

Software Design Document  
for  
Online Shopping Mall  
TEXAS A&M UNIVERSITY  
11/15/2010

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## 1. Introduction

This document is the design report for a web-based Shopping Mall. This is mainly about 'how to do' and also will help provide an insight to the whole system design and implementation of the online Shopping Mall. This software has the following three main components:

1. Implement the different types of user – Administrator, Customer and Vendors.
2. Implement shopping cart for checkout and payment procedures.
3. Management of products and orders.

This design document mainly consists of State Machine/ Activity Flow Diagrams, Class Design, Internal Data Structures, Architectural design, User Interface and Testing. The main purposes of this design document are listed below.

1. Precise understanding of the requirements and constraints related with the programming language, and User Interface.
2. System decomposition into manageable units or modules
3. Abstraction of the system implementation with the help of classes
4. Provide a basic outline of the User Interface of the online shopping mall.

This report is the result of the design phase. The class diagrams and activity provide a schematic representation of the various classes used and design flow respectively. The diagrams were prepared using IBM Rational Software Architect. The Consolidated Activity diagram provides a model to visualize the flow in the system as a whole. The class diagrams also hold the data structures that would be used and also their data types.

The mall will be implemented using PHP as the programming language. MySQL database will be used to store vital user, product and order information.

### 1.1 Purpose

The purpose of this project is to create a functional website for people to be able to both buy and sell goods. Users of this website will be able to create an account which will supply them with an easy to use interface in order to both purchase items listed by other users and sell items to other users. The basic requirements state that the users will be able to securely register and manage their profiles. They will

also be able to navigate through available items by category, or by using a well executed search function. Finally, a payment mechanism will be built in to allow the use of credit cards and checks to purchase items in order to abstract away one of the most difficult parts of setting up an on-line store. The website will be maintained and managed by administrators. They will have the authority to approve and reject requests for new shops and maintain various lists of shop categories. The administrator will also be able to control customers and visitors actions.

## 1.2 Project Scope

For this project we want to define what will be done such that the final product meets expectations. With this in mind, the following are the parts that will be completed:

- Secure registration and profile management facilities for customers
- Browsing through the e-Mall to see the items that are there in each category of products like Apparel, Kitchen Accessories, Bath Accessories, Food, etc.
- Adequate searching mechanisms for easy and quick access to particular products and services
- Payment mechanism and gateway for all popular credit cards, checks and other relevant payment options.

In addition to the above mentioned basic functional requirements for the project, we plan for the following supplementary requirements as well. We will create a shopping cart so that the customers can save their items and checkout later with the entire shopping cart. A sorting mechanism for products in each category such as: most purchased, price from low to high, and newly listed. We also plan for a feedback mechanism for the products from the customers. Feedback can also be given on a particular vendor and the entire mall.

For maintaining the robustness of the system and also for the safety of customers and vendors, we will ensure following in the project:

- Overall system quality should be good and it should be a smooth experience for both vendors and customers.
- The system should be easy to maintain. We will be using object oriented programming techniques.
- Customers and vendors details will be secure from outside intruders.

- Safe payment gateways will be used and all the security checks will be made to ensure a safe deal.
- The system will remain up at all times. The hardware and software should be robust and will be tested extensively.

### 1.3 Technologies to be used

In order to credit the tools we will use and to provide some insight as to what is needed to create a project like this, the list below will highlight all software and technologies used in order to create the project and what it was used for.

Requisite Pro - Used to track progress on the project and to manage requirements

Eclipse - Integrated Development Environment used to write and debug code

MySQL - Database management system

MS Project - Project management software which is used to develop plans, assign resources, and create time lines

SVN - Revision control system used to keep track of revisions to the project

Junits - Used to create unit tests for our Java programs

Maven - Used to build, manage, and integrate our project

RSA - Used to model our desired architecture for the project

## 2. OVERALL DESCRIPTION

### 2.1 Product Perspective and Stakeholders

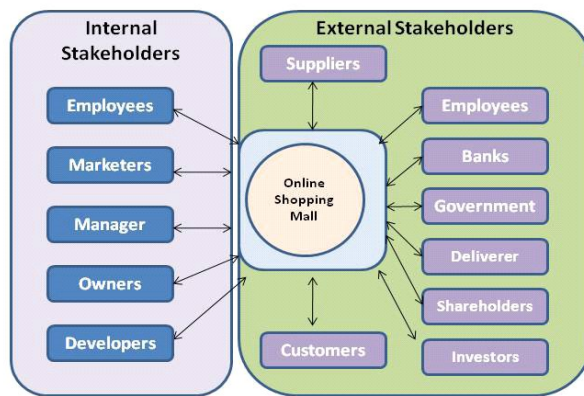
The Online Shopping Mall will provide easy access to consumers to products from different vendors without having to walk into the particular stores. It will also help vendors by reaching out to more and more customers through internet. It will be a win-win situation for all. The software will be designed to be easy to use with very good and intuitive CHI (Computer Human Interface) and reliability. It will be available to customers and vendors round the clock. The support will be added for every Operating System (Windows / UNIX / Mac).

On-line shopping malls have become an essential link between products and customers. In our project, we will be developing an online shopping system for all of our stakeholders. There will be two sets of stakeholders: external stakeholders and internal stakeholders.

External stakeholders consist of suppliers, banks, governments,

deliverers, shareholders, investors, and customers. The primary requirement is the ease with which they can find, transport, and purchase needed items.

The internal stakeholders consist of employees, marketers, managers, owners, and developers. Their primary requirement may be profit, both short and long-term. For these reasons, each group of stakeholders will want the website to emphasize high-margin items. Managers, another group of stakeholders, will require the application to track visitors. The application's developers are stakeholders too: They may want to use new development technology to keep up to date. Our team strives to look for improvement in all related business areas so that members can benefit from its services and obtain the best value for their interests.



## 2.2 Product Functions

### 2.2.1 for Users

- Basic Account features are required for both Customers and Sellers. This includes
  - Registering
  - Login
  - Forgot/change passwords
  - "Account Details" section containing contact details
- Browse and Search:
  - User should be able to browse through the entire items list by

modifying certain selection criteria's such as: Item category, Price range selection, Item/Seller Rating based selection

- In addition to providing the above mentioned search feature, user should also be able to search for a particular product
- This is applicable to all stakeholders (Guests, Customers, Sellers and Administrators)
- Shopping:
  - Add / remove items to their shopping cart/list
  - Customer should have the option to buy desired item(s) sold by one or more sellers.
  - Customer will have access to finalize product lists of items she wishes to buy and make the final payment
  - The website should support all popular credit cards and make sure that the transaction happens securely
- History
  - Shopping history: List of items previously shopped
  - Item View history : List of recently viewed items
  - Search history: Recent search criteria used by a customer

### 2.2.2 For Sellers

- Account Setting
- The requirements specified in the Accounts section in user requirements
- Shop installation request
- Sellers should get authorization from Administrator before selling products/installing shop(s) in the mall.
- Transaction history
- Status of all the transactions for a seller.

### 2.2.3 For Administrators

- Account Setting
- Authorizing shop installation requests
- Updating product information
- Monitoring transactions and keeping track of its status
- Update Seller/Customer/transaction information (In case of system errors/complaints)

## 2.3 User Classes and Characteristics

The system will be implemented for following users:

- For Customers/Visitors

A customer will be able to purchase items through the shopping mall. She will also be able to see her purchase history. A secure session would be maintained and a user name and password would be allocated for every customer. Customers won't be able to make changes to the system. She will only be able to browse through the items using search function and checkout them. She can then purchase it online via the secure payment method and by providing her billing address and shipping address. Customers will also be able to provide reviews for various items and rate them.

- For Administrators

An administrator has more privileges than regular user. Main functions of an administrator will be the management of customers and vendors. Administrators can view, modify and delete the personal information and passwords of members if necessary. They would also be able to search information about members and vendors. Administrators will also be able to view the invoice list of placed orders, orders that have shipped, and disqualified orders.

- Vendors

Any user can submit a shop creation request through the application. After the approval of the request by the Mall Administrator, the requester will be notified. The Shop Owner will be responsible for setting up her products and managing her shop. The shop owner will be able to add, remove or update items from her shop. She will need to assign items to categories listed by the Administrator so that the management of products in the mall is easy. The Shop Owner can also decide to close the shop and remove it from the mall.

## 2.4 Design and Implementation Constraints

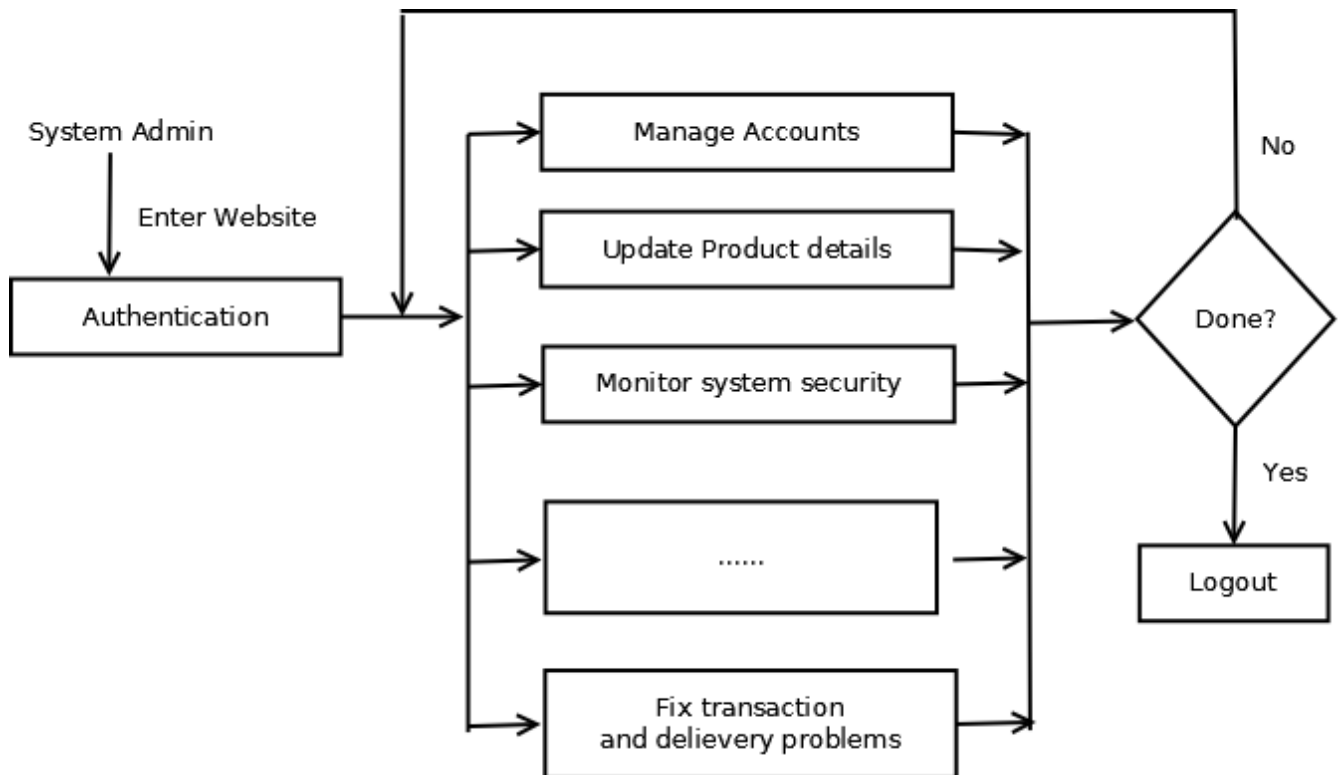
In order to create good software, design constraints and other contingencies need to be addressed. In this section we will enumerate any and all considerations that must be made when creating this project.



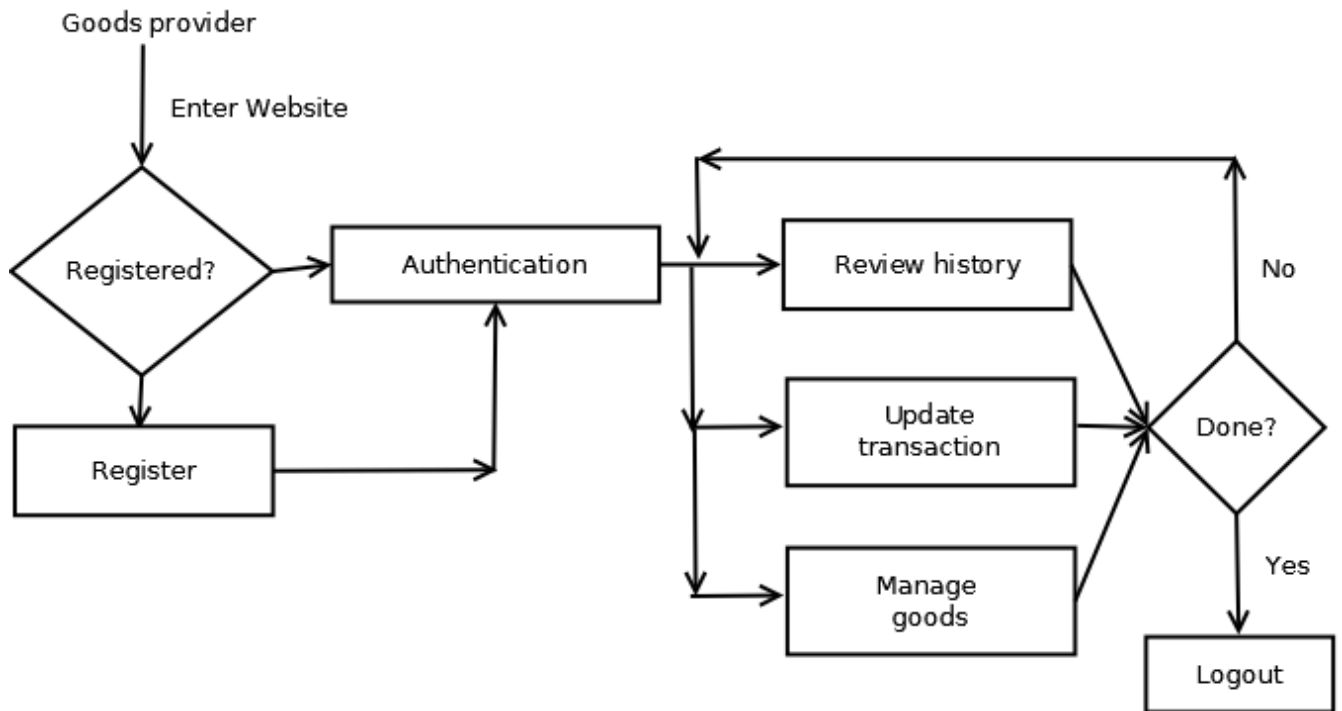
- Must be coded efficiently enough to run well on provided server hardware
- Client side code and/or web pages must be able to run efficiently on low end hardware
- The database will be created and maintained in a way that makes it of reasonable and manageable size.

### 3. Use cases and activity flow

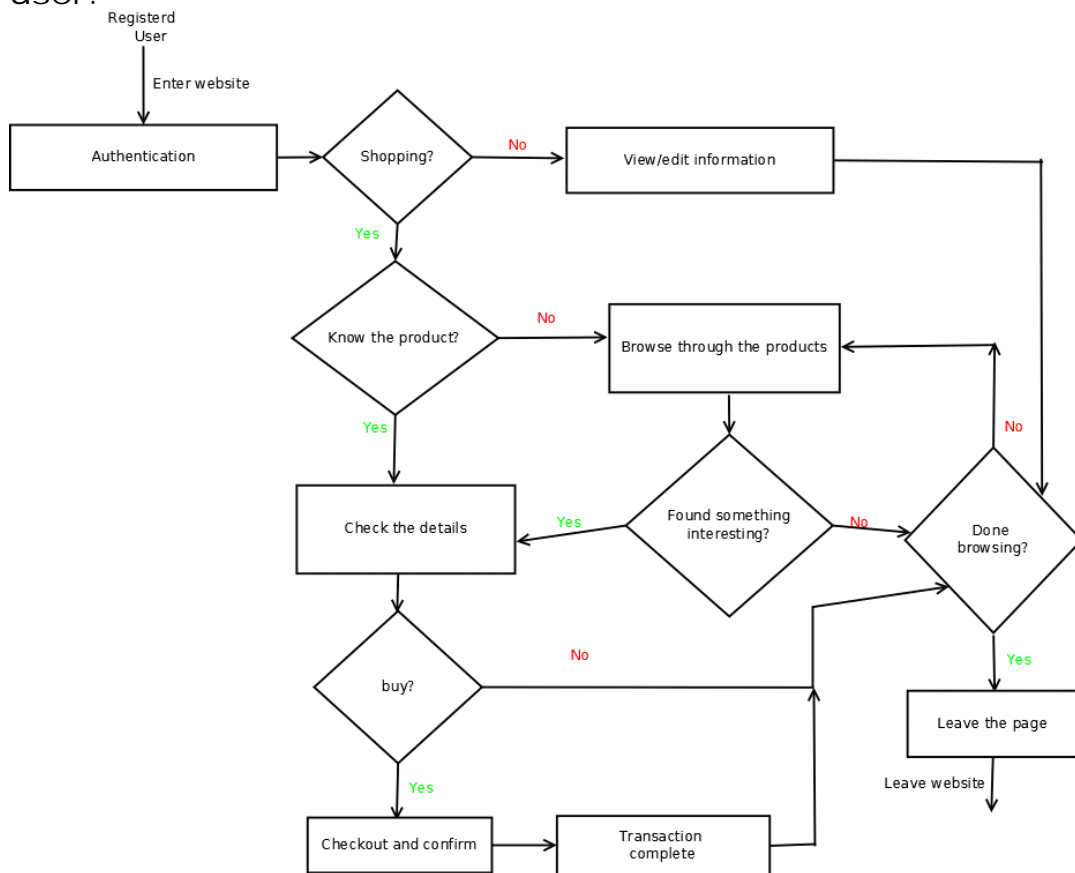
Activity Flow associated with the system administrator.



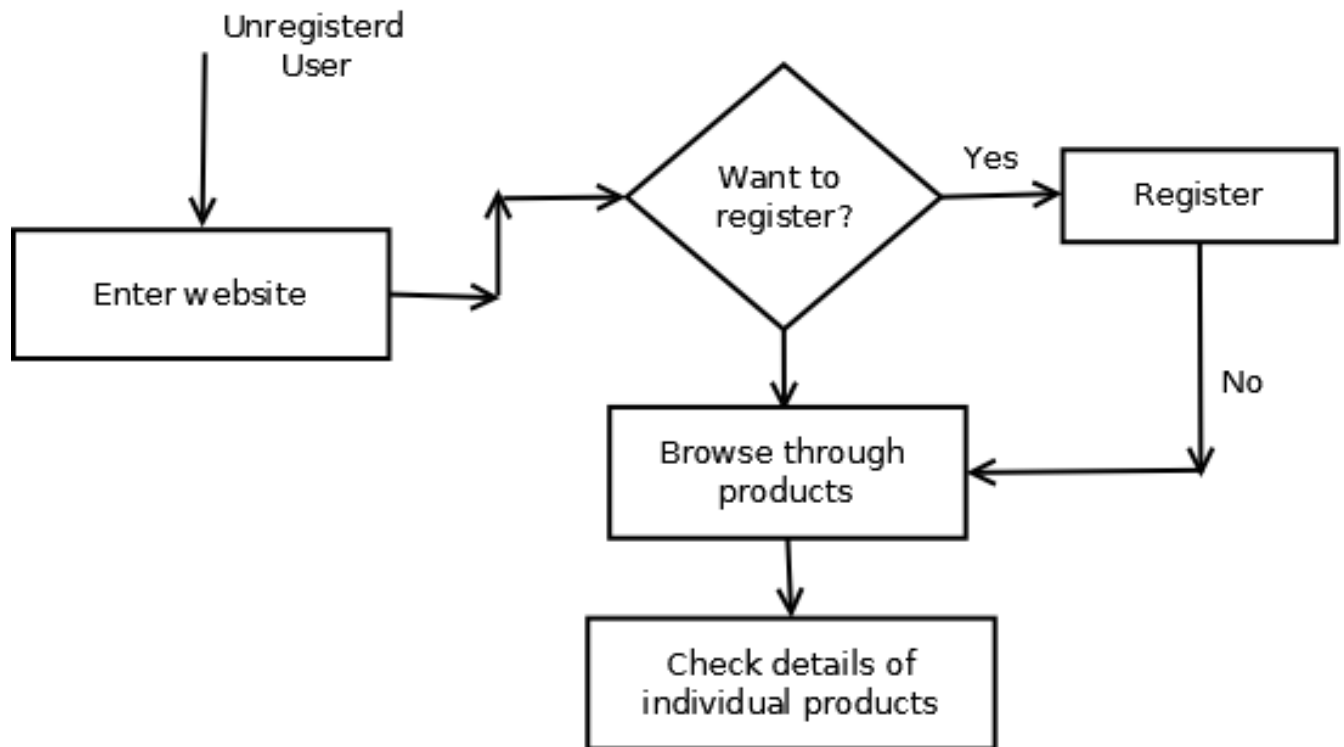
Activity Flow associated with a shop owner



Activity Flow associated with a registered user.

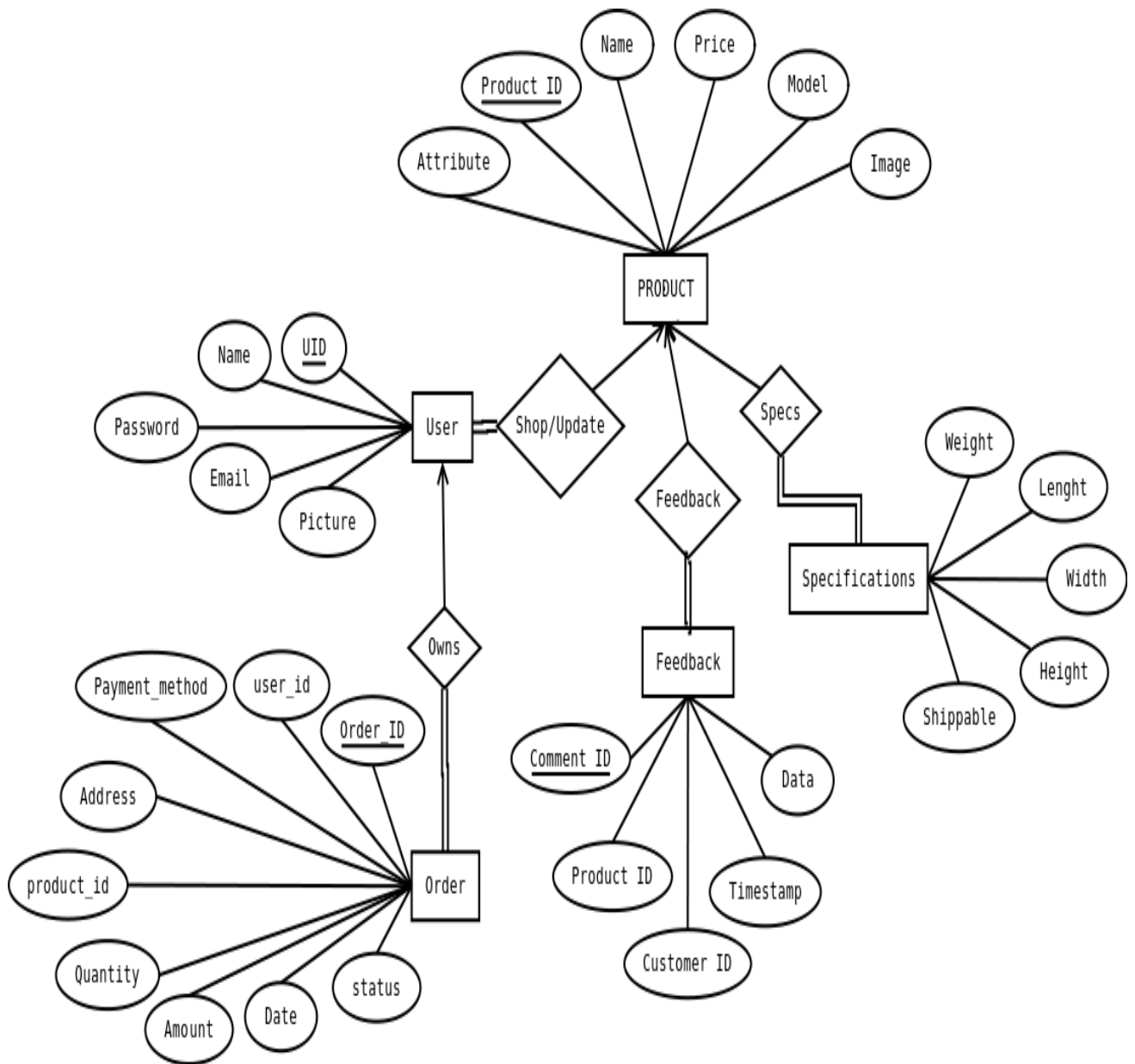


Activity Flow associated with an unregistered user.



## 4. System Analysis

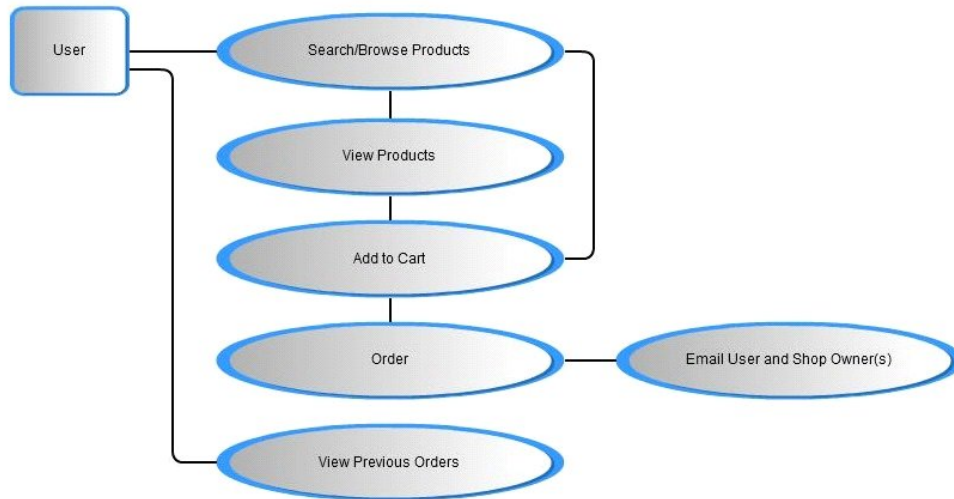
### 4.1 ER Diagram



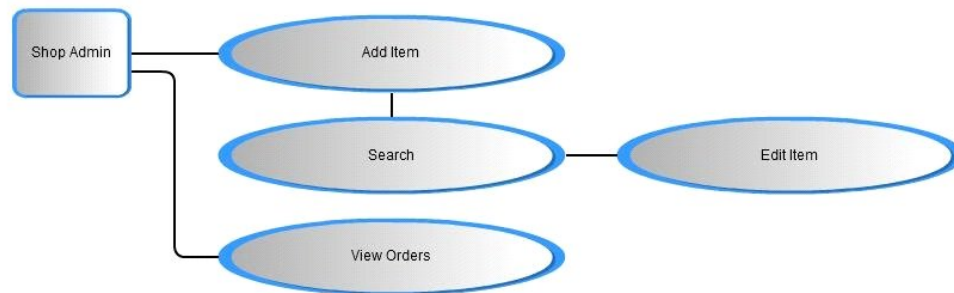
## 4.2 Data flow diagrams

These data flow diagrams represent the how information is moved from action to action for each user group. They show how information flows for each user and the paths they take as they complete various actions specific to their workflow.

Users:



Shop Admins:

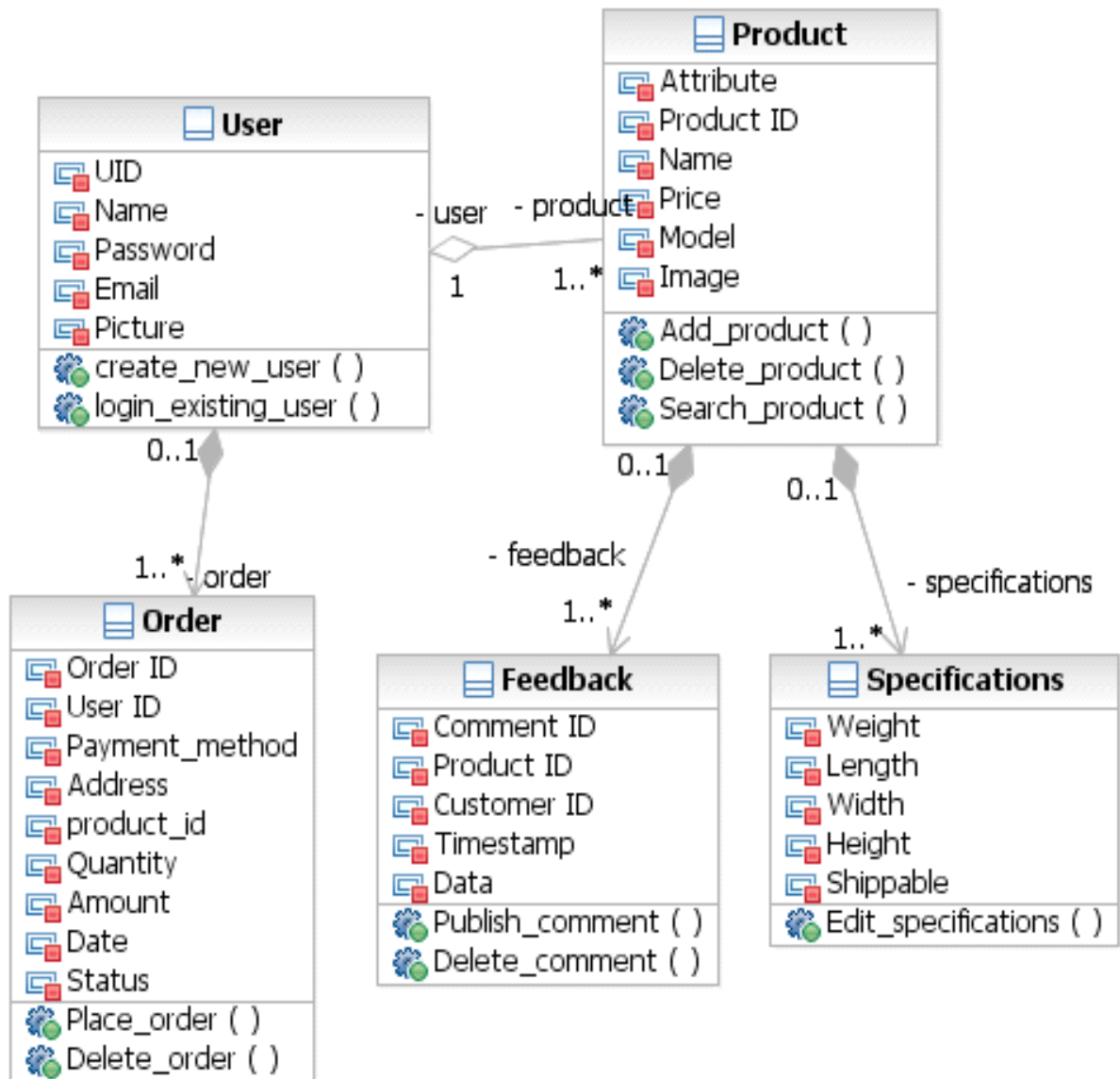


Administrators:



## 5. Classes

The following classes are used to design an online shopping mall. A class diagram is used to represent the relationship between the classes in a Unified Modeling Language (UML).



Class Diagram

- **User Class**  
The user class is used to store the details of all the users. It is used to create a new user or help an existing user login. There are two types of users: admin and a normal user. Every user can place an order or search for a product. The admin can add and delete products as well.
- **Order Class**

The order class contains the details of the placed order. This class is used to place or delete an order. The order class is notified when an order is placed or deleted by a user.

- Product Class

The product class contains the details of the products in the online shopping mall. This class will be notified when the user searches for a product or the admin adds or deletes a product.

- Feedback Class

The feedback class contains the details of the comments posted on the various products. This class is responsible for posting comments on products and deleting them by users.

- Specifications Class

The specifications class contains the various specifications of the products. This class is used to edit the specifications of the products.

## 5.1 Internal Data Structures

The Internal Data Structures are the member variables of each class. The following are the internal data structures used in each of the classes.

- User Class

- UID: this is the unique identifier of each user
- Name: the name of the user
- Password: the password of the user
- Email: the email id of the user
- Picture: the picture uploaded by the user

- Order Class

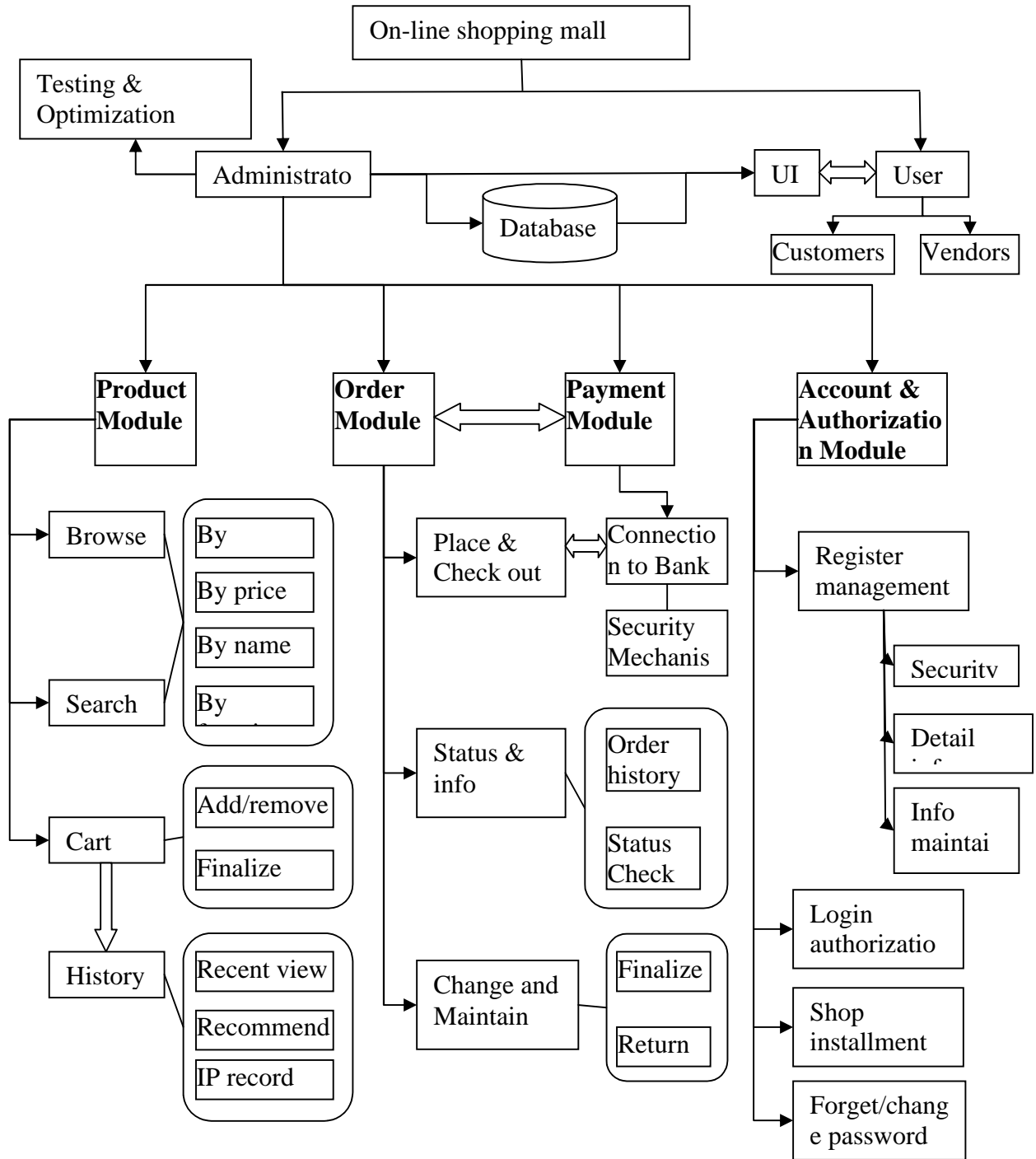
- Order ID: the order ID associated with that particular order
- User ID: the ID of the user who placed the order
- Payment method: the mode of payment
- Address: the shipping address of the user
- Product\_id: the ID of the product that was ordered
- Quantity: the number of items that were ordered
- Amount: the cost of the order
- Date: the date the order was placed

- Status: the current status of the order, whether the order was shipped or still in the processing stage
- Product Class
  - Attribute: the description of the product
  - Product ID: the unique ID of the product
  - Name: the name of the product
  - Price: the price of the product
  - Model: the model number of the product
  - Image: a picture of the product
- Feedback Class
  - Comment ID: the ID of the comment published
  - Product ID: the ID of the product on which the comment was made
  - Customer ID: the ID of the customer who made the comment
  - Timestamp: the time when the comment was made
  - Data: the string that was posted as a comment
- Specifications
  - Weight: the weight of the product
  - Length: the length of the product
  - Width: the width of the product
  - Height: the height of the product
  - Shippable: whether the product is shippable or not

## 6. System Architecture

Comparing to previous structures or architecture of functions or actors, this part mostly focuses on the overall system design architecture, which describes the internal necessary requirements and structures during design process for system designers.






In this figure, "→" means related function or management implementations, and "⇔" means related communication modules.

Except for UI, testing and optimization, the on-line shopping mall system is divided into 4 major modules as below. Each of them implements a primary utility for either vendors or customers or both.

- Product Module
  - Some of its sub-modules (or functions) are exclusive for customers. This module requires designers to implement browse and search function for our web visitors and is supposed to be as friendly as possible and as reliable as possible (i.e. fast, 7-24 service, barely break down and recovery). As it was mentioned in Part 2, browse/search should be by different categories. Then cart is necessary for users' convenience and they should be able to modify any selected items in the cart list. The history record could function as a browse/search history review, similar product recommendation, etc.
- Order Module
  - It contains three major roles, check-out, which connects customers, vendors, banks and administrators. Order information/status check, and order maintenance, which allows users to act (cancel/return etc.) on their placed orders to some extent.
- Payment Module
  - Provides payment methods (i.e. various bank cards or other commercial tools) and provides security mechanism
- Account & Authorization Module
  - This part creates and records user's information in database with different priority and authority, which might allow customers or vendors to have their own account to buy or sell. Related architecture is very straight forward. Administrator authorization required.

All the modules above should be able to connect to database system, normally execute basic SQL.

## 7. User Interface

groupapa.com

Go to ForumSee My Shopping cart

Home > User account

User account

Create new accountLog inRequest new password

Account information

Username: \*

Spaces are allowed; punctuation is not allowed except for periods, hyphens, and underscores.

E-mail address: \*

A valid e-mail address. All e-mails from the system will be sent to this address. The e-mail address is not made public and will only be used if you wish to receive a new password or wish to receive certain news or notifications by e-mail.

Personal Information

User Name:

Please enter your user name here

Create new account

some tags related products

comfortable DIY Hammer

houseware **useful**

more tags

## Create Account

☆ drupaltest@groupapa.com to me

show details 3:20 PM (8 hours ago) Reply

dongkum kim,

Thank you for registering at [groupapa.com](http://groupapa.com). You may now log in to <http://groupapa.com/drupal/user> using the following username and password:

username: dongkum kim

password: XXXXXXXXXX

You may also log in by clicking on this link or copying and pasting it in your browser:

<http://groupapa.com/drupal/user/reset/8/1289769619/c2589783559614efcde1e8caf2a82dbd>

This is a one-time login, so it can be used only once.

After logging in, you will be redirected to <http://groupapa.com/drupal/user/8/edit> so you can change your password.

-- [groupapa.com](http://groupapa.com) team

## E-mail notification



[houseware](#)
[useful](#)
[more tags](#)

Input format

Vocabularies

Catalogs:   
 Accessories   
 Games   
 Phones   
 Furniture   
 Tools   
 Hold Ctrl while clicking to select multiple categories.

Tags:   
 enter proper tags separated by commas.

Image:   
 [Choose File] No file chosen [Upload]   
 Maximum filesize: 8 MB   
 Allowed extensions: gif jpg png

Add another item

Product information

SKU:   
 Product SKU/model.

List price: \$ 0 Cost: \$ 0 Sell price: \$ 0   
 The listed MSRP. Your store's cost. Customer purchase price.

☒ Product and its derivatives are shippable.

Weight: 0 Unit of measurement: Pounds

Dimensions   
 Physical dimensions of the packaged product.   
 Units of measurement: Length: Width: Height:   
 Inches

Package quantity: 1   
 For a package containing only this product, how many are in it?

## Create Products

groupapa.com

Go to Forum See My Shopping cart Store Administer

Home

Search this site:  Search

Catalogs


- Phones (1)
- Furniture (1)
- Tools (2)

admin

- My account
- Create content
- Feed aggregator
- Administer
- Log out

some tags related products

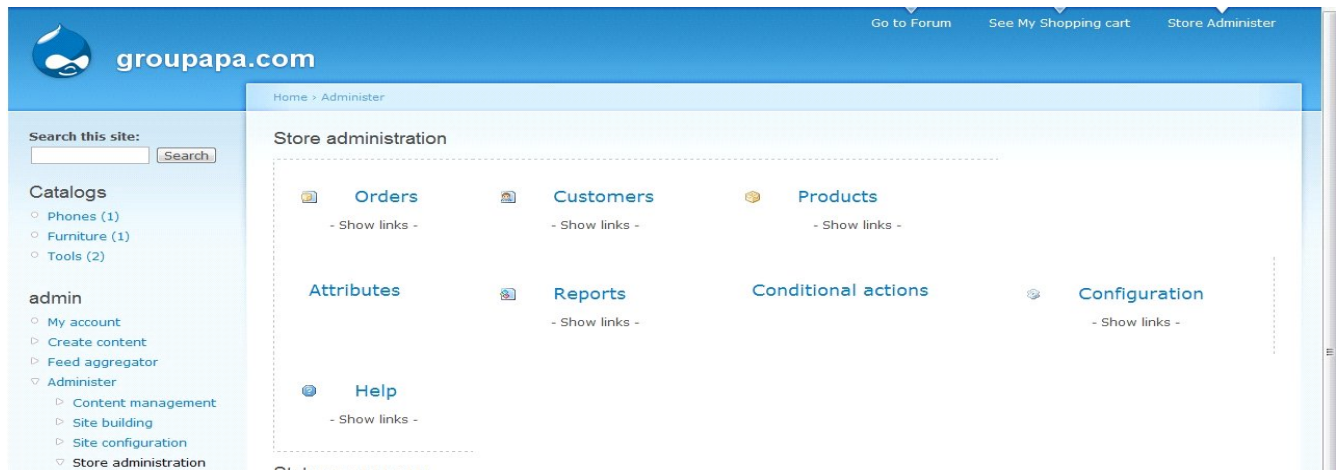
Shopping cart

Remove	Products	Qty.	Total
<input type="checkbox"/>	hammer	1	\$0.00
<input type="checkbox"/>	 IPHONE4	1	\$350.00
<input type="checkbox"/>	couch	1	\$0.00
			<b>Subtotal: \$350.00</b>

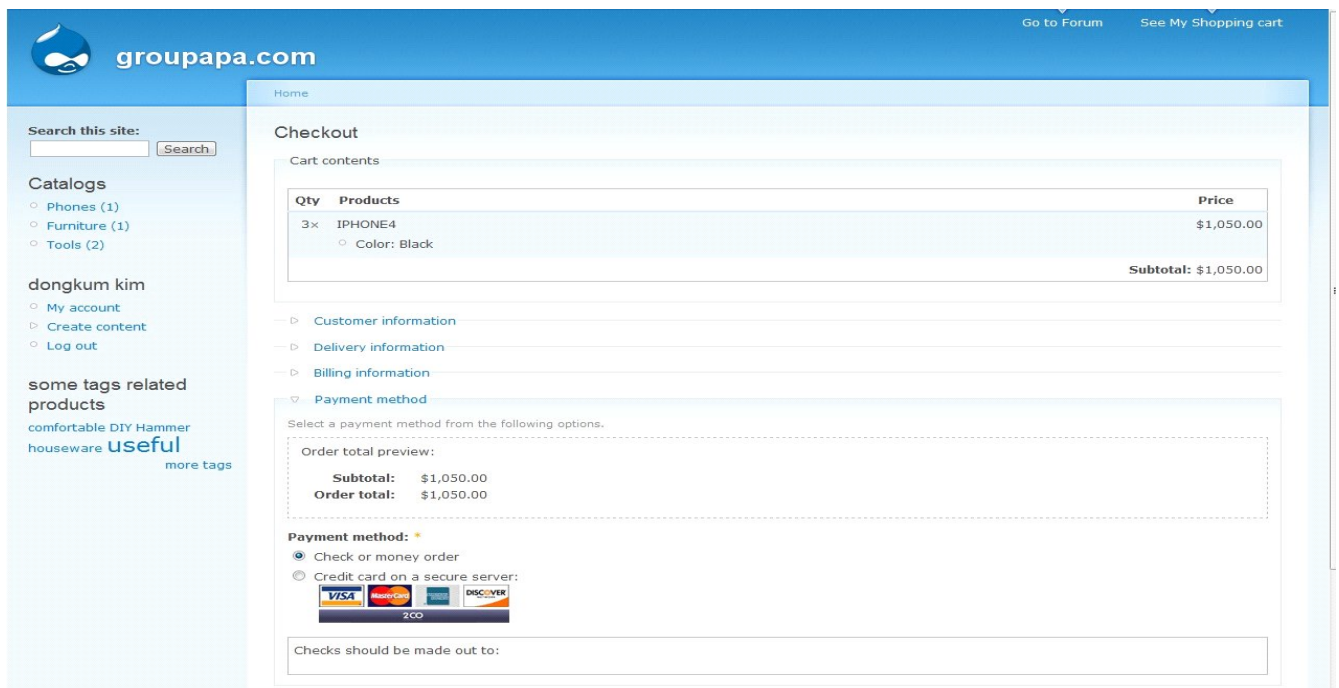
Continue shopping [Update cart.](#) [Checkout.](#)

Drupal

## Shopping Cart



Store Administer



Shipment and payment

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**Thanks for your order, dongkun!**

**Want to manage your order online?**  
 If you need to check the status of your order, please visit our home page at [Our store](#) and click on "My account" in the menu or login with the following link:  
<http://groupapa.com/drupal/user>

Purchasing Information:	
<b>E-mail Address:</b>	<a href="mailto:dongkunkim64@gmail.com">dongkunkim64@gmail.com</a>
<b>Billing Address:</b>	<b>Shipping Address:</b>
DONGKUN KIM	DONGKUN KIM
1501 TEXAS AVE	1501 TEXAS AVE
COLLEGE STATION, TX 77840	COLLEGE STATION, TX 77840
<b>Billing Phone:</b>	<b>Shipping Phone:</b>
<b>Order Grand Total:</b> \$1,050.00	
<b>Payment Method:</b> Check	
Order Summary:	
<b>Shipping Details:</b>	
<b>Order #:</b>	<a href="#">3</a>
<b>Order Date:</b>	11/14/2010 - 23:50
<b>Shipping Method:</b>	Standard delivery
<b>Products Subtotal:</b>	\$1,050.00
-----	
<b>Total for this Order: \$1,050.00</b>	
<b>Products on order:</b>	
3 x IPHONE4 - \$1,050.00 (\$350.00 each)	
SKU: LI_001	
• Color: Black	
-----	
<b>Where can I get help with reviewing my order?</b>	
To learn more about managing your orders on <a href="#">Our store</a> , please visit our <a href="#">help page</a> .	
Please note: This e-mail message is an automated notification. Please do not reply to this message.	
Thanks again for shopping with us.	
<a href="#">Our store</a>	

Final ordering information via E-mail notification

## 8. Testing

### 8.1 Unit testing

For not doing break the functionality of existing the system, we will test individual use cases and list down test cases for each of the use case.

#### 8.1.1 Log in

- Identification and Password properly initiated, encrypted, and validated
- MySQL injection test
- Checking for uppercase, lowercase, number, special character in ID and password
- Either of ID and password not blank
- Checking for overlapping ID

- f. Checking for weak passwords
- g. Not available to minors without permission from parents
- h. Checking for e-mail notification about making ID and initiating password

#### 8.1.2 Login and start shopping

- a. Correctly validated before starting a shopping
- b. Not possible to check out products which is already in progress
- c. Displaying list of all available products
- d. Checking for newest version products place on first page.
- e. Checking for exact number of products stocks
- f. Checking for available coupon information
- g. Checking for visibility about previous history of search
- h. Checking for system about suggestion for newest version of products

#### 8.1.3 View online help

- a. Help documentation appropriate to every occasion

#### 8.1.4 Payment

- a. Certification username and card information for security
- b. Consumer payment for money in proper order.
- c. Certification for expiration month and year
- d. Certification about CVS number
- e. Checking the maximum limit of credit card
- f. Checking for signature

#### 8.1.5 Shipping

- a. Checking for available address information
- b. Checking for private information and updated address
- c. Chargeable or no chargeable for shipping
- d. Checking for number about comment to deliveryman
- e. Checking about time for shipment
- f. Check about comment when the consumer will not be in home

#### 8.1.6 Logout



- a. Search history saved properly after logout
- b. Checking out information saved in database
- c. Customer redirected to the login screen
- d. Checking e-mail system about purchasing information

## 8.2 Integration testing

We consider the online shopping mall system as a black box and white box; also check up all of the parts. Also, we will conduct as following orders; creating test plans, performing code review of the application modules that integrate the application block, executing the use cases of the application, performing load testing, performing stress testing, performing globalization testing and perform security testing.

- System compatible with different web browsers (Google chrome, Fire fox, and IE)
- System compatible with different Operating System (Widows, Linux, and Mac)
- System compatible with 32 bit or 64 bit operation
- Stress testing against a large number of customers
- Stress testing against a large number of purchasing in one products
- Stress testing against security hazard from hackers

## 9. Conclusion

The application can be used for any E-commerce application. It is easy to use, since it uses the GUI provided in the user dialog. User friendly screens are provided. The application is easy to use and interactive making online shopping a recreational activity for users. It has been thoroughly tested and implemented.

The 'Online Shopping' is designed to provide a web based application that would make searching, viewing and selection of a product easier. The search engine provides an easy and convenient way to search for products where a user can search for a product interactively and the search engine would refine the products available based on the user's input. The user can then view the complete specification of each product. They can also view the product reviews and also write their own reviews. Use of Ajax components make the application interactive and prevent annoying post backs. Its drag and drop feature make it easy to use.

## 10. References

- <http://krex.k-state.edu/dspace/bitstream/2097/1109/1/ChaitanyaMittapelli2008.pdf>
- <http://www.ietymec.org/papers/N12.pdf>
- [http://osmlite.googlecode.com/files/OSM\\_SRS\\_v0.1.doc](http://osmlite.googlecode.com/files/OSM_SRS_v0.1.doc)[http://osmlite.googlecode.com/files/OSM\\_SRS\\_v0.1.doc](http://osmlite.googlecode.com/files/OSM_SRS_v0.1.doc)
- <http://www.it.iitb.ac.in/~kamlesh/Page/Reports/oos-project-report.pdf>
- [http://www.scribd.com/doc/15442179/Shopping-Cart-Software-Requirement-](http://www.scribd.com/doc/15442179/Shopping-Cart-Software-Requirement-HYPERLINK)  
[HYPERLINK "http://www.scribd.com/doc/15442179/Shopping-Cart-Software-Requirement-Specification"Specification](http://www.scribd.com/doc/15442179/Shopping-Cart-Software-Requirement-Specification)
- <http://www.ietymec.org/papers/N12.pdf>
- [http://osmlite.googlecode.com/files/OSM\\_SRS\\_v0.1.doc](http://osmlite.googlecode.com/files/OSM_SRS_v0.1.doc)[http://osmlite.googlecode.com/files/OSM\\_SRS\\_v0.1.doc](http://osmlite.googlecode.com/files/OSM_SRS_v0.1.doc)
- <http://www.it.iitb.ac.in/~kamlesh/Page/Reports/oos-project-report.pdf>