, it is still valid in the virtual products. Figure 4.2.1.1 shows the main content design in the home page.

Select the major city on the map or from the list

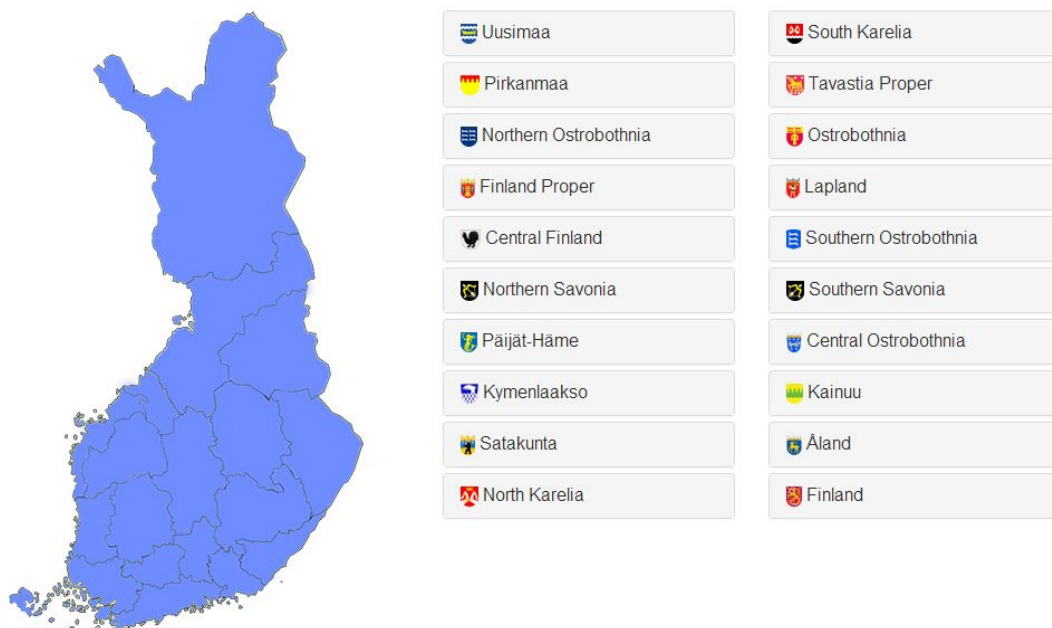|	
Uusimaa	South Karelia
Pirkanmaa	Tavastia Proper
Northern Ostrobothnia	Ostrobothnia
Finland Proper	Lapland
Central Finland	Southern Ostrobothnia
Northern Savonia	Southern Savonia
Päijät-Häme	Central Ostrobothnia
Kymenlaakso	Kainuu
Satakunta	Åland
North Karelia	Finland

Figure 4.2.1.1 Home Page with Map Location Design

On the design level, the map is adopted with the corresponding coat of arms of each region for navigating city. Meanwhile, each region on the map will link to the homologous coat of arms respectively on the function level. The purpose of this combination makes the website more colorful, vivid and practical so that it could improve the user experience.

4.2.2 Responsive Navigation Menu Bar

Navigation menu bar is an important element for any website. A good navigation bar could improve the UI friendly with some creativity and good design thrown in. Menus need to be simple enough for the user to understand, but also contain the elements necessary to guide the user through the website. Meanwhile, a responsive menu will be more flexible in many terminals, such as desktop computer, tablet, mobile phone, and other terminals with different resolutions. Figure 4.2.2.1 and Figure 4.2.2.2 show the design of the navigation menu bar in different resolution.

Figure 4.2.2.1 Navigation menu bar with resolution bigger than 776px

Figure 4.2.2.2 Navigation collapse menu with resolution smaller than 776px

The related code can be found in Appendix I.

4.2.3 User Authentication Interface with Fading Modal

User authentication should integrate with the existing login server, or authenticate user with only client-side code. It could be built-in functionality for email and

password authentication or third-party providers such as Google, Facebook, Twitter, GitHub, etc. Figure 4.2.3.1 presents the design of use authentication interface.
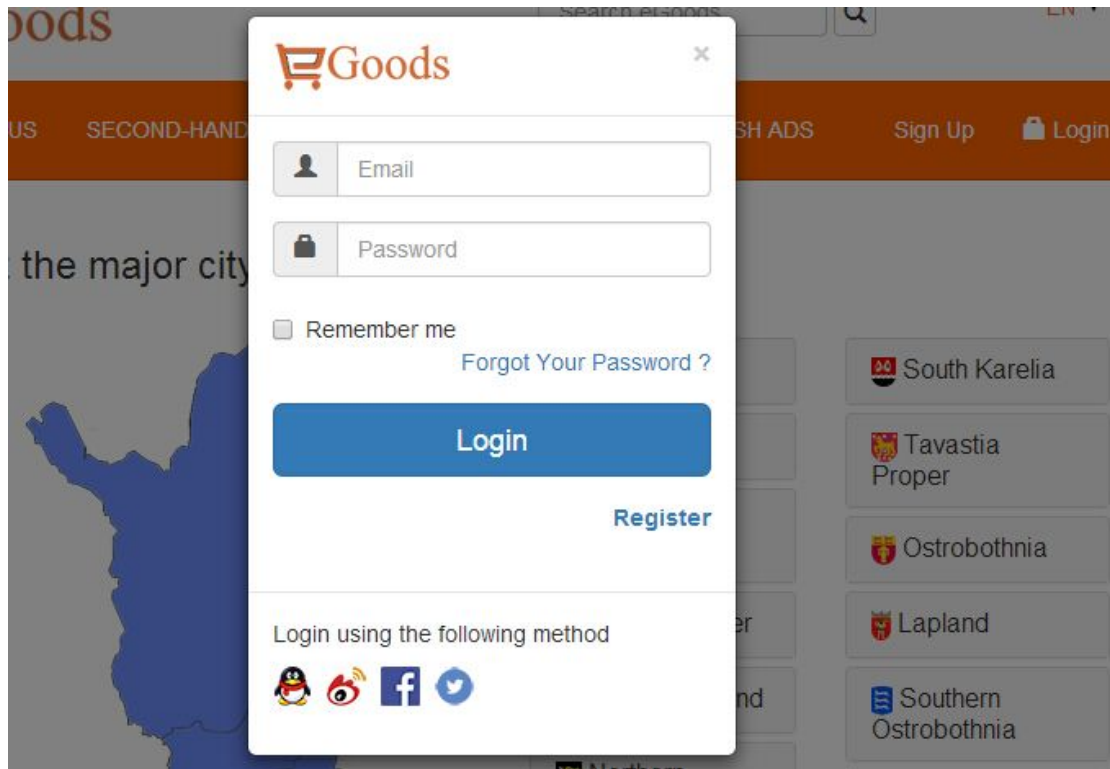
Figure 4.2.3.1 User authentication interface with fading modal

The related code can be found in Appendix II.

4.2.4 Category List Design

It is very essential in the product menu page for navigating the selected category what the user wants. For instance, the user could click "Vehicles" if they search cars. Meanwhile, each category badge easily highlight how many items linking to the specific category. Figure 4.2.4.1 shows the design of the category list.

Figure 4.2.4.1 Category List with Badge Design

PHP Script for calculate badges for each category

```php
<?php
$conn = mysqli_connect("localhost","root","root","market");
if(mysqli_connect_errno()){
echo "<p class='bg-danger'> Database connection failed, </p>";
}

mysqli_query($conn,"SET NAMES UTF8");
```

```
$category = array("Audio", "Auto Accessories", "Book", "Clocks Watches",
"Clothing","Computer","Digital Product","Furniture","House appliances",
"Jewelry","Kitchenware","Luggage","Luxury","Phone","Shoes","Sports
Outdoors","Toy","Vehicles","Other");
$num = array(0);
$total = 0;

for($c=0;$c<=18;$c++){
$sql_category = "SELECT * FROM object WHERE category ='".$category[$c]."'AND
storeid='".$storeid."'";
 if($results = mysqli_query($conn,$sql_category)){
      $num[$c] = mysqli_num_rows($results);
}
}
$total = mysqli_num_rows(mysqli_query($conn,"SELECT * FROM object WHERE
storeid='".$storeid."'"));
?>
```

The database should be connected firstly, and then retrieve category data into the category array. It shows how to calculate items for each product. The related HTML code can be found in Appendix III.

4.2.5 Control Panel of Product List Design

In this platform, the control panel for listing products according to the different user needs will be designed. The user can select a city to search products, at the same time, and decide which view mode, including gallery mode and list mode, and which sorting method to show products. All cities, default and gallery mode will be used by system default.
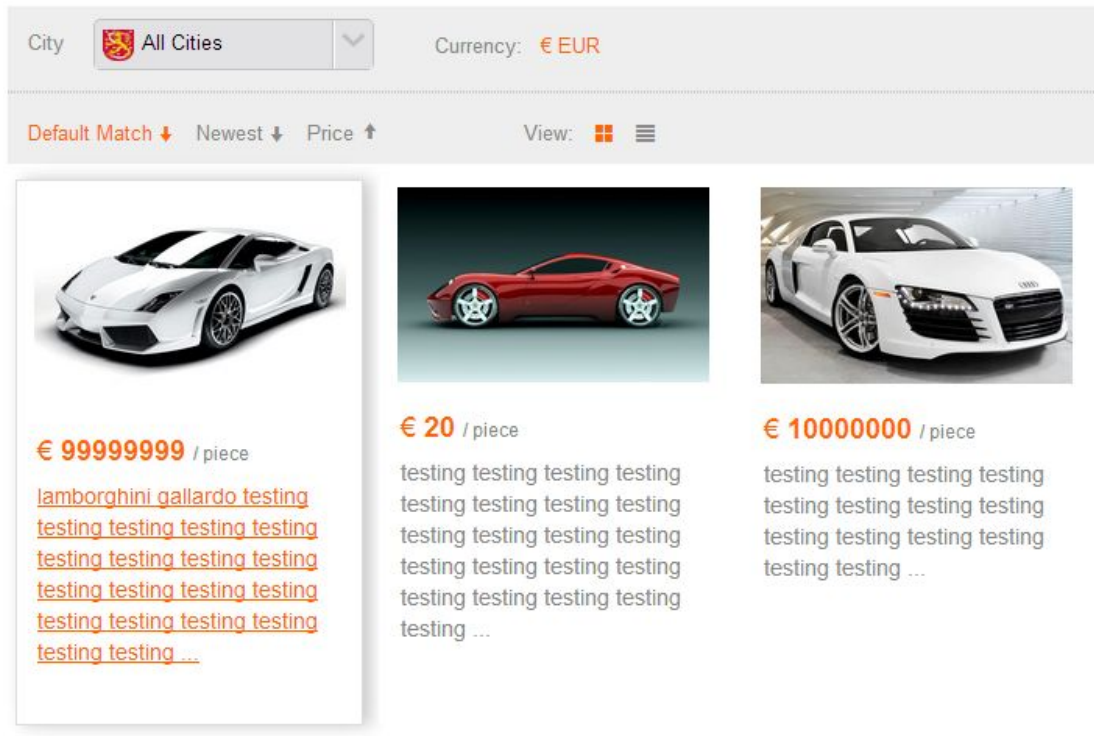
Figure 4.2.5.1 Product control panel and showing products

* The item has been selected with orange color and background shadow.

On the product page, the responsive layout is adopted for different clients, such as a tablet, a smart phone and a computer. As it shows, an item status that is moused over will be changed. Moreover, the user can choose the sorting method and view mode according to their requirements and preference. The related HTML and Javascript code can be found in Appendix IV.

4.2.6 Shopping Cart

Every e-commerce application that offers some form of shopping cart functionality needs to be able to remember user-specific data as users click through the website. Unfortunately for the developer, the HTTP protocol, over which communication on the Internet takes place, is a stateless protocol. (Network working group 1999) Each request received by the server is an independent piece of information that has no relation to previously received requests. Therefore, if a user clicks a button to add a new item to his or her shopping cart, the application must take measures to ensure not only that the state of the user's cart is updated, but that the action does not affect the cart of another user who happens to be browsing the site at the same time.

In order to properly handle the above-described scenario, the developer need to implement functionality so that a session can be created and maintained for the duration of a user's visit to the site. PHP technology is the foundation for this web application, providing with the session interface. It allows the shopping cart to temporarily store different user data while the session is being maintained.

Figure 4.2.6.1 Shopping cart design

As you can see, they could have several actions to be executed, such as 'update', 'remove','empty' actions in the shopping cart. The related code can be found in Appendix V.

4.2.7 User Interface Conclusion

In addition, there are also other user interfaces, registration, transaction, index, releasing panel etc. As previously mentioned, the application interface will give users the first experience at a glance. The developer should focus on color matching, theme, layout, responsive on mobile terminals for better experience. Behind this, it also needs some scripts to work well.

As briefly discussed, the suite of the technology of user interface is a key player in the development of the web application.

4.3 Webpage Optimization and Search Engine Optimization

4.3.1 Webpage Optimization

As users visit from site to site across the Internet, the site's performance has been expected from them. As a general rule, the users just wait less than 2.5 seconds (Jamsa 2014, 321) for downloading a web page. If users have to wait beyond a few seconds for a web page, many would like to visit other internet resources. The developer should keep performance in mind when designing websites. There are several ways to improve a site's performance. (Jamsa 2014, 321)

* Adjust videos, audios etc to other pages, not on home page.
* Balancing image size and resolution by selecting suitable quality.
* Using loading-balancing servers for websites over millions visiting each day.
* Setting expiration date in the future for static content, etc.

Meanwhile, the developers can use sites below to test webpage performance.

1. http://tools.pingdom.com/fpt/
2. http://www.webpagetest.org
3. http://www.websitepulse.com/help/tools.php
4. http://www.websiteoptimization.com/services/analyze/

4.3.2 Search Engine Optimization

Search engine optimization (SEO) is a procedure of strategies and techniques for attracting more audiences to a website by developing a high-ranking orders in the search results page of the search engine, such as Google, Baidu, and Yahoo etc.(Search engine optimization 2015) In general, a keyword in having users find a website is having the site listed, or indexed, within search engine results. Figure 4.3.2.1 shows an example of searching results.

Figure 4.3.2.1 Example of search engine's search results on Google engine

In general cases, search engine robot will list results by indicating page titles with using title tags. What is more, the robot also detects meta data inside a web page. Google use meta tags as snippets for web sites so description data are very essential.

Here are hints for search engine robots on the page:

<title>eGoods · Home Page · Enter store center in each city</title>
<meta name="description" content=" the purpose of this second hand platform is for reusing, recycling, exchanging. this is a free, easy and fun platform for searching and selling the second hand products in Finland ">
<meta name="keywords" content=" second hand center in finland, reuse in finland, recycling in finland ">
<meta name="author" content="Xinkai Wang">

There are some rules to create efficient and unique tags for web pages.

In summary, the title tag should be both brief and useful. Otherwise, the portion of the search result will be illustrated by Google. Never use extremely lengthy titles that are unhelpful to user and stuff unneeded keywords in your title tag. What is more, Both users and Google can search the different description meta tag for each page so that users will get the serceral page on the same domain. (search engine optimization starter guide 2015)

5. SERVER-SIDE OF EGOODS

In comparison with client-side scripting, server-side scripting is hidden from the audience. Its main job is concerned with communicating Web sites to back end servers, such as database, XML data sheet.

5.1 Server-Side Task

In a Web server, including two main parts, the scripting language and the scripting engine. The function of the server parses and interprets pages written in the language. This figure 5.1.1 shows how the Web server machine works. (Converse & Park & Morgan 2004, 21)
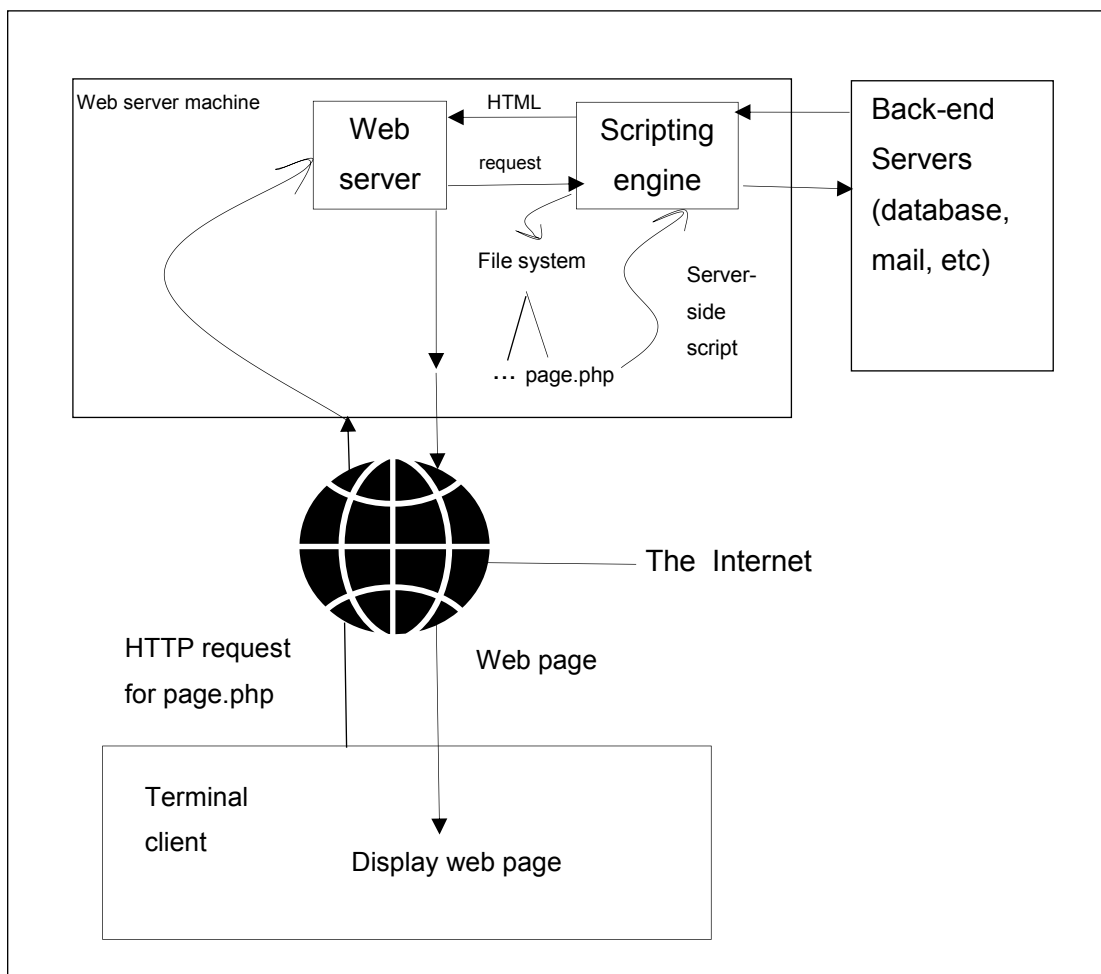
Figure 5.1.1 server-side tasks

As Figure 5.1.1 presents, in the terminal client, such as a computer, a tablet, a phone, the user can send an HTTP request to the Internet, and then the Internet will handle it to the destination according to the request header address. Once the Web server accepts this request, it is forwarded to the scripting engine for searching resources in the file system. If the requested file needs to communicate with the database server, then the scripting engine will connect to the specified database. The scripting engine processes the requested file to the Web server. After this, the Web server sends a response back to the requested client. Finally, the page is displayed in the browser.

Figure 5.1.2 shows an example of the product page assembled on the server-side from a database, followed by both the server-side source and the client-side source. This example is intended to show the final product of PHP rather than a piece of working code.
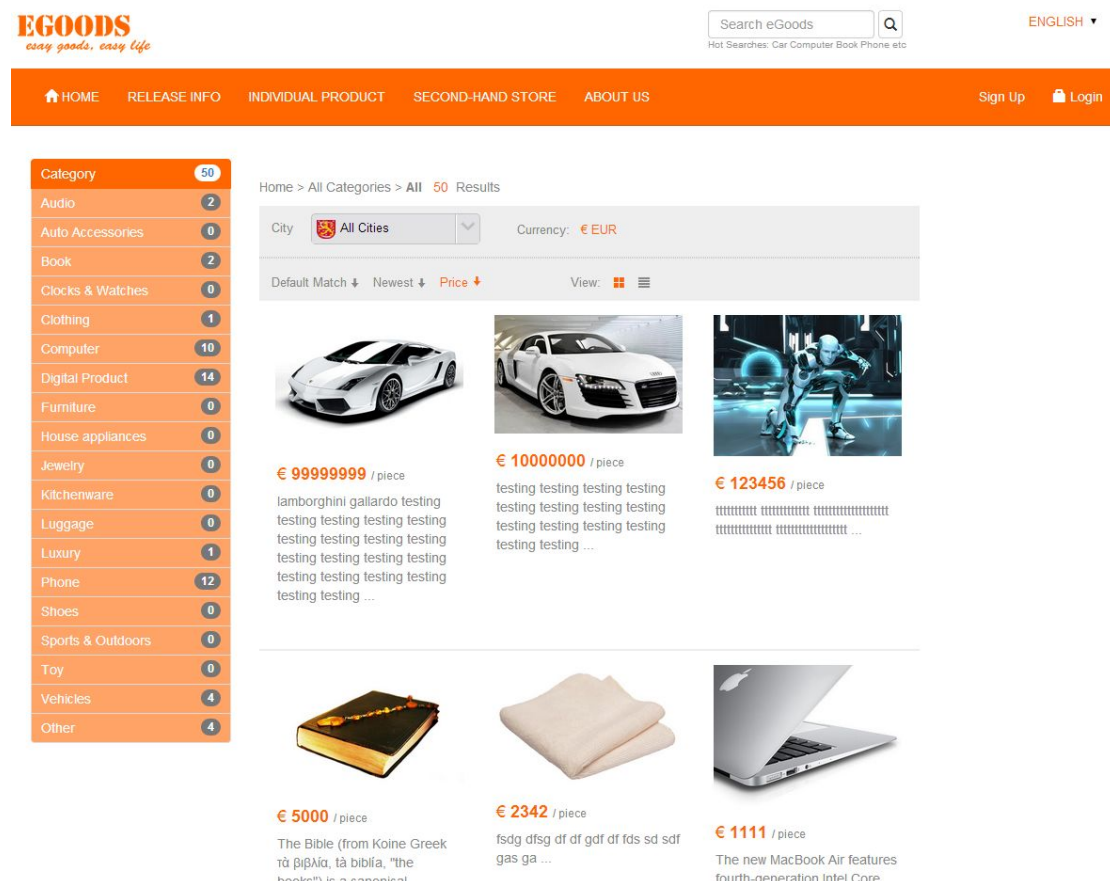
Figure 5.1.2 Server-side scripting example

The PHP, in Appendix VI, code presents the raw source code on the server side. After parsing of the server-side, it shows the HTML code in the browser of the client-side.

As can be seen from the two different codes, the user cannot view server-side scripting from the client. The code displays on the terminal browser as normal HTML after processing from the Web server.

5.2 File Handling

File handling is an important part of any web application, because the user often needs to process a file for different tasks, such as open/read, create/write, uploading or removing. The developer should be careful to manipulate files, if not, it may result in some errors, for instance, editing the wrong file, filling a hard-drive with garbage data, and deleting the content of a file by accident.

5.2.1 File Uploading Function

In this platform, the users have to upload images to a Web server while they release advertisement and apply functions. With PHP, it is very simple and easy to upload images to the Web server. In addition, the developer needs to modify the configuration file, php.ini file, and then search for "file_uploads", and set it on.

The following HTML code is a form that the user could choose image files to be uploaded. The result is shown as Figure 5.2.1.1

```
<!DOCTYPE html>
<html>
<body>
<form action="<?php echo htmlspecialchars($_SERVER["PHP_SELF"]);?>" method=
"post" enctype="multipart/form-data" class="form-horizontal" role="form">
 <div class="form-group">
<div class="input-group">
<span class="input-group-addon">Upload Photo</span>
<input type="file" class="form-control" name="picture" multiple/>
</div>
<button type="submit" name="submit" class="btn btn-info btn-lg btn-block"> Confirm
</button>
</div>
</form>
</body>
</html>
```

Figure 5.2.1.1 HTML image uploading form

Examples of PHP script, which shows how image be filtered and uploaded in a PHP file.

```php
if(isset($_REQUEST['submit']))
{
function check($var){
        return($var!="");
}
$allowedExts = array("gif", "jpeg", "jpg", "png");
$pics  = array_filter($_FILES["picture"]["name"],"check");
$sizes = array_filter($_FILES["picture"]["size"],"check");
$types = array_filter($_FILES["picture"]["type"],"check");

foreach($pics as $key=>$value){
        $temp = explode(".", $value);
        $extension[$key] = end($temp);
        if($sizes[$key] > 1024*1024){
            $errs = "Image size is bigger than 1024KB, Current
size:".($sizes[$key]/1024)." KB.";
        }elseif ((strcasecmp($types[$key],"image/gif")==0) ||
            (strcasecmp($types[$key],"image/jpeg")==0) ||
            (strcasecmp($types[$key],"image/jpg")==0) ||
            (strcasecmp($types[$key],"image/pjpeg")==0) ||
            (strcasecmp($types[$key]== "image/x-png")==0) ||
            (strcasecmp($types[$key]== "image/png")==0) &&
            n_array($extension[$key], $allowedExts)) {
                if(!is_dir("img/upload/")){
                    mkdir("img/upload/");
                }
```

```php
            $date = date("YmdHis");
            $filename[$key] = $date.mt_rand(10000,99999).basename($value);


            $picname[$i] = $filename[$key];
            $i++;


             if (file_exists("img/upload/".$filename[$key]))
            {
                $errs = "Sorry, Failed to upload, Try Again.";
            }else{
                foreach($pics as $key=>$value){
                    $path = "img/upload/".$filename[$key];
                    move_uploaded_file($_FILES["picture"]["tmp_name"][$key],
                                $path );
                }
                 $feedback =  "Image Successfully uploaded!";
            }
        }else{
                $errs = "Uploaded file is not allowed.";
          }
    }//end foreach function for filtering Image size.
}
```

5.2.2 File Removing Function

After uploading, the user may cancel their advertisement or the super administrator should manage these advertisements for legal and valid examination. For the sake of saving storage of Web server, these old files should be removed from the server.

Example of removing image from Web server

```php
<?php
$conn = mysqli_connect("localhost","root","root","test");
if(mysqli_connect_errno()){
    echo "Database connection failed ";
}
```
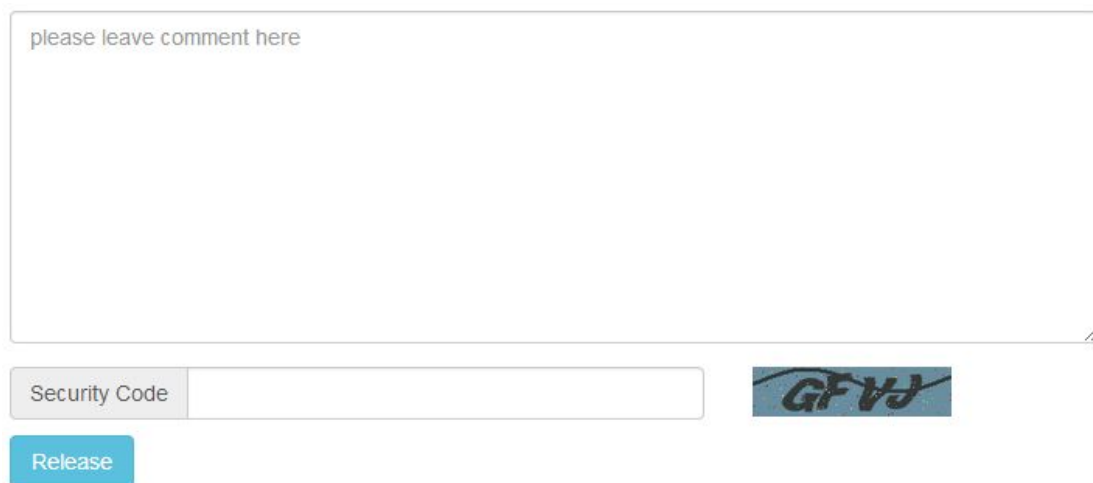
```php
mysqli_query($conn,"SET NAMES UTF8");

$pid = base64_decode($_GET['id']);
$sql = "SELECT filename FROM product Where id=".$pid;
$result = mysqli_query($GLOBALS['conn'],$sql);

if($result){
while($row = mysqli_fetch_array($result)){
                $dir = "imgs/upload/".$row['filename'];
                if(file_exists($dir)){
                    If(unlink($dir)){
                        echo ("Deleted image file");
                    }else{
                        echo ("Error deleting image file");
                         break;
                    }
                }
}// end while
}
?>
```

5.3 Graphics Function

In the project development, the security code is essential in sections of log in, registration or comment etc, for the sake of the security of web application, stopping the user entering the site by malicious programs. The technology of security code can effectively prevent the user from detecting illegal ways to improve the security of the site. Figure 5.3.1 shows the graphical security code on the comment system panel.

Figure 5.3.1 Security code in the comment system

The following part example is to generate an image by using PHP script.

```php
<?php
function getAuthImage($text) {
    $im_x = 160;
    $im_y = 40;
    $im = imagecreatetruecolor($im_x,$im_y);
    $text_c = ImageColorAllocate($im,mt_rand(0,100),mt_rand(0,100),
                                        mt_rand(0,100));
    $tmpC0=mt_rand(100,255);
    $tmpC1=mt_rand(100,255);
    $tmpC2=mt_rand(100,255);
    $buttum_c = ImageColorAllocate($im,$tmpC0,$tmpC1,$tmpC2);
    imagefill($im, 16, 13, $buttum_c);
```

```
    $font = 't1.ttf';

  .........OMITTED


   // Output calling function
   $checkcode = make_rand(4);
   getAuthImage($checkcode);
?>
```

The related detail code can be found in the appendix VII.

In summary, some GD and image functions should be explained.

* imagecreatetruecolor() returns an image identifier representing a black image of the specified size.
* imagecolorallocate(), allocating a color for an image. It must be called to create each color that is to be used in the image represented by image.
* imagefill(), which performs a flood fill starting at the given coordinate (top left is 0, 0) with the given color in the image.
* imagettftext() writes the given text into the image using TrueType fonts.
* imagesetpixel() draws a pixel at the specified coordinate.
* imagepng() outputs or saves a PNG image from the given image.
* imagedestroy() frees any memory associated with image.
 (PHP Manual 2015)

5.4 Security

Security is always a momentous part of the web application for the most of Web sites. The programmer should focus on the security of Web server and protect the data secure from prying eyes. In security services, there are five common points, including confidentiality, authentication, integrity, authorization, non-Repudiation. (Collins 2014, 58) With the tremendous growth of e-business, a major security breach is a story which destroys audience's confidence in that site. The mistake leads them to the competition and possibly leaving that site to evaporate as quickly as it appeared. (Converse & Park & Morgan 2004, 531)

The following three basic creeds is also from PHP5 and MySQL Bible.(Converse & Park 2004, 535) First of all, Every byte of data that derives from the internet should be treated as potentially hazardous. The Web server configuration restricts clients to view the source code. In addition, the sensitive data should be encrypted and have enough length characters for minimizing the damage. So the programmer have to minimize the damage from a particular type of security breach. Finally, if the programmer run their own server, spend some time breaking into it. If successful, they have identified a vulnerability that they can patch before an intruder finds it. It means that the programmer should tell himself about the site's security before others. So the programmer have to find the security issue before the intruders.

The encryption is the process of encrypting some sensitive data into unrecognizable information. It is hardly reconstructed the plain text from the encrypted information. However, the encrypted information can be easily decrypted into the original plain text by someone who has the proper key. Because the selected and integrated encryption function is not one-way.

With the help of mcrypt function, the sensitive information is easily changed into the uncertain information. For instance, the user's cookies should be encrypted while they sign in as the following code.

```php
<?php
$key = base64_decode("SDKFCEM9054FWERF+");
```

```
If(isset($_COOKIE["username"])){
$encryption = base64_decode($_COOKIE["username"]);
$user_name =  mcrypt_cbc ( MCRYPT_DES, $key, $encryption,
MCRYPT_ENCRYPT);
}
setcookie("username", base64_encode($encryption));
?>
```

If an intruder could view this program from his or her computer, he or she would have the proper encryption key and could decrypt the cookie values with ease.

5.5 E-Commerce Database Design

5.5.1 Introduction

This section will discuss the structure and components of the database for this second-hand platform system. In general, there are two major approaches to build an e-commerce system. The suite of tools could be used for customization, which is a solution, an example is IBM's Websphere Commerce Suite. (Shurety 1999) It could provide tools for building the infrastructure of a virtual shopping mall, like catalog templates, registration, shopping cart and transaction etc. Another solution is the bottom-up development of this system by the developers. In addition, the database model should manually support the business model of the e-commerce system developed.

In this project, the first solution was adopted. It means that the developer has to develop this application from bottom to up. The major issues (Buchner & Mulvenna 1998, 54) (Ceri & Fraternalim & Paraboschi 1999, 84) (Lohse & Spiller 1998, 81) of designing a database for e-commerce environment are:

- Supporting user interface at the database level (e.g., navigation, hyperlinks)
- Handling data operation (e.g., exporting description, naming, prices from database)
- Capturing data for customization such as navigation data within the context
- Catalog translation into a standard unified format
- Schema evolution (e.g., category of products, new products)
- Handling of multimedia and semi-structured data

5.5.2 E-Commerce Value Chain

The value chain model, as firstly explained by Porter (1985), was defined as nine strategically relevant activities that create value and reduce cost in a specific business. Five primary activities and four support activities are included in these activities. In primary activities, there are inbound logistics, operation, outbound logistics, marketing and service. The support activities include procurement, technology development, human resource management, and firm infrastructure. The

chain model is very meaningful for identifying specific activities in business where competitive strategies could be applied and where information systems are most likely to have a strategic impact. (Soliman 2003)

Figure 5.5.2.1 shows primary activities with five activities with the integration and interaction. The key to e-commerce is improving value chain efficiency.
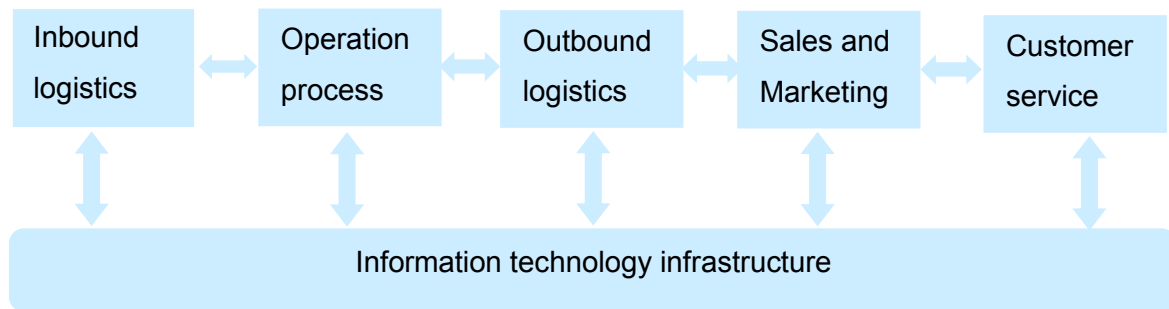
Figure 5.5.2.1 e-commerce value chain with primary activities

Meanwhile, the value chain could be simplified into four-process, including Attract, Interact, Act, And React. (Treese & Stewart 1998) Attract gets and keeps customer interest. Interact turns interest into orders. Act manages orders. React services customers. It could be considered as a minimal model for a working e-commerce system.

5.5.3 Database Schema Design

In this section, the EER (Enhanced Entity-Relationship) diagram of the database for the project are shown along with information about primary, foreign keys and others.

As Figure 5.5.3.1 shows, there are several tables, including user, store, owner, product, product_img, order, order_detail, comment tables. In addition, the EER diagram contains several entities, but lacks any relationships between them. The data model must also indicate whether objects are aware of (i.e., contain references to) one another. If one object contains a reference to another object, this is known as a unidirectional relationship. Likewise, if both objects refer to each other, this is called a bidirectional relationship. For example, the one-to-many relationship is between store and product, one store could contain one or more products. While linking tables together, foreign keys are added as new columns in the tables.
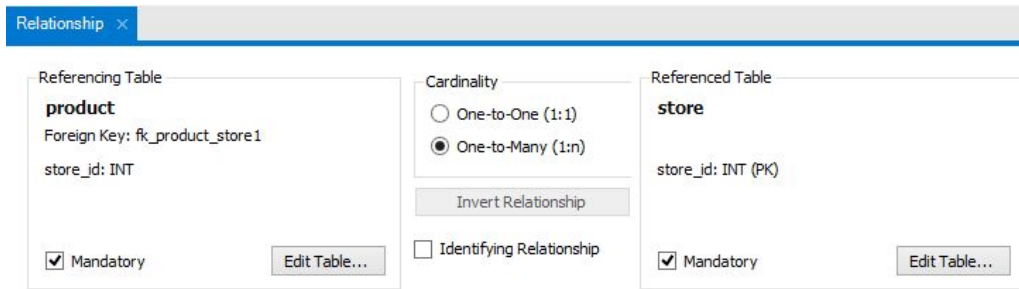
Figure 5.5.3.1 The Foreign Key tab in the Relationship editor

Figure 5.5.3.2 is the database schema for this research. It shows how many tables are in the data model with the relationships between tables.

comment
- 🔑 comment_id INT
- ◇ comment_descrition TEXT
- 🔶 user_id INT
- 🔶 store_id INT

Indexes
- PRIMARY
- fk_comment_user1_idx
- fk_comment_store1_idx

user
- 🔑 user_id INT
- ◇ user_email VARCHAR(255)
- ◇ user_password VARCHAR(255)
- ◇ user_city VARCHAR(45)
- ◇ user_last_login DATETIME

Indexes
- PRIMARY

order
- 🔑 order_id INT
- ◇ shipName VARCHAR(10...
- ◇ shipAddress VARCHAR(...
- ◇ secondShipAddress VA...
- ◇ orderCity VARCHAR(45)
- ◇ orderRegion VARCHAR(...
- ◇ orderZip VARCHAR(45)
- ◇ orderPhone VARCHAR(...
- ◇ orderEmail VARCHAR(45)
- ◇ orderDate DATETIME

Indexes
- PRIMARY

store
- 🔑 store_id INT
- ◇ store_se VARCHAR(50)
- ◇ store_name VARCHAR(100)
- ◇ store_email VARCHAR(100)
- ◇ store_phone VARCHAR(45)
- ◇ store_street VARCHAR(255)
- ◇ store_city VARCHAR(45)
- ◇ store_description TEXT
- ◇ store_coverimg VARCHAR...
- 🔶 owner_id INT

Indexes
- PRIMARY
- fk_store_owner1_idx

owner
- 🔑 owner_id INT
- 🔶 user_id INT

Indexes
- PRIMARY
- fk_owner_user1_idx

product
- 🔑 product_id INT
- ◇ product_title VARCHAR(45)
- ◇ product_category VARCH...
- ◇ product_price VARCHAR(...
- ◇ product_phone VARCHAR...
- ◇ product_email VARCHAR(...
- ◇ product_city VARCHAR(45)
- ◇ product_description TEXT
- ◇ product_publishdate DAT...
- 🔶 store_id INT

Indexes
- PRIMARY
- fk_product_store1_idx

order_detail
- 🔑 detail_id INT
- ◇ detailName VARCHA...
- ◇ detailPrice FLOAT
- ◇ detailSKU VARCHAR...
- ◇ detailQuantity INT
- 🔶 order_id INT
- 🔶 product_id INT

Indexes
- PRIMARY
- fk_order_detail_order1...
- fk_order_detail_produ...

product_img
- 🔑 id INT
- ◇ filename VARCHAR(255)
- 🔶 product_id INT

Indexes
- PRIMARY
- fk_product_img_product1_idx

Figure 5.5.3.2 The EER diagram of data model with tables for application

6. CONCLUSION

Since the term of the online shopping system was first introduced by Michael Aldrich in 1979, the popularity of e-business has made an exponential progress. In fact, there are some e-commerce platforms, such as eBay, Amazon, Taobao etc. The developers can design an interactive, exciting, and impressive web application by combining the front-end and back-end technologies.

First of all, the developers should make sure their web application is secure enough. Security is always a prerequisite for any network applications. From the view of database design, the developers should clearly know what kind of database structures are needed to support customization and personalization most effectively. For instance, the developers need to capture of what kind of data to build a web comment system for personalization. Moreover, which way is best to build a communication between the application and the users. Significant resources play a key role in the personalization process for capturing click-stream data and the user behavior patterns. What is more, there are some important services, such as the comment system, administrator system, store back-end system etc.

In addition, HTML references, such as tags, events, color names, entities, URL encoding, language codes, HTTP messages, attributes etc, have been finished for this research. For a better user interface, bootstrap theme, layout and cascading style allow developers to customize and enhance UI layer depending on the needs of research. In the architecture of egoods, it is inevitable to use Javascript and JQuery for making it more colorful and friendly. Meanwhile, the backbone of egoods has to be mentioned, because it is the specific bridge for communicating between people and computers. So PHP and MySQL are very important in this system. To some degree, the database can be treated as the brain to handle the requests from the outside world and PHP is like neurons to execute the code.

In brief, PHP, MySQL, HTML, CSS, Javascript are indispensable elements in egoods. At the same time, they are mutually individual from the theory aspect. The question is how to make them into an organic system for some specific functions.

As a result, this study has identified and confirmed the key factors so that the e-commerce can indicate the potential of the secondhand online platform. The aim of the project was to provide an e-platform so that recycling can be easier and more efficient in Finland.

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APPENDIX I   Navigation Menu collapse of Responsive Design

Example of HTML code, which shows how could navigation menu be arranged in HTML file.

```
<!--navigation section-->
<div id="nav">
<div class="navbar navbar-inverse navbar-static-top" role="navigation">
<div class="container">
<div class="navbar-header">
<button type="button" class="navbar-toggle" data-toggle="collapse" data-target=
".navbar-collapse">
<span class="sr-only">Navigation</span>
<span class="icon-bar"></span>
<span class="icon-bar"></span>
<span class="icon-bar"></span>
</button>
</div>
<div class="navbar-collapse collapse">
<ul class="nav navbar-nav">
<li><a href="overview.php">ABOUT US</a></li>
<li><a href="showStore.php">SECOND-HAND STORE</a></li>
<li><a href="products.php">INDIVIDUAL PRODUCT</a></li>
<li><a href="publishAds.php">PUBLISH ADS</a></li>
</ul>
<ul class="nav navbar-nav navbar-right">
<li><a href="reg/register.php">Sign Up</a></li>
<li data-toggle="modal" data-target="#myModal">
<a><span class="glyphicon glyphicon-lock"> </span> Login</a></li>
</ul>
</div><!--/.nav-collapse -->
</div>
</div>
</div>
<!--end navigation section-->
```

In addition, as below part of CSS code for above HTML code correspondingly.

```css
.navbar {
  position: relative;
  min-height: 60px;
  margin-bottom: 20px;
  border: 1px solid transparent;
}
@media (min-width: 768px) {
  .navbar {
    border-radius: 4px;
  }
}
@media (min-width: 768px) {
  .navbar-header {
    float: left;
  }
}
.navbar-collapse {
  overflow-x: visible;
  padding-right: 15px;
  padding-left: 15px;
  border-top: 1px solid transparent;
  box-shadow: inset 0 1px 0 rgba(255, 255, 255, 0.1);
  -webkit-overflow-scrolling: touch;
}
.navbar-collapse.in {
  overflow-y: auto;
}
@media (min-width: 768px) {
  .navbar-collapse {
    width: auto;
    border-top: 0;
    box-shadow: none;
  }
  .navbar-collapse.collapse {
    display: block !important;
```

```css
    visibility: visible !important;
    height: auto !important;
    padding-bottom: 0;
    overflow: visible !important;
  }
  .navbar-collapse.in {
    overflow-y: visible;
  }
  .navbar-fixed-top .navbar-collapse,
  .navbar-static-top .navbar-collapse,
  .navbar-fixed-bottom .navbar-collapse {
    padding-left: 0;
    padding-right: 0;
  }
}
```

APPENDIX II   Fading Modal for User Authentication Interface

HTML code is implemented as below:

```html
<div class="modal fade bs-example-modal-sm" id="myModal" tabindex="-1"
role="dialog" aria-labelledby="myModalLabel" aria-hidden="true">
<div class="modal-dialog modal-sm">
<div class="modal-content">
<div class="modal-header">
<button type="button" class="close" data-dismiss="modal">
<span aria-hidden="true">&times;</span><span class="sr only">Close</span>
</button>
 <h4 class="modal-title" id="myModalLabel">
<img src="logo_header.png"height="30px"/></h4></div>
<div class="modal-body">
<form class="form-horizontal" role="form" action="#" method="post">
<div class="form-group">
<div class="col-xs-12">
<div class="input-group">
<span class="input-group-addon"><label class="glyphicon glyphicon-user"></label>
</span>
<input type="text" name="user" class="form-control" placeholder="Email">
</div>
</div>
</div>

<div class="form-group">
<div class="col-xs-12">
<div class="input-group">
<span class="input-group-addon"><label class="glyphicon glyphicon-lock"></label>
</span>
<input type="password" name="password" class="form-control" placeholder
"Password">
</div>
</div>
</div>
```

```
<div class="form-group">
<div class="checkbox col-xs-12">
<label><input type="checkbox"> Remember me</label>
<label class="pull-right"> <a href="#">Forgot Your Password ? </a></label>
</div>
</div>

<div class="form-group">
<div class="col-xs-12">
<button type="submit" class="btn btn-primary btn-lg btn-block">Login</button>
</div>
</div>

<div class="form-group">
<div class="col-xs-12">
<label class="pull-right"> <a href="#">Register</a></label>
</div>
</div>
</form>
</div>

<div class="modal-footer">
<div class="form-group">
<div class="row">
<div class="col-xs-12"  style="text-align:left">
<p>Login using the following method</p>
<a  href="#"><img  src="Tencent.png"  style="margin-right:5px"  title="Tecent  QQ">
</a>
<a href="#"><img src="sina-weibo.png" style="margin-right:5px" title="Sina  Weibo">
</a>
<a  href="#"><img  src="facebook.png"  style="margin-right:5px"  title="Facebook">
</a>
<a href="#"><img src="twitter.png" style="margin-right:5px" title="Twitter"> </a>
</div>
</div>
</div>
```

```
</div>
</div>
</div>
</div>
```

Corresponding part of JavaScript code for above HTML code as below:

```
+function ($) {
var Modal = function (element, options) {
   this.options      = options
   this.$body  = $(document.body)
   this.$element = $(element)

   if (this.options.remote) {
    this.$element
      .find('.modal-content')
      .load(this.options.remote, $.proxy(function () {
       this.$element.trigger('loaded.bs.modal')
      }, this))
   }
 }
Modal.DEFAULTS = {
   backdrop: true,
   keyboard: true,
   show: true
 }
 Modal.prototype.toggle = function (_relatedTarget) {
   return this.isShown ? this.hide() : this.show(_relatedTarget)
 }


  Modal.prototype.show = function (_relatedTarget) {
   var that = this
   var e    = $.Event('show.bs.modal', { relatedTarget: _relatedTarget })

   this.$element.trigger(e)

   if (this.isShown || e.isDefaultPrevented()) return
```

```
    this.isShown = true
    this.checkScrollbar()
    this.setScrollbar()
    this.$body.addClass('modal-open')
    this.escape()
    this.resize()

    this.$element.on('click.dismiss.bs.modal', '[data-dismiss="modal"]', $.proxy(this.
hide, this))
    this.backdrop(function () {
      var transition = $.support.transition && that.$element.hasClass('fade')

      if (!that.$element.parent().length) {
        that.$element.appendTo(that.$body) // don't move modals dom position
      }

      that.$element.show().scrollTop(0)

      if (that.options.backdrop) that.adjustBackdrop()
      that.adjustDialog()

      if (transition) {
        that.$element[0].offsetWidth // force reflow
      }
}
........................// OMITTED PART OF CODE
 function Plugin(option, _relatedTarget) {
    return this.each(function () {
      var $this   = $(this)
      var data    = $this.data('bs.modal')
      var options = $.extend({}, Modal.DEFAULTS, $this.data(), typeof option ==
'object' && option)

      if (!data) $this.data('bs.modal', (data = new Modal(this, options)))
      if (typeof option == 'string') data[option](_relatedTarget)
      else if (options.show) data.show(_relatedTarget)
```

```
      })
    }

    var old = $.fn.modal
    $.fn.modal  = Plugin
    $.fn.modal.Constructor = Modal


    // MODAL NO CONFLICT
    $.fn.modal.noConflict = function () {
      $.fn.modal = old
      return this
    }
    // MODAL DATA-API
    $(document).on('click.bs.modal.data-api', '[data-toggle="modal"]', function (e) {
      var $this   = $(this)
      var href    = $this.attr('href')
        var $target = $($this.attr('data-target') || (href && href.replace(/.*(?=#[^\s]+$)/, '')))
        // strip for ie7
      var option  = $target.data('bs.modal') ? 'toggle' : $.extend({ remote: !/#/.test(href)
&& href }, $target.data(), $this.data())


        if ($this.is('a')) e.preventDefault()


      $target.one('show.bs.modal', function (showEvent) {
        if (showEvent.isDefaultPrevented()) return
        // only register focus restorer if modal will actually get shown
        $target.one('hidden.bs.modal', function () {
          $this.is(':visible') && $this.trigger('focus')
        })
      })
      Plugin.call($target, option, this)
    })
}(jQuery);
```

APPENDIX III   HTML Code of Category List Design

HTML code is implemented as below:

```html
<div class="list-group">
 <a href="?category=<?php echo base64_encode("All");?>" class="list-group-item active"> Category<span class="badge"><?php echo $total;?></span></a>

<a href="?category=<?php echo base64_encode("Audio");?>" class="list-group-item list-group-item-info"> Audio <span class="badge"><?php echo $num[0]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Auto Accessories");?>" class="list-group-item list-group-item-info">Auto Accessories  <span class="badge"> <?php echo $num[1]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Book");?>" class="list-group-item list-group-item-info">Book  <span class="badge"> <?php echo $num[2]; ?> </span></a>
<a href="?category=<?php echo base64_encode("Clocks Watches");?>" class="list-group-item list-group-item-info">Clocks & Watches <span class="badge">
<?php echo $num[3]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Clothing");?>" class="list-group-item list-group-item-info">Clothing <span class="badge"> <?php echo $num[4]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Computer");?>" class="list-group-item list-group-item-info">Computer <span class="badge"><?php echo $num[5]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Digital Product");?>" class="list-group-item list-group-item-info">Digital Product <span class="badge">
<?php echo $num[6]; ?></span></a>
```

```
<a href="?category=<?php echo base64_encode("Furniture");?>" class="list-group-
item list-group-item-info">Furniture  <span class="badge"><?php echo $num[7]; ?>
</span></a>


<a href="?category=<?php echo base64_encode("House appliances");?>"
class="list-group-item list-group-item-info"> House appliances <span class="badge">
<?php echo $num[8]; ?></span></a>


<a href="?category=<?php echo base64_encode("Jewelry");?>" class="list-group-
item list-group-item-info">Jewelry <span class="badge"><?php echo $num[9]; ?>
</span></a>


<a href="?category=<?php echo base64_encode("Kitchenware");?>" class="list-
group-item list-group-item-info">Kitchenware <span class="badge">
<?php echo $num[10]; ?></span></a>


<a href="?category=<?php echo base64_encode("Luggage");?>" class="list-group-
item list-group-item-info">Luggage <span class="badge"><?php echo $num[11]; ?>
</span></a>
<a href="?category=<?php echo base64_encode("Luxury");?>" class="list-group-item
list-group-item-info">Luxury <span class="badge"><?php echo $num[12]; ?></span>
</a>


<a href="?category=<?php echo base64_encode("Phone");?>" class="list-group-item
list-group-item-info">Phone <span class="badge"><?php echo $num[13]; ?> </span>
</a>


<a href="?category=<?php echo base64_encode("Shoes");?>" class="list-group-item
list-group-item-info">Shoes<span class="badge"><?php echo $num[14]; ?> </span>
</a>


<a href="?category=<?php echo base64_encode("Sports Outdoors");?>" class="list-
group-item list-group-item-info">Sports & Outdoors <span class="badge">
<?php echo $num[15]; ?></span></a>
```

```
<a href="?category=<?php echo base64_encode("Toy");?>" class="list-group-item
list-group-item-info">Toy <span class="badge"><?php echo $num[16]; ?> </span>
</a>


<a href="?category=<?php echo base64_encode("Vehicles");?>" class="list-group-
item list-group-item-info">Vehicles <span class="badge"><?php echo $num[17]; ?>
</span></a>


<a href="?category=<?php echo base64_encode("Other");?>" class="list-group-item
list-group-item-info">Other <span class="badge"> <?php echo $num[18]; ?>
</span></a>
</div>   <!-- end list group -->
```

APPENDIX IV   Control Panel of Product List Design

```
<div class="form-group" style="margin-right:85px">
<button type="button" class="sortType sortOn" id="def" value="def" onClick=
"changeSort(this)"> Default Match <span class="glyphicon glyphicon-arrow-
down" style="font-size:10px"></span></button>

<button type="button" class="sortType" id="new" value="new" onClick=
"changeSort(this)"> Newest <span class="glyphicon glyphicon-arrow-down"
style="font-size:10px"></span></button>

<button type="button" class="sortType" id="pri" value="pri" onClick=
"changeSort(this)"> Price</button><span class="glyphicon glyphicon-arrow-up
sortOff" id="arrow" style="font-size:10px"></span>
</div>

<div class="form-group" style="color:#888; padding-left:5px;">
 <span style="padding-right:5px;">View:</span></div>

<div class="form-group" style="color:#888;">
<button type="button" class="sortType" id="ga" value="gallery" onClick=
"changeView(this)"> <span class="glyphicon glyphicon-th-large" title="Gallery"
style="font-size:12px;"></span></button>

 <button type="button" class="sortType" id="li" value="list" onClick=
"changeView(this)"> <span class="glyphicon glyphicon-align-justify"
title="List" ></button>
</div>
```

The responsive javascript be executed when user trigger 'onClick' function.

```
<script t type="text/javascript">

function changeSort(s){
var sortBy = s.value;
var url = window.location.href;
```

```
//check whether url has ? mark
if(url.indexOf("?")==-1){ //no ? mark
    url = url.concat("?sortType="+sortBy+"&ph=1");
}else{ // has ? mark
  if(url.indexOf("sortType")==-1){ // no sortType
        url = url.concat("&sortType="+sortBy+"&ph=1");
  }else{ // has sortType
        var pat = /(def|new|pri)/gi;
        url = url.replace(pat,sortBy);
        url = url.replace("&ph=0","&ph=1");
  }
}
  window.location.href = url;
}


function changeCity(c){
var city = c.options[c.selectedIndex].value;
var url = window.location.href;
//check whether url has ? mark
if(url.indexOf("?")==-1){ //no ? mark
        url = url.concat("?city="+city);
}else{ // has ? mark
        if(url.indexOf("city")==-1){ // no city
                url = url.concat("&city="+city);
                if(url.indexOf("sortType")!=-1){ // sortType
                        url = url.replace("&ph=1","&ph=0");
                }
        }else{ // has city

                var cities =
'All|Aanekoski|Akaa|Espoo|Forssa|Hameenlinna|Hamina|Haukipudas|Heinola|Helsink
i|Hollola|Hyvinkaa|Iisalmi|Imatra|Jakobstad|Jamsa|Janakkala|Jarvenpaa|Joensuu|Jyv
askyla|Kaarina|Kajaani|Kangasala|Kauhava|Kemi|Kerava|Kirkkonummi|Kokkola|Kors
holm|Kotka|Kouvola|Kuopio|Kuusamo|Lahti|Lappeenranta|Laukaa|Lempaala|Lieto|Lo
hja|Loimaa|Mantta-Vilpula|Mariehamn|Mikkeli|Naantali|Nastola|Nokia|Nurmijarvi|
Orimattila|Oulu|Pargas|Pieksamaki|Pirkkala|Pori|Porvoo|Raahe|Raisio|Rauma|Riihim
aki|Rovaniemi|Salo|Sastamala|Savonlinna|Seinajoki|Siilinjarvi|Tampere|Tornio|Turku|
```

Tuusula|Uusikaupunki|Vaasa|Valkeakoski|Vantaa|Varkaus|Vihti|Ylojarvi';

```
        var arg = url.split("?");
        arg = arg[1].split("=");
        var dd,subarg;
        for(var i=0; i < arg.length; i++){
                if(arg[i].indexOf("&")!=-1){
                        subarg = arg[i].split("&");
                        for( var j=0; j < subarg.length ; j++ ){
                                if( cities.indexOf(subarg[j]) != -1){
                                        dd = subarg[j];
                                }
                        }
                }else{
                        if( cities.indexOf(arg[i]) != -1){
                                dd = arg[i];
                        }
                }
         }
        url = url.replace(dd,city);
        if(url.indexOf("sortType")!=-1){ // sortType
                url = url.replace("&ph=1","&ph=0");
        }
     }
  }
  window.location.href = url;
}

function changeView(v){
  var view = v.value;
  var url = window.location.href;

  if(url.indexOf("?")==-1){ //no ? mark
         url = url.concat("?view="+view);
  }else{ // has ? mark
         if(url.indexOf("view")==-1){ // no viewType
                url = url.concat("&view="+view);
```

```
            if(url.indexOf("sortType")!=-1){ // sortType
                    url = url.replace("&ph=1","&ph=0");
            }
        }else{ // has niewType
            var pat = /(gallery|list)/gi;
            url = url.replace(pat,view);
            if(url.indexOf("sortType")!=-1){ // sortType
                    url = url.replace("&ph=1","&ph=0");
            }
        }
    }
    window.location.href = url;
}

</script>
```

APPENDIX V   Code for Shopping Cart

HTML code with inseparable PHP script.

```php
<?php
$con=mysqli_connect("localhost","root","root","market");
// Check connection
if (mysqli_connect_errno()){
  echo "Failed to connect to MySQL: " . mysqli_connect_error();
}

if(isset($_POST['update'])){
    if(!empty($_SESSION['cart'])){
        foreach($_POST['quantity'] as $key => $val){
            if($val<=0){
                unset($_SESSION['cart'][$key]);
            }else{
                $sql = sprintf("SELECT quantity FROM object where
objectid=%d",$key);
                $row = mysqli_fetch_array( mysqli_query($con,$sql));
                if($row[0] >= $val ){
                    $_SESSION['cart'][$key]['quantity'] = $val;
                }else{
                    $_SESSION['cart'][$key]['quantity'] = $row[0];
                }
            }
        }// end foreach
    }
}
if(isset($_POST['empty'])){
    if(!empty($_SESSION['cart'])){
        foreach($_POST['quantity'] as $key => $val)
            unset($_SESSION['cart'][$key]);
    }
}
?>
```

```php
<form  method="post"
action="<?php echo htmlspecialchars($_SERVER["PHP_SELF"]); ?>">
<h3 style="color:#FFF; background-color:#FFA319; padding:5px;border-top-left-
radius:5px; border-top-right-radius:5px"> Shopping Cart </h3>
<div class="table-responsive">
<table class="table table-striped" style="margin-top:-10px; width:100%">
<?php
  if(!empty($_SESSION['cart'])){
?>
<thead>
     <tr class="success" style=" width:100%">
      <th width="10%"></th>
      <th width="8%">Name</th>
      <th width="50%">Description</th>
      <th width="8%">Quantity</th>
      <th width="8%">Price</th>
      <th width="8%">Subtotal</th>
      <th width="8%"></th>
     </tr>
</thead>
<?php
   }
      $sql = "SELECT * FROM object WHERE objectid IN(";
           if(!empty($_SESSION['cart']))
               foreach($_SESSION['cart'] as $id => $value){
                       $sql .=$id. ",";
               }
      $sql=substr($sql,0,-1) . ") ORDER BY title ASC";
      $query = mysqli_query($con, $sql);
      $totalprice=0;

      if(!empty($query)){
        while($row = mysqli_fetch_array($query)){
             $subtotal= $_SESSION['cart'][$row['objectid']]['quantity'] * $row['price'];
             $totalprice += $subtotal;
 ?>
```

```
<tr>
<td>
<img src="image/upload/<?php echo $row['pic']; ?>" width="72px" height="48px"/>
</td>
<td><?php echo $row['title']; ?></td>
<td><?php echo substr($row['description'],0,60)."..."; ?></td>
<td ><input  id="objquantity" type="text" name="quantity[<?php echo
$row['objectid']; ?>]" size="1"
value="<?php echo $_SESSION['cart'][$row['objectid']]['quantity']; ?>"
onBlur="qty(this)">
</td>
<td><?php echo $row['price']." &euro;"; ?></td>
<td><?php echo $_SESSION['cart'][$row['objectid']]['quantity']*$row['price'].
".00 &euro;"; ?></td>
<td><a href="productInStore.php?action=<?php echo base64_encode("remove");?>
&id=<?php echo base64_encode($row['objectid']);?>">Remove</a></td>
</tr>
<?php
            }
    }else{
?>
<tr><td colspan="7"><?php echo "<h4 style='color:#FFA319'> No Item in your
cart.</h4>"; ?></td></tr>
<?php
  }
  if(!empty($_SESSION['cart'])){
?>
<tr>
<td colspan="7">
<button class="btn btn-warning" type="submit" name="update">Update
Cart</button>
<button class="btn btn-warning" type="submit" name="empty">Empty Cart</button>
</td>
</tr>
<?php
  }
```

```
?>
<tr>
<td colspan="7">
 <h4 style="float:right; color:#FFA319; padding-right:1em;">Total Price:
<?php echo " " ."$totalprice". ".00  &euro;";?> </h4></td>
</tr>
<tr><td colspan="7">
<ul class="cartAction">
<li><a href="store.php">Continue Shopping</a></li>
<?php
   if(!empty($_SESSION['cart'])){
?>
<li><a href="#">Check Out</a></li>
<?php
    }
?>
</ul>
</td></tr>
</table>
</div>
</form>
<?php mysqli_close($con);  ?>
```

With Javacript trigger script.

```
<script type="text/javascript">
function qty(){
  quantity = document.getElementById("objquantity").value;
  if (quantity < 0){
      alert (" Quantity is more than 0. ");
      document.getElementById("objquantity").value=0;
  }
  if (quantity >=100){
      document.getElementById("objquantity").style.width="30px";
  }else if(quantity<100 && quantity >=10){
      document.getElementById("objquantity").style.width="20px";
  }
```

```
}
</script>
```

Meanwhile, it also needs PHP script in the product page with some actions.

```php
<?php
$conn = mysqli_connect("localhost","root","root","freetrade");
if(mysqli_connect_errno()){
     echo "<p class='bg-danger'> Database connection failed, </p>";
}
mysqli_query($conn,"SET NAMES UTF8");

if(isset($_GET['action']) && isset($_GET['id'])){
     $action = base64_decode($_GET['action']);
     $id = base64_decode($_GET['id']);

     //function to chech if the product id exists
     $SQL = sprintf("SELECT * FROM object where objectid=%d",$id);
     $flag = mysqli_num_rows(mysqli_query($conn,$SQL));
     if($flag){
        $row = mysqli_fetch_array(mysqli_query($conn,$SQL));
          switch($action){
             case "add":
             if(isset($_SESSION['cart'][$id])){
                $_SESSION['cart'][$id]['quantity']++;
                   if($row['quantity'] < $_SESSION['cart'][$id]['quantity']){
                            $_SESSION['cart'][$id]['quantity'] = $row['quantity'];
                   }
             }else{
               $_SESSION['cart'][$id] = array("quantity" => 1, "price" => $row['price']);
             }
             echo "<script> window.location.href= 'cart.php'</script>";
             break;

             case "remove":
             if(isset($_SESSION['cart'][$id])){
                 $_SESSION['cart'][$id]['quantity'] = 0;
```

```php
            unset($_SESSION['cart'][$id]);
        }
      echo "<script> window.location.href= 'cart.php'</script>";
        break;
    }// End switch operation for cart add,remove
  }else{
    echo "<p class='bg-danger'> Error, Products is Not Avaliable.</p>";
  }
}
?>
```

APPENDIX VI   Server-side Parsing

```
<!doctype html>
<html lang="en">
<head>
<title>eGoods</title>
<link href="style.css" rel="stylesheet">
<script src="js.js"></script>
<link rel="icon" href="favicon.ico">
</head>
<body>
<?php include_once 'Navbar.php';?>
<div class="container">
<div class="row">

<div class="col-sm-3" id="sidebar">
<div class="list-group">
 <a href="?category=<?php echo base64_encode("All");?>" class="list-group-item
active"> Category<span class="badge"><?php echo $total;?></span></a>

<a href="?category=<?php echo base64_encode("Audio");?>" class="list-group-item
list-group-item-info"> Audio <span class="badge"><?php echo $num[0]; ?> </span>
</a>

<a href="?category=<?php echo base64_encode("Auto Accessories");?>" class="list-
group-item list-group-item-info">Auto Accessories  <span class="badge"> <?php
echo $num[1]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Book");?>" class="list-group-item
list-group-item-info">Book  <span class="badge"> <?php echo $num[2]; ?> </span>
</a>

<a href="?category=<?php echo base64_encode("Clocks Watches");?>" class="list-
group-item list-group-item-info">Clocks & Watches <span class="badge">
<?php echo $num[3]; ?> </span></a>
```

```
<a href="?category=<?php echo base64_encode("Clothing");?>" class="list-group-
item list-group-item-info">Clothing <span class="badge"> <?php echo $num[4]; ?>
</span></a>
<a href="?category=<?php echo base64_encode("Computer");?>" class="list-group-
item list-group-item-info">Computer <span class="badge"><?php echo $num[5]; ?>
</span></a>

<a href="?category=<?php echo base64_encode("Digital Product");?>" class="list-
group-item list-group-item-info">Digital Product <span class="badge">
<?php echo $num[6]; ?></span></a>

<a href="?category=<?php echo base64_encode("Furniture");?>" class="list-group-
item list-group-item-info">Furniture  <span class="badge"><?php echo $num[7]; ?>
</span></a>

<a href="?category=<?php echo base64_encode("House appliances");?>"
class="list-group-item list-group-item-info"> House appliances <span class="badge">
<?php echo $num[8]; ?></span></a>

<a href="?category=<?php echo base64_encode("Jewelry");?>" class="list-group-
item list-group-item-info">Jewelry <span class="badge"><?php echo $num[9]; ?>
</span></a>

<a href="?category=<?php echo base64_encode("Kitchenware");?>" class="list-
group-item list-group-item-info">Kitchenware <span class="badge">
<?php echo $num[10]; ?></span></a>

<a href="?category=<?php echo base64_encode("Luggage");?>" class="list-group-
item list-group-item-info">Luggage <span class="badge"><?php echo $num[11]; ?>
</span></a>

<a href="?category=<?php echo base64_encode("Luxury");?>" class="list-group-item
list-group-item-info">Luxury <span class="badge"><?php echo $num[12]; ?></span>
</a>
```

```html
<a href="?category=<?php echo base64_encode("Phone");?>" class="list-group-item list-group-item-info">Phone <span class="badge"><?php echo $num[13]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Shoes");?>" class="list-group-item list-group-item-info">Shoes<span class="badge"><?php echo $num[14]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Sports Outdoors");?>" class="list-group-item list-group-item-info">Sports & Outdoors <span class="badge"><?php echo $num[15]; ?></span></a>

<a href="?category=<?php echo base64_encode("Toy");?>" class="list-group-item list-group-item-info">Toy <span class="badge"><?php echo $num[16]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Vehicles");?>" class="list-group-item list-group-item-info">Vehicles <span class="badge"><?php echo $num[17]; ?> </span></a>

<a href="?category=<?php echo base64_encode("Other");?>" class="list-group-item list-group-item-info">Other <span class="badge"> <?php echo $num[18]; ?> </span></a>
</div>   <!-- end list group -->
</div>

<div class="col-sm-9">
<div style="position:relative; margin-top:10px; padding:0 0;" class="col-xs-12">
 <?php
$conn = mysqli_connect("localhost","root","root","market");
if(mysqli_connect_errno()){
    echo "Database connection failed ";
}
mysqli_query($conn,"SET NAMES UTF8");
$sql = "select * from Object";
$result = mysqli_query($conn,$sql);
while($row = mysqli_fetch_array($result)){
```

```php
?>
<div class="thumbnail" style="float:left; margin:0 5px;width:223px; height:350px">
<a href="productDetail.php?pid=<?php echo base64_encode($row["id"]);?>">
<img src="upload/<?php echo $row['img'];?>" width="200px"  alt="<?php echo
substr($row['title'],0,30);?>">

</a>
<div class="caption" style="color:#888">
<h4 style="color:#ff6600">&euro; <strong><?php echo $row['price'];?>
</strong> <span style="color:#888; font-size:12px">/ piece</span>
</h4>
<p><a href="../pd/productDetail.php?pid=<?php echo base64_encode($row["id"]);?>"
class="prodes">
<?php
    $token = strtok($row['description'], " ");
    $j = 0;
     while ($token !== false && $j <= 20)
     {
            $j++;
            echo "$token ";
            $token = strtok(" ");
     }
?> ...
    </a></p>
   </div>
</div>
<?php
}
?>
</div>
</div>
</div><!-- end row -->
</div><!-- end container -->
</body>
</html>
```

When the PHP scripting engine parses the preceding PHP source, the following client-side code will be produced by the Web server and sent to the browser.

```
<!doctype html>
<html lang="en">
<head>
<title>eGoods</title>
<link href="style.css" rel="stylesheet">
<script src="js.js"></script>
<link rel="icon" href="favicon.ico">
</head>
<body>
<?php include_once 'Navbar.php';?>
<div class="container">
<div class="row">
<div class="col-sm-3" id="sidebar">
<a href="?category=QWxs" class="list-group-item active"> Category
<span class="badge">50</span></a>
<a href="?category=QXVkaW8%3D" class="list-group-item list-group-item-info">
Audio <span class="badge">2</span></a>
<a href="?category=QXV0byBBY2Nlc3Nvcmllcw%3D%3D" class="list-group-item
list-group-item-info">Auto Accessories  <span class="badge">0 </span></a>
<a href="?category=Qm9vaw%3D%3D" class="list-group-item list-group-item-
info">Book <span class="badge"> 2 </span></a>
<a href="?category=Q2xvY2tzIFdhdGNoZXM%3D" class="list-group-item list-group-
item-info">Clocks & Watches <span class="badge">0 </span></a>
<a href="?category=Q2xvdGhpbmc%3D" class="list-group-item list-group-item-
info">Clothing <span class="badge">1</span></a>
<a href="?category=Q29tcHV0ZXI%3D" class="list-group-item list-group-item-
info">Computer <span class="badge">10 </span></a>
<a href="?category=RGlnaXRhbCBQcm9kdWN0" class="list-group-item list-group-
item-info">Digital Product <span class="badge">14</span></a>
<a href="?category=RnVybml0dXJl" class="list-group-item list-group-item-
info">Furniture <span class="badge">0 </span></a>
<a href="?category=SG91c2UgYXBwbGlhbmNlcw%3D%3D" class="list-group-item
list-group-item-info"> House appliances <span class="badge">0</span></a>
```

```
<a href="?category=SmV3ZWxyeQ%3D%3D" class="list-group-item list-group-item-
info">Jewelry <span class="badge">0</span></a>
<a href="?category=S2l0Y2hlbndhcmU%3D" class="list-group-item list-group-item-
info">Kitchenware <span class="badge">0</span></a>
<a href="?category=THVnZ2FnZQ%3D%3D" class="list-group-item list-group-item-
info">Luggage <span class="badge">0</span></a>
<a href="?category=THV4dXJ5" class="list-group-item list-group-item-info">Luxury
<span class="badge">1</span></a>
<a href="?category=UGhvbmU%3D" class="list-group-item list-group-item-
info">Phone <span class="badge">12</span></a>
<a href="?category=U2hvZXM%3D" class="list-group-item list-group-item-
info">Shoes <span class="badge">0</span></a>
<a href="?category=U3BvcnRzIE91dGRvb3Jz" class="list-group-item list-group-item-
info">Sports & Outdoors <span class="badge">0</span></a>
<a href="?category=VG95" class="list-group-item list-group-item-info">Toy
<span class="badge">0</span></a>
<a href="?category=VmVoaWNsZXM%3D" class="list-group-item list-group-item-
info">Vehicles <span class="badge">4</span></a>
<a href="?category=T3RoZXI%3D" class="list-group-item list-group-item-info">Other
<span class="badge">4</span></a>
</div>
<div class="col-sm-9">
<div style="position:relative; margin-top:10px; padding:0 0;" class="col-xs-12">


<div class="thumbnail" style="float:left; margin:0 5px;width:223px; height:350px">
<a href="productDetail.php?pid=MTA3">
<img src="upload/SoftwareTestingWordle02.png" width="200px"  alt="TESTIONM">
</a>
<div class="caption" style="color:#888">
<h4 style="color:#ff6600">&euro; <strong>1</strong> <span
style="color:#888; font-size:12px">/ piece</span> </h4>
<p><a href="productDetail.php?pid=MTA3" class="prodes">SADF DSF SD ASD
ASDF SADF SAD  ...</a></p>
</div>
</div>


<div class="thumbnail" style="float:left; margin:0 5px;width:223px; height:350px">
```

```
<a href="productDetail.php?pid=Nzg%3D">
<img src="upload/t012c247cc188f19282.jpg" width="200px"  alt="pink book">
</a>
<div class="caption" style="color:#888">
<h4 style="color:#ff6600">&euro; <strong>5</strong> <span
style="color:#888; font-size:12px">/ piece</span> </h4>
<p><a href="productDetail.php?pid=Nzg%3D" class="prodes">
bulabulabulabulabula  ...
</a></p>
</div>
</div>

<div class="thumbnail" style="float:left; margin:0 5px;width:223px; height:350px">
<a href="productDetail.php?pid=NjY%3D">
<img src="upload/88523.jpg" width="200px"  alt="Ferrari">
</a>
<div class="caption" style="color:#888">
<h4 style="color:#ff6600">&euro; <strong>20</strong> <span
style="color:#888; font-size:12px">/ piece</span> </h4>
<p><a href="productDetail.php?pid=NjY%3D" class="prodes">testing testing testing
testing testing testing testing testing testing testing testing testing testing testing
testing testing testing testing testing testing testing  ...
</a></p>
</div>
</div>
<div style="border:1px #eee solid; margin:10px 0"></div>
<div class="thumbnail" style="float:left; margin:0 5px;width:223px; height:350px">
<a href="productDetail.php?pid=MTI2">
<img src="upload/555f79d9fb1ac7.jpg" width="200px"  alt="sdfsd">
</a>
<div class="caption" style="color:#888">
<h4 style="color:#ff6600">&euro; <strong>87</strong> <span
style="color:#888; font-size:12px">/ piece</span> </h4>
<p><a href="productDetail.php?pid=MTI2" class="prodes">hg1f t4ft fty fdtd t yddt
yfdty hdtyt  ...
</a></p>
</div>
```

```
</div>

<div class="thumbnail" style="float:left; margin:0 5px;width:223px; height:350px">
<a href="productDetail.php?pid=ODY%3D">
<img src="upload/2015020917454220623ferrari_100420855_l.jpg" width="200px"
alt="2014 Ferrari F70 HY-KERS - Spe">
</a>
<div class="caption" style="color:#888">
<h4 style="color:#ff6600">&euro; <strong>88</strong> <span
style="color:#888; font-size:12px">/ piece</span> </h4>
<p><a href="productDetail.php?pid=ODY%3D" class="prodes">this is just a model,
~~~~~ testing testing testing testing testing testing testing testing testing testing
testing testing testing testing testing  ...
</a></p>
</div>
</div>

<div class="thumbnail" style="float:left; margin:0 5px;width:223px; height:350px">
<a href="productDetail.php?pid=Nw%3D%3D">
<img src="upload/IMG_0121.JPG" width="200px"  alt="Testing">
 </a>
<div class="caption" style="color:#888">
<h4 style="color:#ff6600">&euro; <strong>111</strong> <span
style="color:#888; font-size:12px">/ piece</span> </h4>
<p><a href="productDetail.php?pid=Nw%3D%3D" class="prodes">testing testing
testing testing testing testing testing testing testing testingtesting testing testing  ...
</a></p>
</div>
</div>

</div>
</div>
</div><!-- end row -->
</div><!-- end container -->
</body>
</html>
```

APPENDIX VII   Generating Security Code by PHP Functions

```php
<?php
function getAuthImage($text) {
    $im_x = 160;
    $im_y = 40;
    $im = imagecreatetruecolor($im_x,$im_y);
    $text_c = ImageColorAllocate($im,mt_rand(0,100),mt_rand(0,100),
                                        mt_rand(0,100));
    $tmpC0=mt_rand(100,255);
    $tmpC1=mt_rand(100,255);
    $tmpC2=mt_rand(100,255);
    $buttum_c = ImageColorAllocate($im,$tmpC0,$tmpC1,$tmpC2);
    imagefill($im, 16, 13, $buttum_c);

    $font = 't1.ttf';

    for ($i=0;$i<strlen($text);$i++)
    {
            $tmp =substr($text,$i,1);
            $array = array(-1,1);
            $p = array_rand($array);
            $an = $array[$p]*mt_rand(1,10);
            $size = 28;
            imagettftext($im, $size, $an, 15+$i*$size, 35, $text_c, $font, $tmp);
    }

    $distortion_im = imagecreatetruecolor ($im_x, $im_y);

    imagefill($distortion_im, 16, 13, $buttum_c);
    for ( $i=0; $i<$im_x; $i++) {
      for ( $j=0; $j<$im_y; $j++) {
            $rgb = imagecolorat($im, $i , $j);
            if(  (int)($i+20+sin($j/$im_y*2*M_PI)*10)  <=  imagesx($distortion_im)&&
(int)($i+20+sin($j/$im_y*2*M_PI)*10) >=0 ) {
```

```php
                imagesetpixel ($distortion_im,
                (int)($i+10+sin($j/$im_y*2*M_PI-M_PI*0.1)*4) ,
                $j ,
                $rgb);
            }
        }
}


//Adding interference pixels;
$count = 160;
for($i=0; $i<$count; $i++){
        $randcolor=ImageColorallocate($distortion_im,mt_rand(0,255),
                                        mt_rand(0,255),mt_rand(0,255));
        imagesetpixel($distortion_im, mt_rand()%$im_x ,
                                        mt_rand()%$im_y , $randcolor);
}


 $rand = mt_rand(5,30);
 $rand1 = mt_rand(15,25);
 $rand2 = mt_rand(5,10);
 for ($yy=$rand; $yy<=+$rand+2; $yy++){
            for ($px=-80;$px<=80;$px=$px+0.1)
            {
                    $x=$px/$rand1;
                    if ($x!=0)
                    {
                            $y=sin($x);
                    }
                    $py=$y*$rand2;
                    imagesetpixel($distortion_im, $px+80, $py+$yy, $text_c);
            }
      }

            //Setting header type;
            Header("Content-type: image/JPEG");

            //out PNG type image;
```

```php
        ImagePNG($distortion_im);

        // Destroy the image and free space
        ImageDestroy($distortion_im);
        ImageDestroy($im);
}

function make_rand($length="32"){ //Code word generating function
        $str="ABCDEFGHIJKLMNOPQRSTUVWXYZ";
        $result="";
        for($i=0;$i<$length;$i++){
            $num[$i]=rand(0,25);
            $result.=$str[$num[$i]];
        }
    return $result;
}

// Output calling function
$checkcode = make_rand(4);
getAuthImage($checkcode);
?>
```