



Design and Development of an Online Shopping System Using ASP.NET

A Research Paper

Amani Musbah Farfar

اماني مصباح كريم فرفر
المعهد العالي للعلوم والتقنية الاصابة

ABSTRACT

This research paper explores the complete design, development, and implementation of an online shopping system tailored for San Antonio Shoes. The system is built using ASP.NET and SQL Server, providing customers with seamless access to browse products, add them to a shopping cart, and complete purchases. Administrators are equipped with powerful tools to manage inventory, product types, and customer orders. The paper also examines the importance of e-commerce in modern business environments and how digital transformation increases operational efficiency. The findings demonstrate that the developed system improves user experience, reduces manual administrative tasks, and supports scalability for future expansion, including the integration of secure online payment gateways

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Introduction

Online shopping allows customers to view products, browse for information, select items, and collect them in a shopping cart before ordering. The system manages customer data, product information, and transactions. Management can add, edit, and view products, while administrators can monitor, edit, or remove transactions. Customer information is kept confidential but can be accessed by authorized administrators.

San Antonio Shoes is a virtual store where customers can browse the catalog and place orders by providing billing and shipping addresses, delivery options, and payment details. Notifications are sent once an order is placed.

Although online shopping is convenient, some people prefer physical stores to touch products, try on clothing, and enjoy social interaction. Online shopping offers advantages such as access to niche products, comparing items across stores, and avoiding crowded shops.

With rapid technological growth, e-commerce is increasingly popular, creating the need for online shopping systems that are simple, secure, and user-friendly.

Background of the project

Currently, San Antonio Shoes does not directly sell shoes over the Internet. Their products can be purchased at retail stores. The most recent trend in the shoes industry is to use website as a direct-to-customer channel. The



company wishes to develop a website to market their products and serve as a resource for both existing customer and potential new customer.

In order to solve this, simple and secure online shop system has to be developed.

Benefits of the project

Using this system, we can buy goods or products online just by visiting the website, ordering the item and making payments online. Being able to solve complexity and security problem this system it will be easier for new customers to use and secure for customer's data and their details. There will be reduced expenditure, reduced risk of customer's cash loss to the company. The system also minimizes on expenditure and cost of transport for customers.

Purpose of the project

The purpose of the project is to come up with electronic commerce system that is simple and secure for San Antonio Shoes shop.

Significance of the project

The significance of the project is to create an online shop management system that will provide secure services to customers, easy to use and provide management with features of store (products) management.

Objectives

This project is about a website for San Antonio Shoes Online Shop that has been implemented using Visual Studio ASP.NET. As requested by the company, this website provides the opportunities for customers to purchase leather products on Internet. The based objectives of this system are:

- To come up with a system that will keep secure records of the customers
- To develop a system that enable customers to purchase San Antonio products online.
- To develop a system that enable San Antonio shops to manage the sales' records and clients' records.

Scope of the Study

The front-end system of the San Antonio web application includes the main functionalities of online shopping, with extra features added as needed. Access is divided into two sections:

a) User Interaction Section: Users can browse products, add items to the shopping cart, and proceed to checkout.



b) Admin Interaction Section: Admins can browse products, add items to the cart, complete checkouts, and manage database tables such as the product table and product type table.

Targeted Audience: The website mainly targets working-class families in the country and international customers. People worldwide who are interested in leather products can access the site and shop online.

Project Schedule

Duration is in weeks.

Figure 1: Project Schedule

Activity	1	2	3	4	5	6	7	8	9	10	11
Project proposal	█										
Feasibility study		█									
Req. analysis			█	█							
System design				█	█	█					
System coding						█	█	█	█		
testing										█	
Implementation										█	█
Documentation	█	█	█	█	█	█	█	█	█	█	█

Summary of the major functions

This system will provide many features throughout the web application, these functionalities are as follow:

- An online shopping system that will enable customers to buy and order products online.
- An online shopping management that enable shop management to manage stores, transaction data and customers' data.
- An interface that is easy and user friendly to use.
- A login page that prompts for user password when accessing shopping cart.
- Administration login page that prompts management to login to view, edit, delete, add products to store and manage the store.
- A help page that guides the user how to use the application.

Requirement Specification

A requirement is a software capability that must be achieved by a system to satisfy obligations, prescribed standards, or desired features.

Software requirements

- Windows Operating System Windows 7/XP/8/10
- Web browser e.g. Mozilla Firefox, opera, Safari or Netscape Navigator



- Visual Studio .NET 2015
- SQL Server 2014

Hardware requirements

- Pentium IV 1 GHz.
- Minimum of 512MB RAM (Recommended).
- 40GB Hard disk for storage.

Audience Modeling:

User Requirements for the Proposed System

- Have a user-friendly interface and user guides understandable by people of average computer skills.
- Should demonstrate robustness so that in event of any failure, the system should be able to recover automatically to its initial state.
- Be able to handle multiple users at the same time and with the same efficiency, this will cater for the large and ever growing number of new clients.

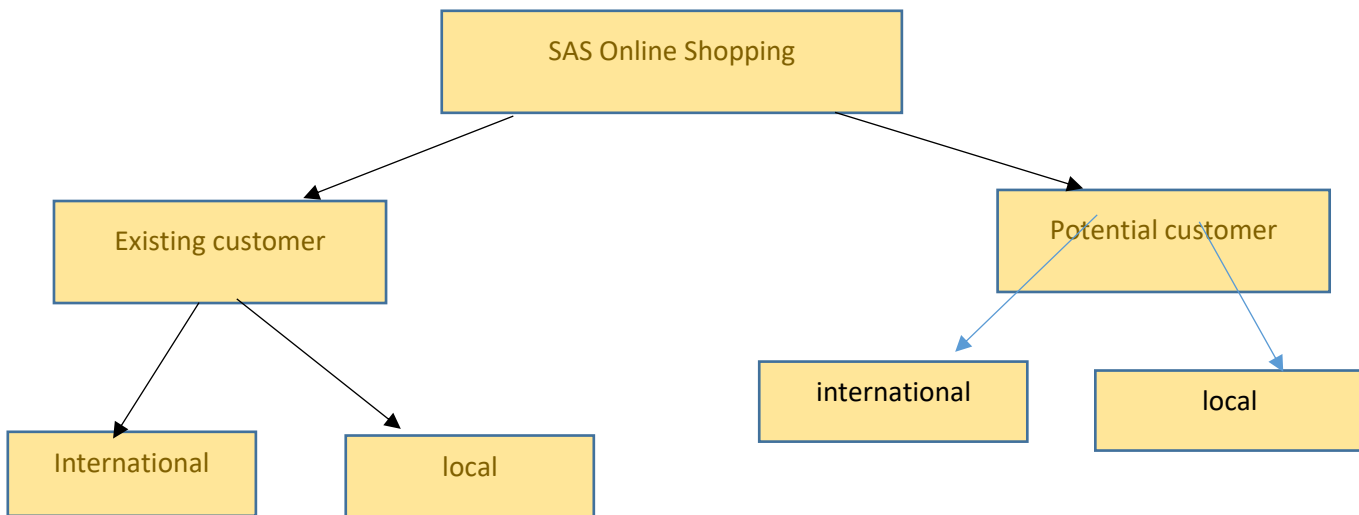


Figure 2: Audience Modelling:

In this section you will find all diagrams related to this web application. Diagrams which you will find here are:

- Task & Information Modeling
- Navigation Design
- Database Table Diagram

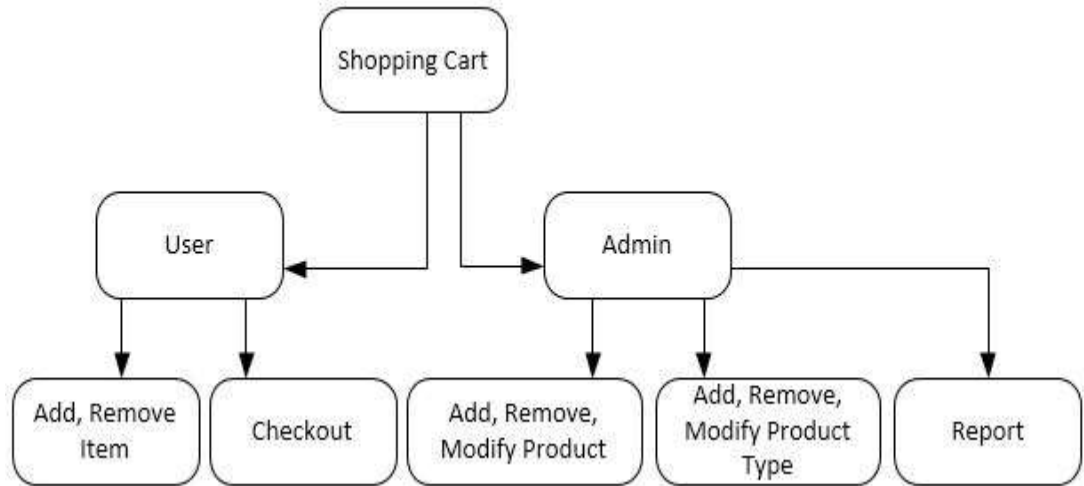


Figure 3:conceptual structure

To achieve the most accurate audience characterization, I have separated our audience into two sections:

- 1) Normal users who reaches our website through Internet from working class in country and overseas.
- 2) Admins who will manage the product inventory, product types and manage the business reports.

Task & Information Modeling

This part explains the task which are permitted to users (normal customer, administrator and potential customer). All information is modeled based on three types of audience targets: customer, admin and potential customer.

- Administrator: as shown in figure below, administrator tasks are displayed in Figure 4

Admin tasks:

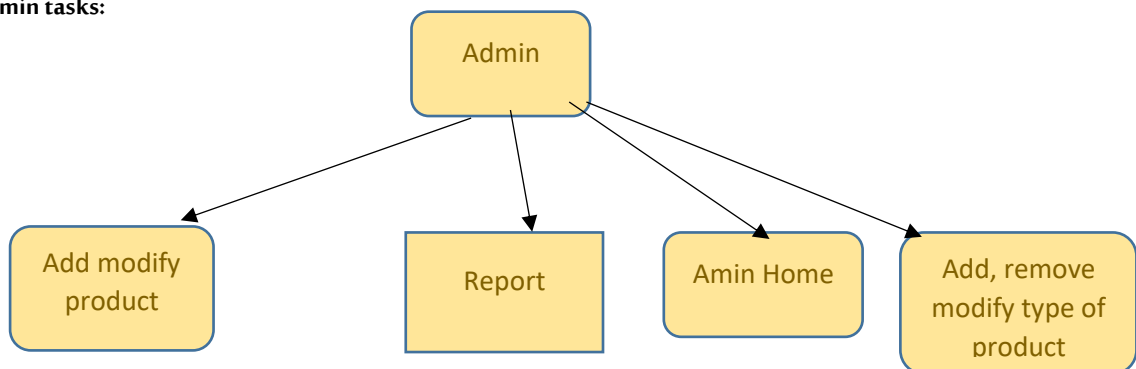


Figure 4: Admin tasks

- Login: Administrator also has to login into the system to start making modifications and administrations over the system. The web.config file will distinguish the admin from all other normal customers



- where admins can login into their account: Administrator will have management page they can add, update or delete products from the online shop.
- Add, Update, Delete Product Type: in the management page, administrator can also add, update and delete from product type which are associated with products type, in our example here some of the product types are: Men Shoes, Women Shoes, Handbags.
- Report Delivery: all delivery reports can be seen in Report Page where administrator can set pending items to marked "delivered".
- User: user's tasks follow as figure below, from browsing through products to shop multiple items.

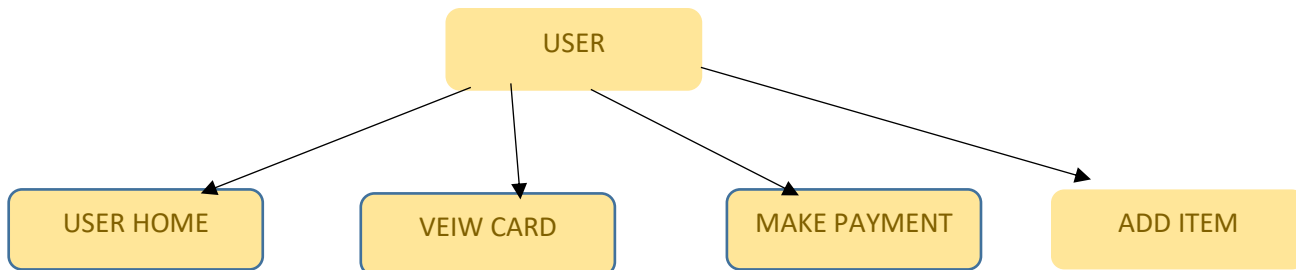


Figure 5: user tasks

- customers will have a login button in first page where customer can login into their account to start shopping and add items to their shopping cart. This website can check to see whether this user is customer or the administrator.
- Add Item: after customer login to their account, they can start to add items into their shopping cart. After users added the items into their shopping cart they can proceed to checkout.
- Checkout: after adding items to shopping cart customers can proceed to checkout where they will see a success page as the bank payment confirmation.

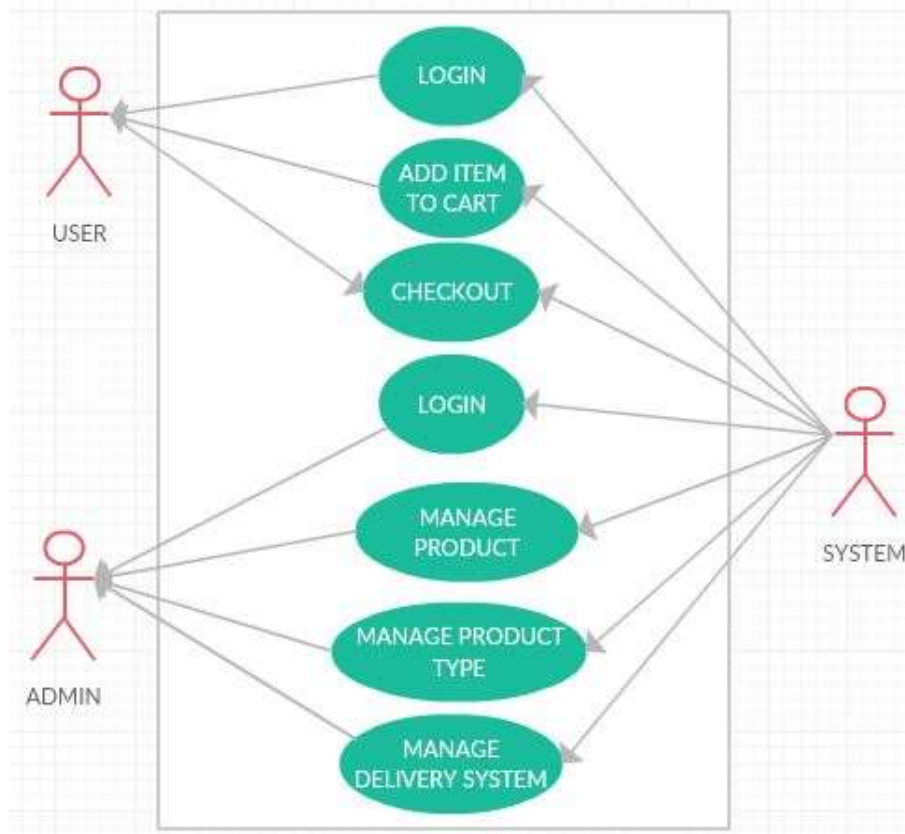


Figure 6: general tasks

Navigation Design

This section explains the navigation work flow for both audience targets (user and admin) from login page to checkout page by users and also this part will demonstrate a diagram to show the steps which users and admin must take to work through our web application.

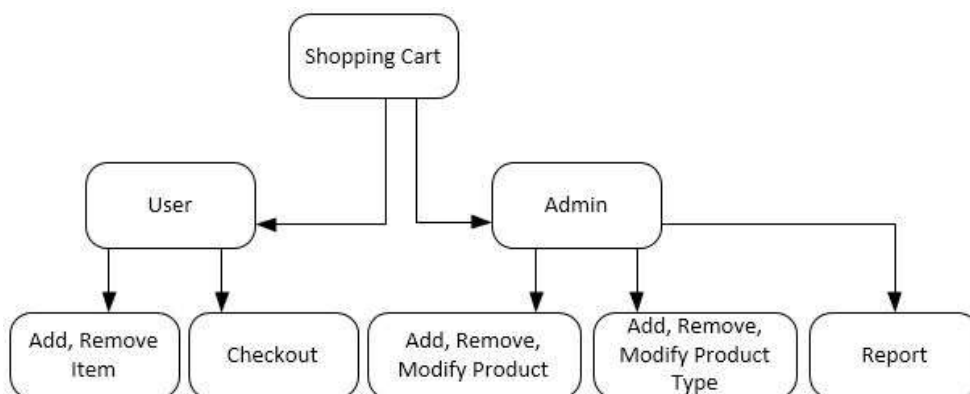


Figure 7:Navigation Design



for new customer can see available products only as he cannot add to cart before register in the website after that all functions are available to him.

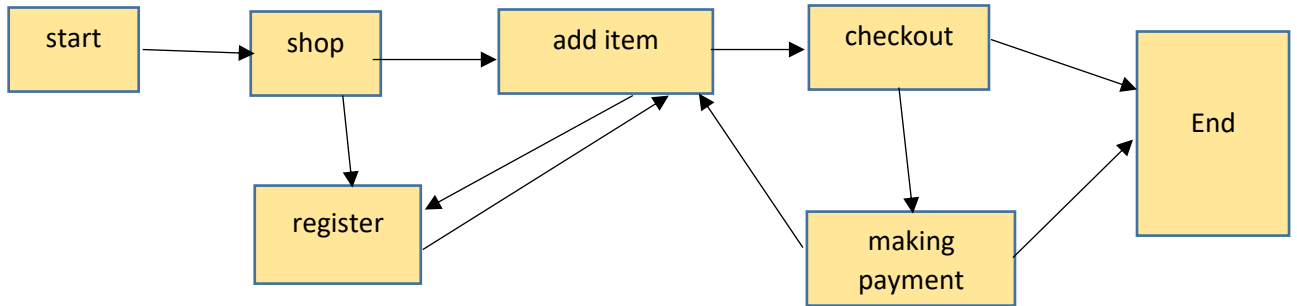


Figure 8: tasks for new customer

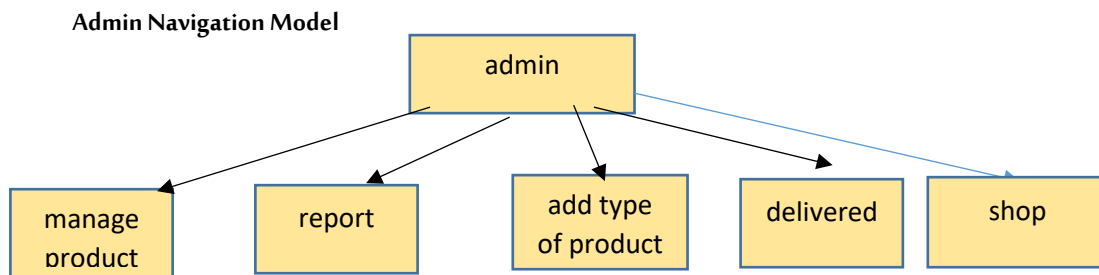


Figure 9:Admin Navigation Model

first task: -

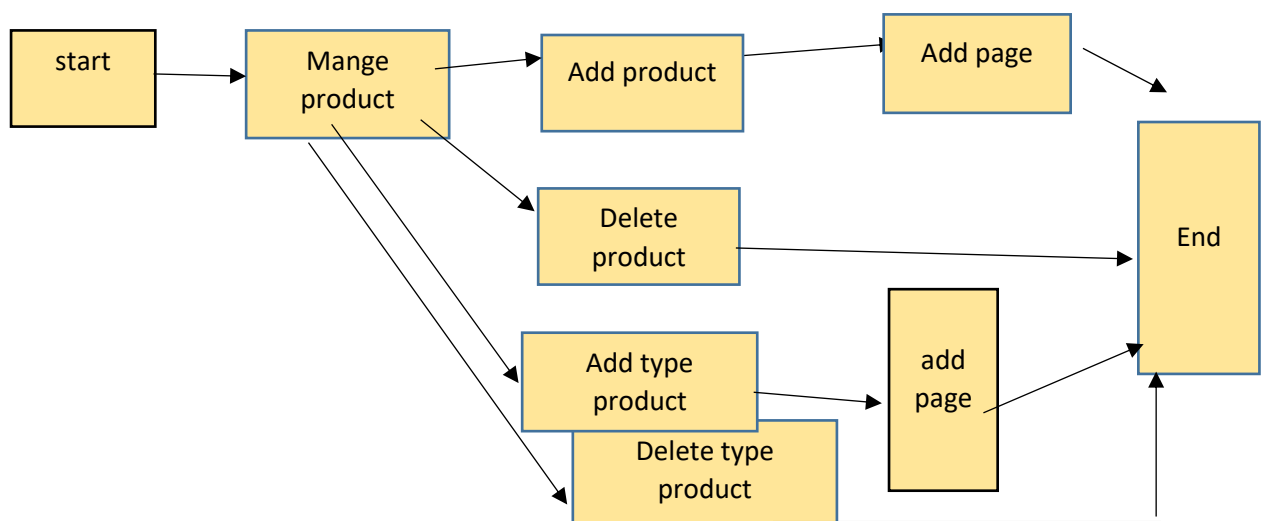


Figure 10:Admin Navigation Model first task



manage product: in this process admin after login and press on manage product there are many choses like add product than to add product page and end .

when start than mangle product to delete product than end .

another option adds type of product.

second task: -

from this task admin can delivered the product to customer.

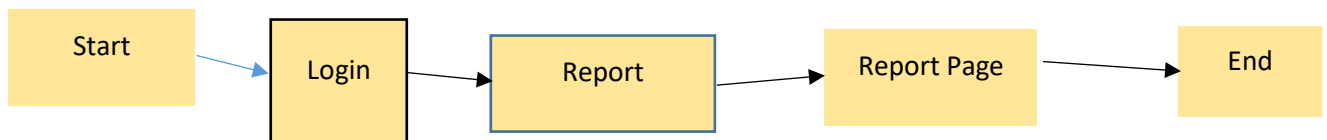


Figure 11:Admin Navigation Model second task

User Navigation Model:

Users should register before buying or ordering products online to make the transaction secure. Once the user register and have an account he/she can be able to buy or order product online.

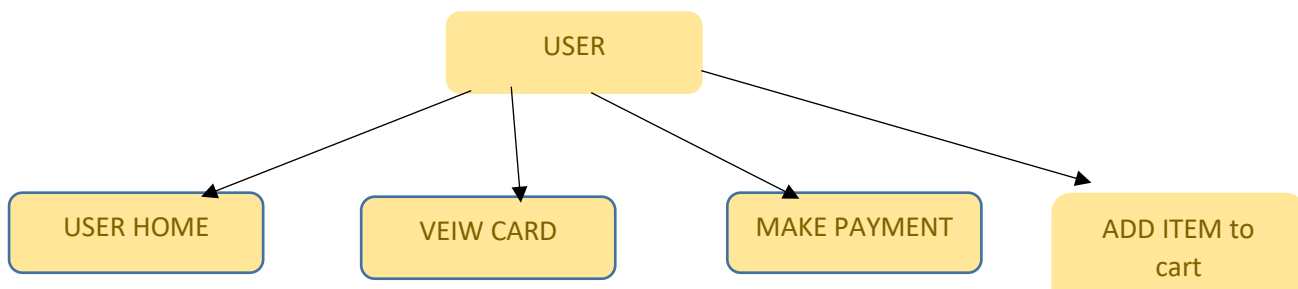


Figure 12: User Navigation Model:

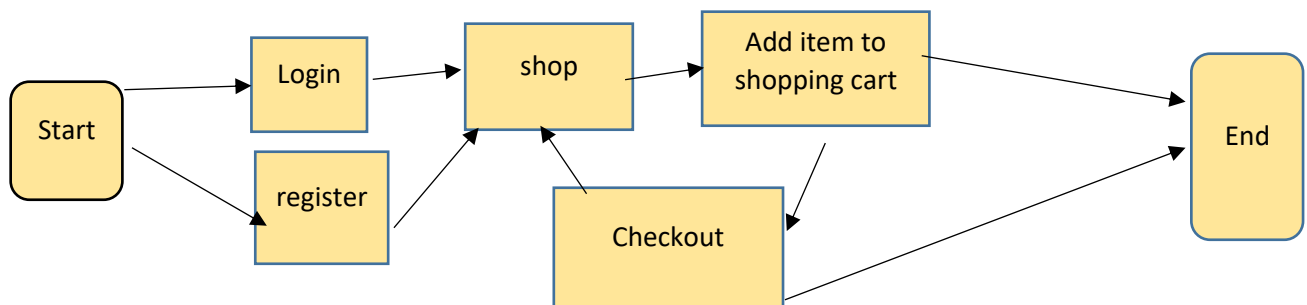


Figure 13:User Navigation Model



Site Structure Design

master page:

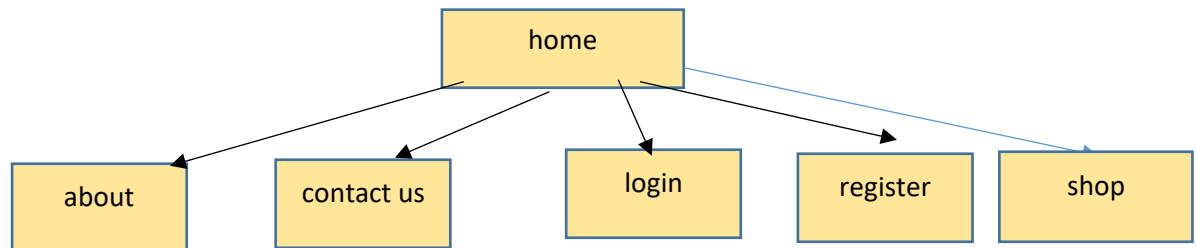


Figure 14: Home page

from these page any user can open these pages if he has account the can directe start shopping after login or register

admin page:

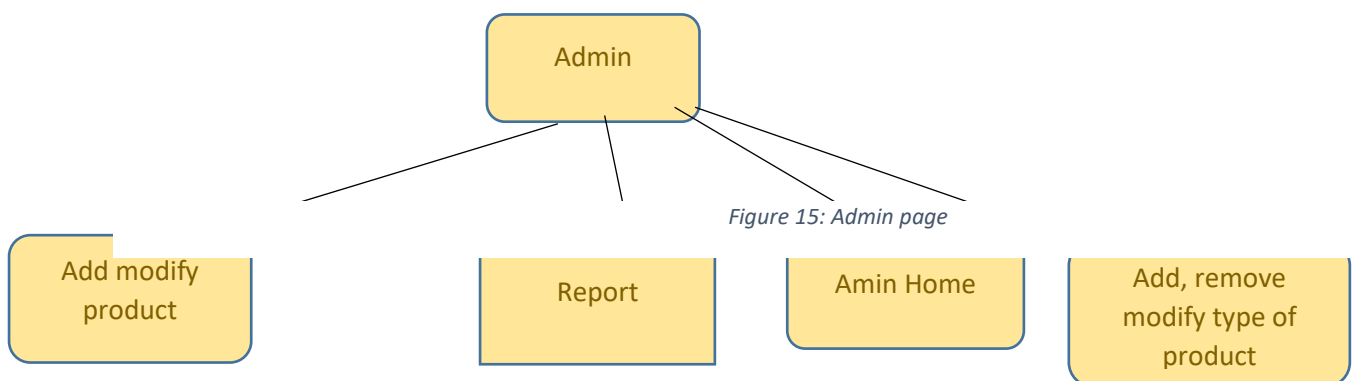
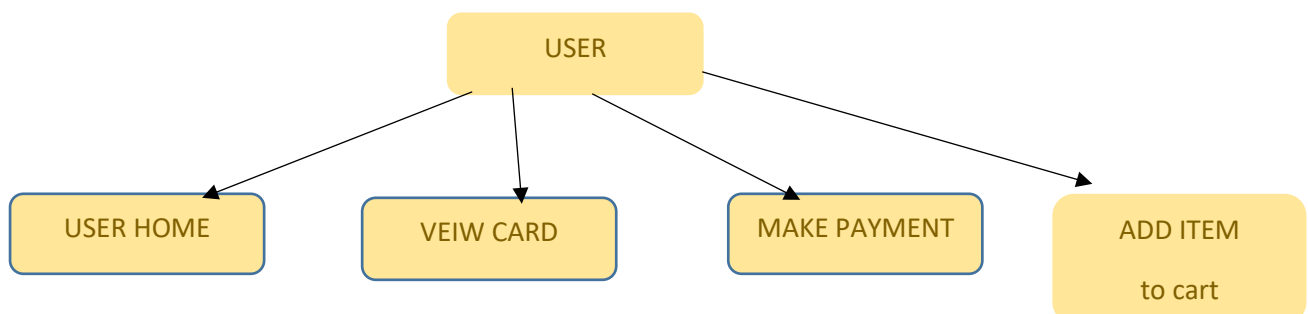


Figure 15: Admin page

user page:



product page:

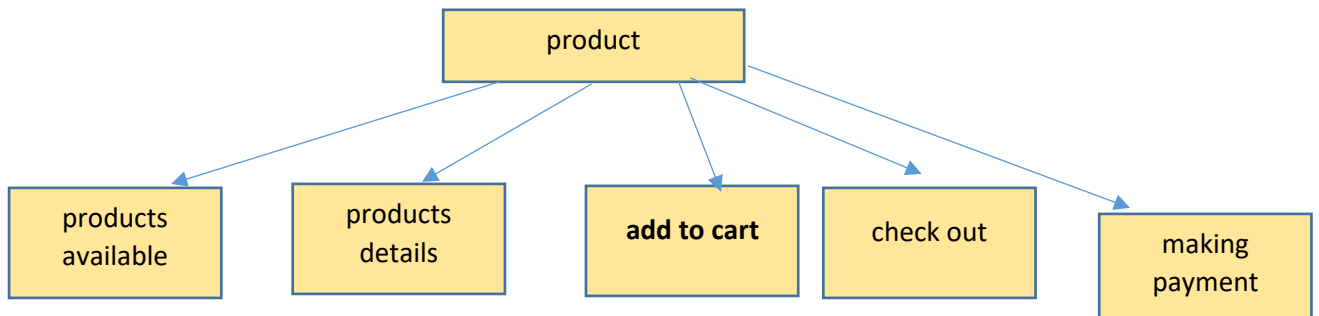


Figure 16: product page

Presentation Design

story board:

This section will demonstrate an conceptual design of every web page that will be in interaction with the user or admin. These pages are:

- Index
- Product
- Management
- Report
- Login
- Register
- Account Page

Index: This page will be made of three section: 1) Header which include the navigation bar 2) Content which includes the items listing 3) Footer which includes the copy right statement.

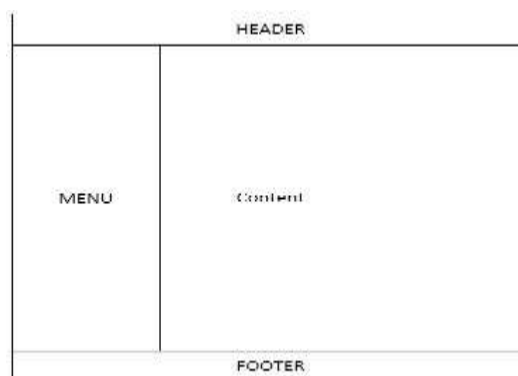


Figure 17:store board home page





Product: this page will have the same layout as index page but the content will display a detail information form. This page provides add item button which lets the user to add items to shopping cart.

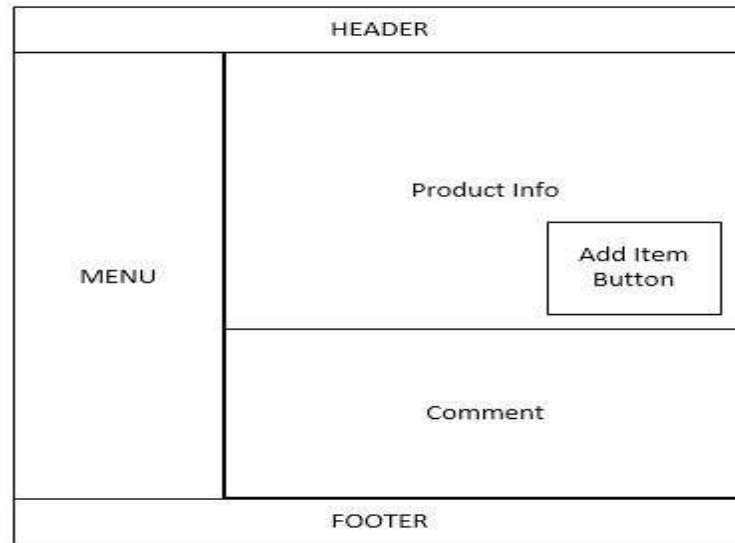


Figure 18:story board product page

Management: This page provided the functions for admin to manage items and item types in the web application as shown in figure below.

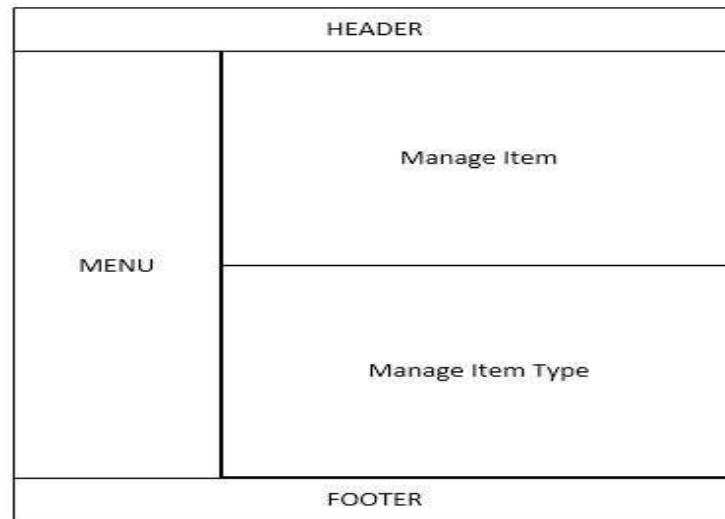


Figure 19: story board management page

Report: This page will provide the management functionalities for only administrator to manage the delivery reports and set delivered items marked.

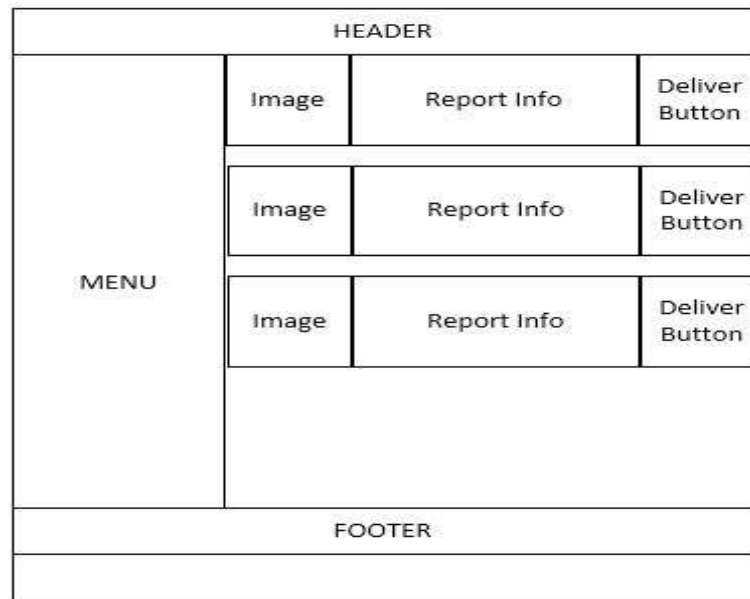


Figure 20: storyboard report page

Login: This page will handle the login form where the user and admin can log into their accounts as shown in below model.

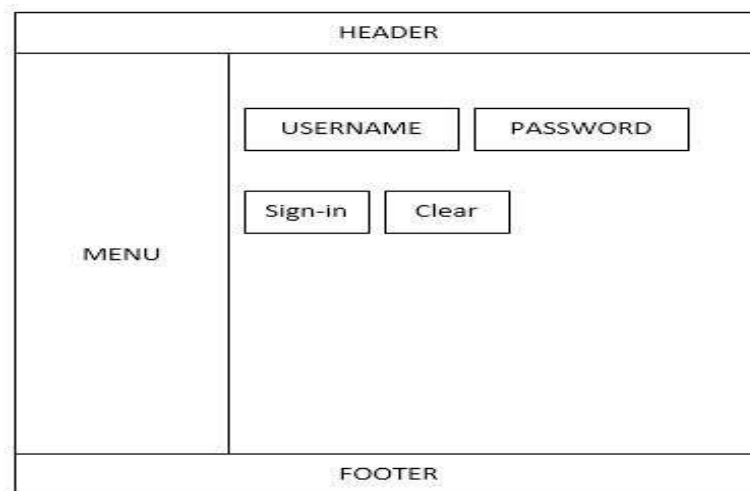


Figure 21:story board login page

Register: As below figure, this page will handle the registration form where users can sign up for our web application.



HEADER	
MENU	USERNAME
	PASSWORD
	CONFIRM PASS
	FIRST NAME
	LAST NAME
	ADDRESS
POST CODE	
Enter	Clear
FOOTER	

Figure 22:story board register page

Account Page: In this page, users can manage their orders in the shopping cart. Each cart will have product image and order details inside and also there will be the price listing at the bottom of all carts.

HEADER		
MENU	Image	Delete Button
	Order Info	Delete Button
	Image	Delete Button
	Order Info	Delete Button
Pricing and Checkout Button		
FOOTER		

Figure 23:story board account page



Logical Data Design

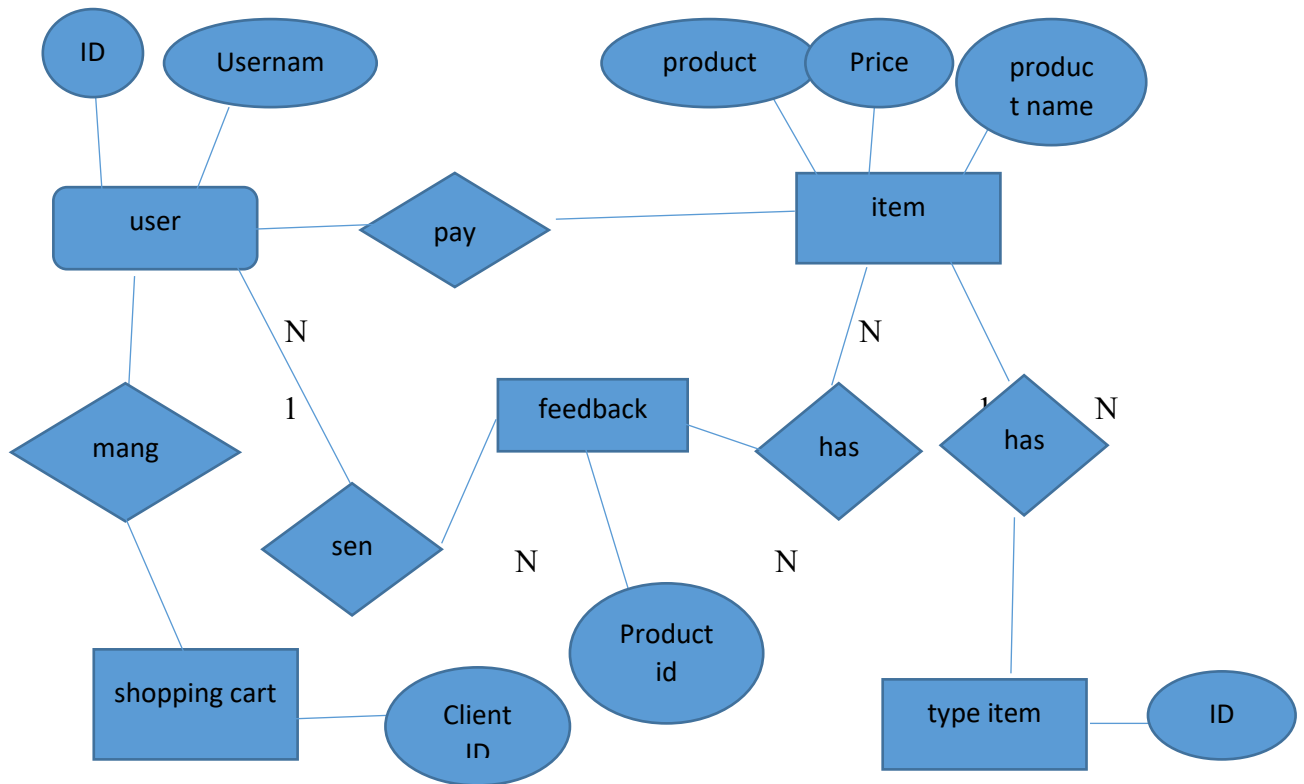


Figure 24: logical Data Design



Physical Data Design

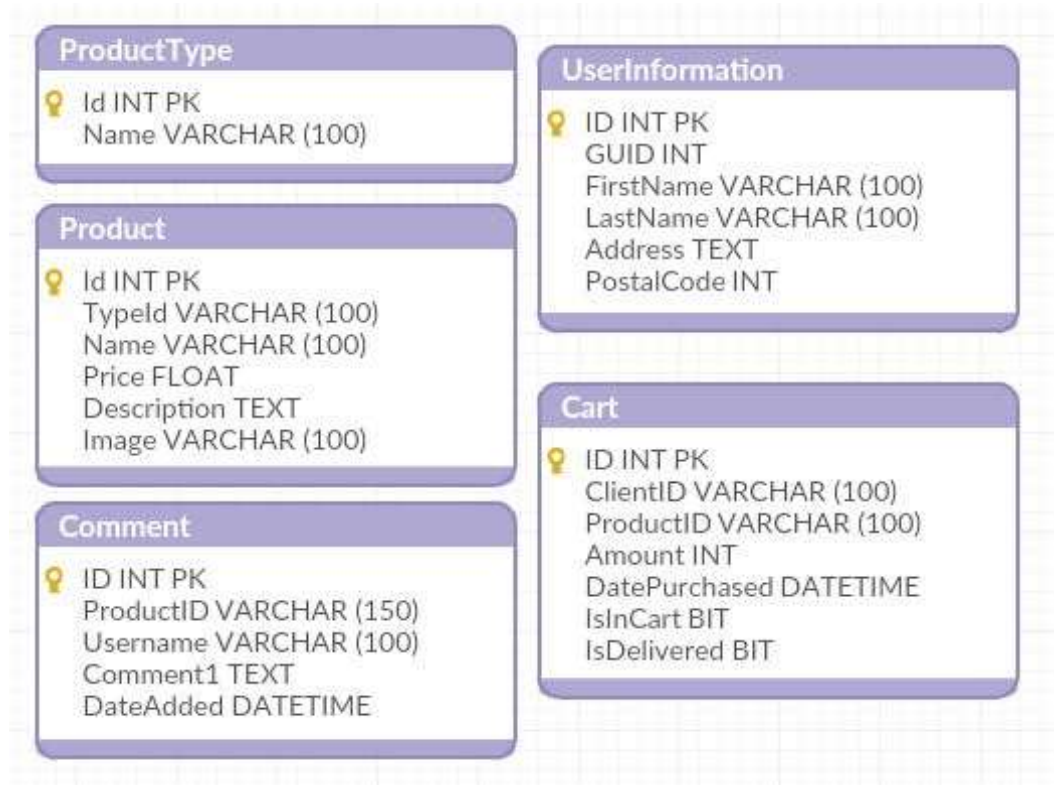


Figure 25: physical data design

Our project will be connected into a SQL Server Database. You can find the figure of database table in above image. Our database will have five tables are follows:

- Product
- ProductType
- UserInformation
- Comment
- Cart

Product:

This table will collect the data about the product id, product name, product image, product price, product type id and product description and any other information which the administrator wants to add to items. There are many 6 columns in this table:





	Id	Typeld	Name	Price	Description	Image
	21	10	shoes women	123	product in USA	shoes w1.jpg
	22	10	shoes women 2	112	PRODUCT IN U...	shoes w2.jpg
	23	10	shoes women3	311	MADE IN UK	shoes w3.jpg
	24	11	bag women1	123	Fashion wome...	bag w2.jpg
	25	11	Crossbody Bags	123	Fashion wome...	bag w3.jpg
	26	11	bag travel	132	made in USA	bag w4.jpg
	27	9	comfort shoes ...	234	made in USA IN...	shoes m1.jpg
	28	9	arrived now	400	made in USA IN...	shoes m2.jpg
	29	9	Last one	125	made in USA in...	shoes m4.jpg
	30	12	handbag men	100	made in USA in...	bag m1.jpg
	31	12	men handbag	300	made in USA in...	bag m2.jpg
*	NULL	NULL	NULL	NULL	NULL	NULL

Figure 26: product table

Int Id [primary key]: contains user id as primary key. Its type is integer and this column is incremental by one.

Int Typeld [foreign key]: contains product type id. The data type is integer. This column is the foreign key to product table id.

Nvarchar(50) Name: contains product name. the data type is string. This data is used in product page, order page and delivery page.

Int Price: contains the price for the product The data type is integer. In the checkout page price will be used to calculate the GST and plug the shipping fees as 15 dollars.

Text Description: contains product description. An extra space for the administrator to write about the item functionality and usage. The data type is string as a long text.

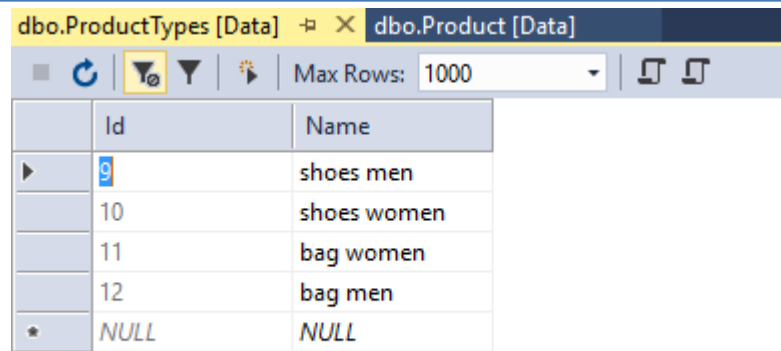
Nvarchar(150) Image: this data member will hold the URL address to the images location. Each time the admin tries to add a product, a list of all available images will be displayed to him/her; this list is a sum of all image URL's

given by Image data member in this table.

ProductType:

ProductType table contains the data about the type of items we will add products into the system. These data will be product type id and product type name. Most of the item types are mentioned previously by San Antonio requirement declaration in introduction section. This table has 2 columns:



	Id	Name
▶	9	shoes men
	10	shoes women
	11	bag women
	12	bag men
★	NULL	NULL

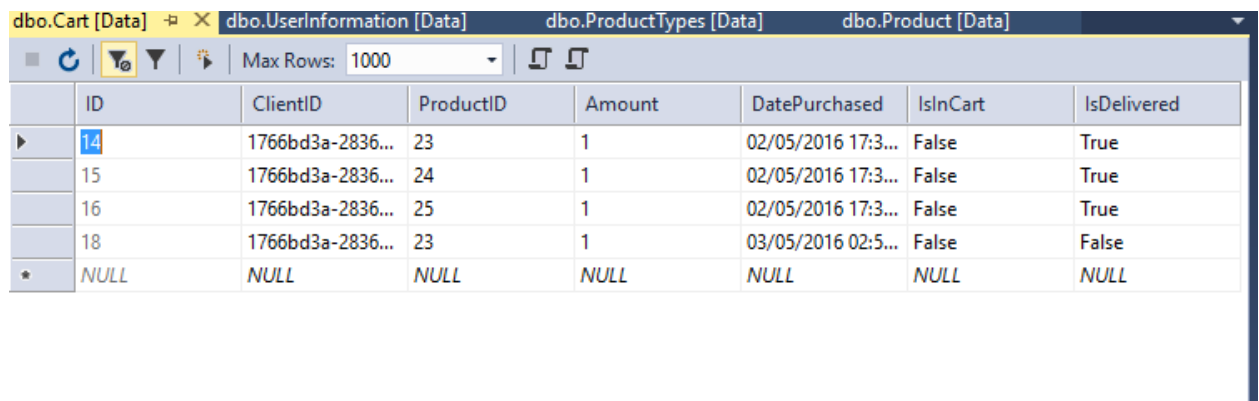
Figure 27:product type table

Int Id [primary key]: contains the product type id in this table. The data type of this column is integer. This data will be used to get the product type in management page, product page and many other pages through-out project.

Nvarchar(50) Name: contains the product type name. the data type is string. Product type name is displayed in product page.

Cart:

This table contains the data about the shopping cart information. Customers will mostly interactive with this table through the online shop web application. This table will have 7 columns:



	ID	ClientID	ProductID	Amount	DatePurchased	IsInCart	IsDelivered
▶	14	1766bd3a-2836...	23	1	02/05/2016 17:3...	False	True
	15	1766bd3a-2836...	24	1	02/05/2016 17:3...	False	True
	16	1766bd3a-2836...	25	1	02/05/2016 17:3...	False	True
	18	1766bd3a-2836...	23	1	03/05/2016 02:5...	False	False
★	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Figure 28:cart table

Int ID: contains the order id in users shopping cart. The data type is integer. This column is incremental by one.

Int ClientID: contains the customer id information. The data type is integer. This column is used to get the user by its id and use the customer information in the web application. This id has been used in report page to get the user name from the user id.

Int ProductID: contains the product id as the same one as product id in the product table. The table holds the product id from the product table id in this column to keep track of the orders product id. The data type is integer.





Int Amount: contains the amount of product which has been added into the shopping cart table. The data type is integer. Customers can modify or delete the amount of the items they wish to purchase on our online shop web application.

DateTime DatePurchased: contains the date of purchase that the item was bought on that day and exact time. The data type is DateTime. The date will be saved and displayed in orders page and delivery page to check the time and the date when the customer bought the item.

Bit IsInCart: contains the information to decide if the item is still in the cart or the customer has removed it from their cart. The data type is bit as it can only store zero or one. Whenever the customers press the delete button in shopping cart page, this column will be set to zero and when the customers add items to their shopping cart, regardless of the amount of the items, this column will be set as one.

Bit IsDelivered: contains the information to decide if the item is still in stock or it has been delivered to the customer. The data type is bit as it can only store zero or one. Whenever the administrator presses the deliver button in report page, this column will be set to zero unless it will remain pending as digit one in the column.

UserInformation:

UserInformation table contains all the information about the users' data, user name, user id, user last name, user address, user postal code and other information which they wish to add to their profile account. The columns in this table are as following:

ID	GUID	FirstName	LastName	Address	PostalCode
8	1766bd3a-2836...	asil	labid	12434	3434
9	8dcb356a-a906...	Admin	Admin	325	5325
10	e754e2bc-59a9-...	amani	farfar	13445	251256
11	056e9756-c1d5-...	ali	omer	25524	2515
12	c487b2ff-dded-...	ahmad	ali	235456	2755185
NULL	NULL	NULL	NULL	NULL	NULL

Figure 29: User information table

Int ID: contains the user id in the web application. This data will be used to check which user orders items in the shopping cart and also in the main page, users and check their name and also the number orders they have in the shopping cart. The data type for this column is integer and it is incremental by the time a user registers it will increment by one digit.

Nvarchar(100) GUID: contains the unique id for each user to keep the record of the activity of the user in the online shop web application. Whenever the user makes an action on the page it will be saved in the responsible



table with this id. The data type is integer and it is randomly generated by the system to keep the user guid unique from other users.

Nvarchar(50) FirstName: contains the first name which belongs to the customer. This data will be represented in the order page and delivery page to show to full name of the user. The data type is string.

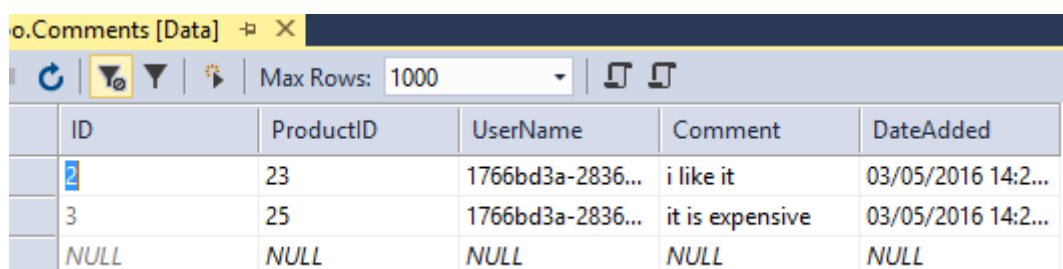
Nvarchar(50) LastName: contains the last name which belongs to the customer. This data will be represented in the order page and delivery page to show the full name of the user. The datatype is string.

Nvarchar(50) Address: contains the address of the user. This data has been used in the delivery page to help the administration team to deliver the items to the customer. The datatype is string.

Nvarchar(50) PostalCode: contains the postal code of the user. The data has been used in the delivery page to help the administration team to deliver the items to the right customer after they got the address. The datatype is string.

Comment Table:

This table contains the data information about the feedbacks made by all customer from all over the project in product pages. Each comment has an id, content text, product id of which the product has been fed, username of the person who send the feedback and the date and time of the feedback. There 5 columns in this table:



ID	ProductID	UserName	Comment	DateAdded
2	23	1766bd3a-2836...	i like it	03/05/2016 14:2...
3	25	1766bd3a-2836...	it is expensive	03/05/2016 14:2...
NULL	NULL	NULL	NULL	NULL

Figure 30: comment table

Int ID: contains the comment id which helps the system to identify the right comment for the products and also keep track of the comments. This column has been set as the primary key in this table and it is an incremental integer. The datatype is also integer.

Int ProductID: contains the product id that tells the system of which product, this comment is from. This data helps the system to gather all comments for one product sorted out and ready to display on the product page. The datatype is integer.

Nvarchar(50) Username: contains the user name that tells the system of which user has sent the feedback to our products. This data helps the system to gather all comments for one username sorted out. This practice is good for administrating comments from unauthorized users and also violent feedbacks.

Text Comment: contains the comment actual text content where user can put the feedback comment into. The datatype is text as long string of 500 characters, this will give a freedom to users so that they can post long feedbacks.



DateTime DateAdded: contains the date of when the comment was added into the system. This information later will be used to sort the comments accordingly. The datatype is DateTime.

Table relations:

Between Product table and ProductType table, there is a foreign key relation as TypeID in Product Table will be the same as the ID in the ProductType table. I figure below you can find conceptual view of our database relation diagram:

Implementation

In this section, you can find visual interface of every page in Shopping Cart Website Application. I have used the table layout for my website.

In following you can find our web application screen shot of all pages:

Shop Page:

This is the main page where the administrator can see after login to the system. All the products will be displayed in the main page. There will be multiple options for users to login, logout.

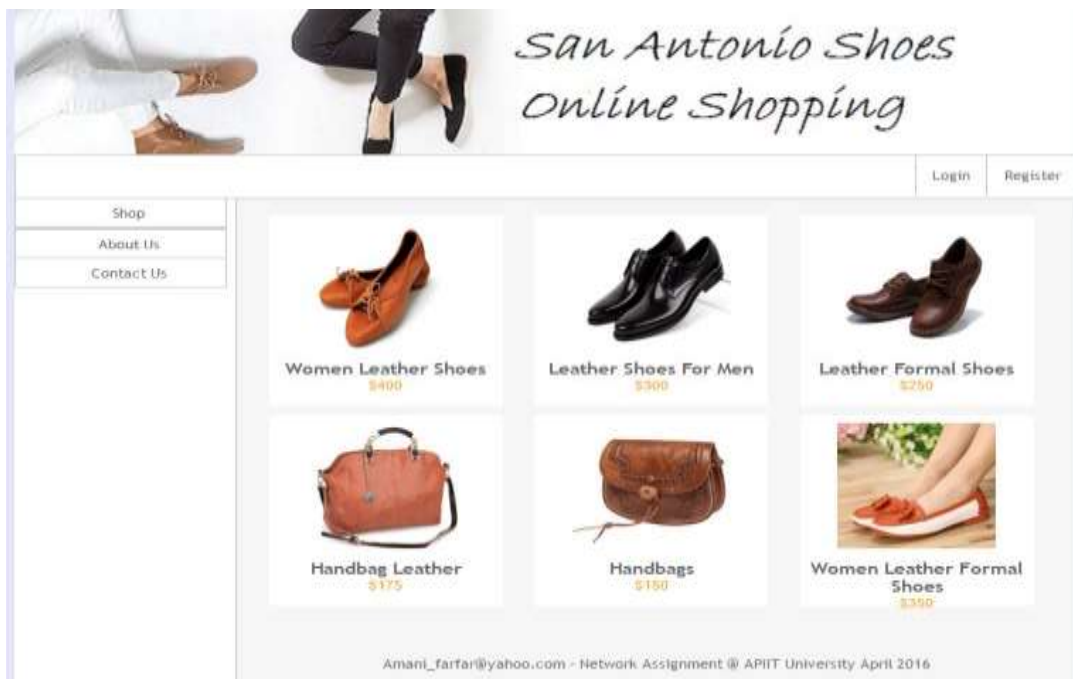


Figure 31: home page

Register.aspx: is the page where the customer can make a user profile. And then redirect to the login page where the user can login to their new account.

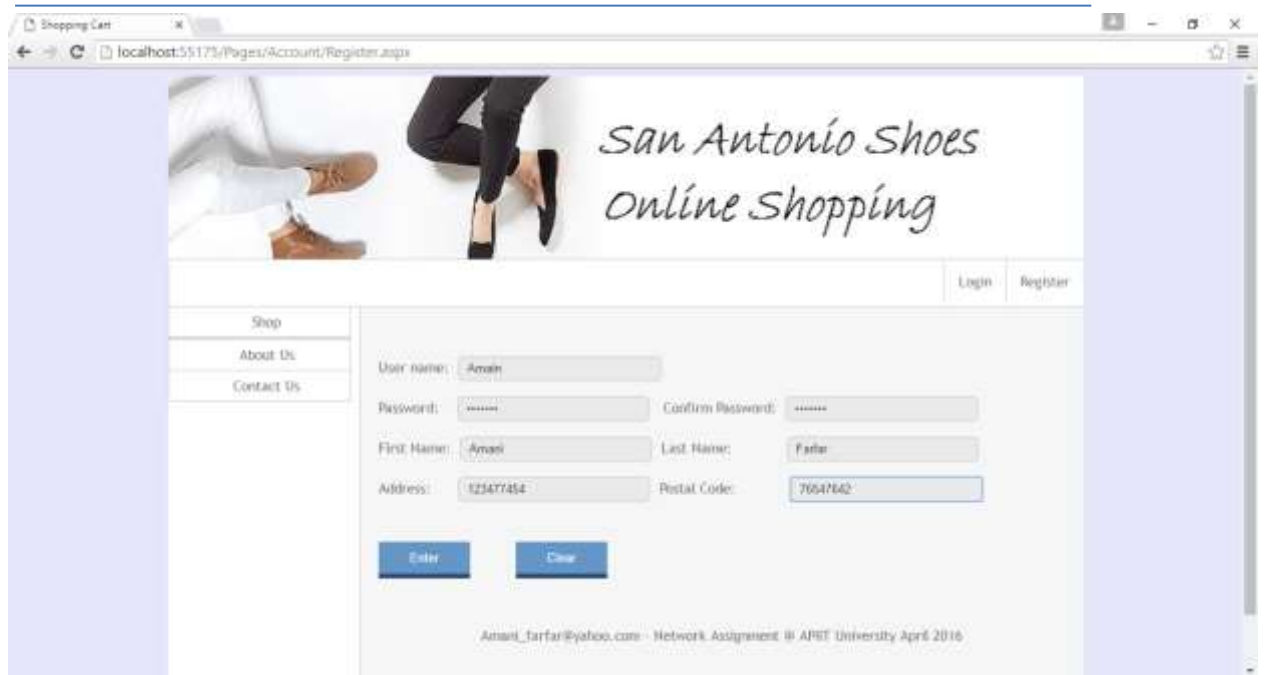


Figure 32: register page

Login.aspx: this page is the login page where users can enter their username and password to start shopping or leave a feedback for their favorite item on the shop. This page will check whether the user is the admin or a normal user.

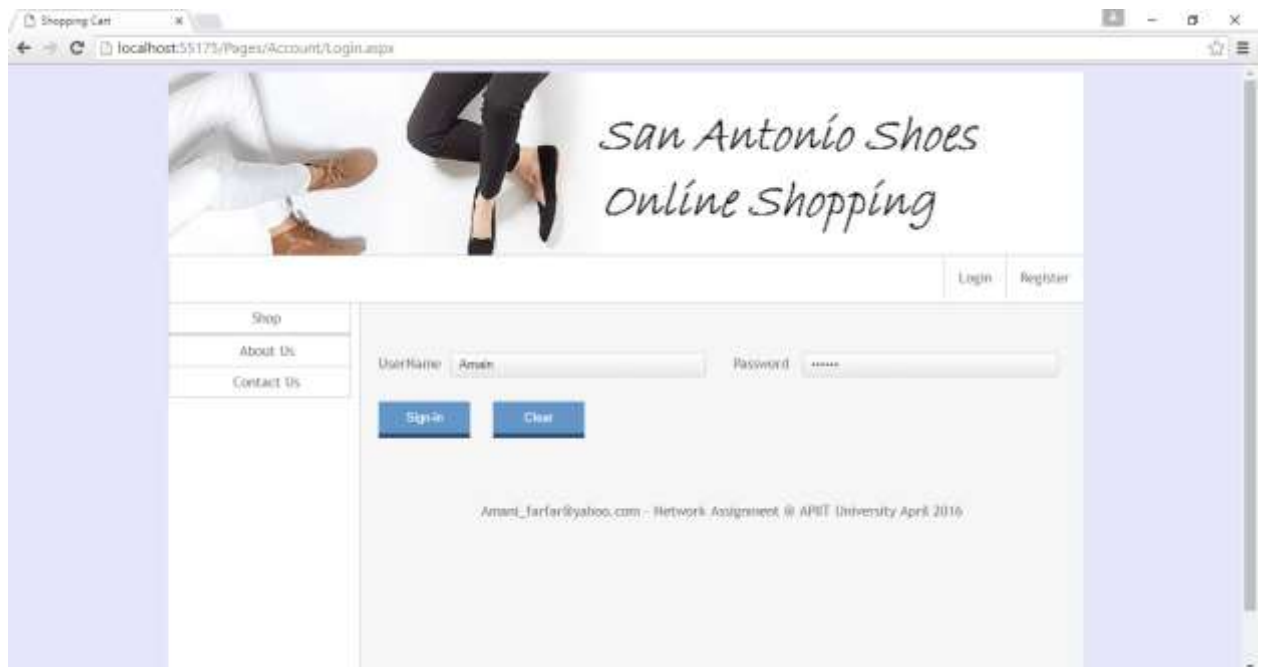


Figure 33:login page

Product Page:





All products will have a separate page to display the extra information about them and also customer will have to order their products from these pages. Master page will contain the navigation in every page.

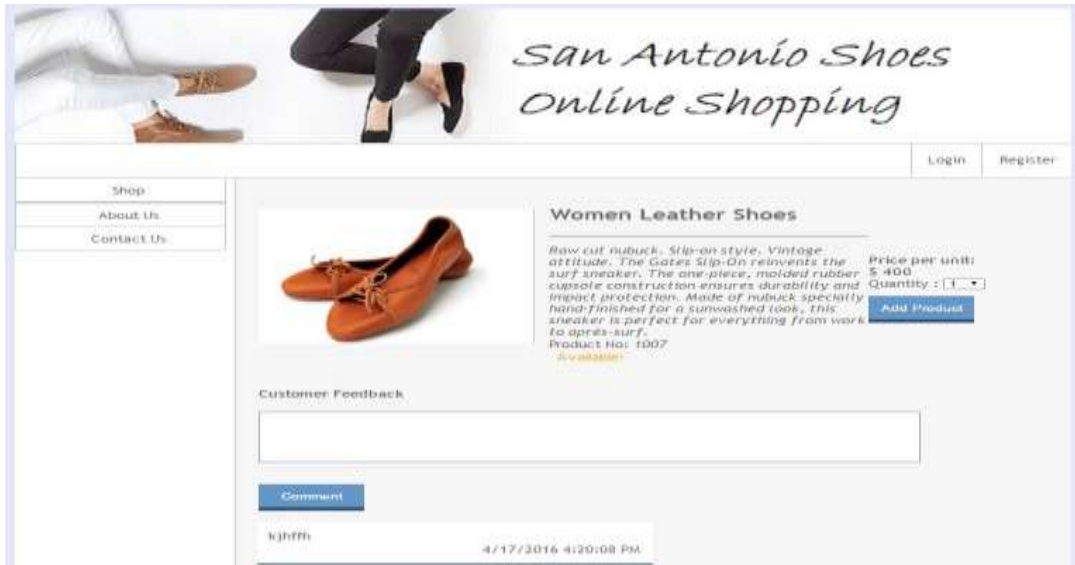


Figure 34: product page

ShoppingCart.aspx: is the page where the shopping cart is located; each user can enter this page by clicking on their name after they choose their products to the cart. If the cart is empty, an error message will be displayed on the page. In this page also customer can check all the orders which has been ordered. From here the customer can add items into the cart and even delete the existing items in the shopping cart. Customers will have two options after setting the shopping cart items: 1) to get back to product page to continue shopping and surfing on the project we 2) to continue to checkout where they will be redirected to another page "Success.aspx".

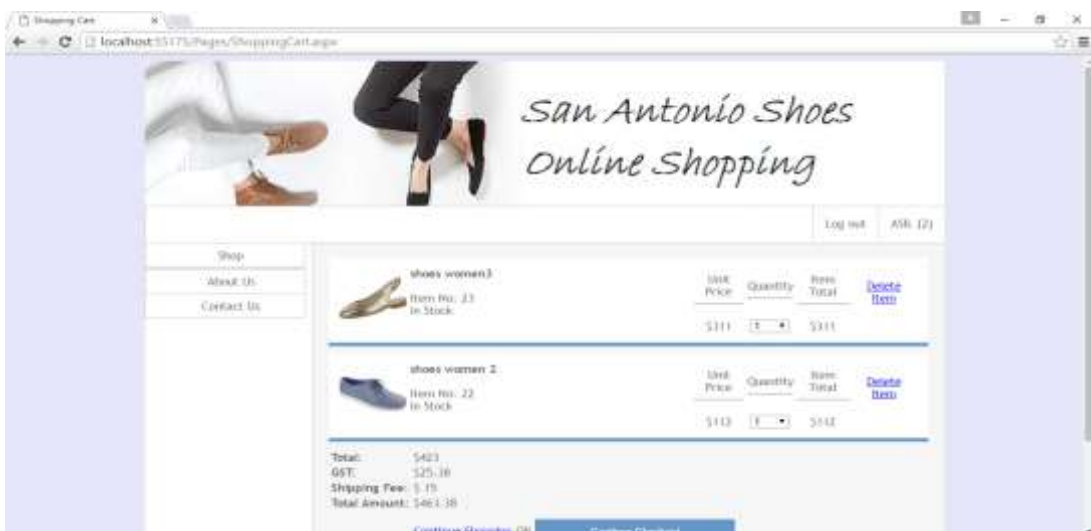


Figure 35: shopping cart page

Management Page:

This is the management page where the admin has the ability to manage the products and also the product types. Also the admin can add products and also add product types. If the admin presses the add new product or add new product type, admin will be redirected to another page to add more information about the products or product type and then there will be a note presented to show that the process has been done successfully.



Figure 36: management page

Orders Report Page:

This is the report page where the admin can check the pending orders from the customer orders. Admin then can make the delivery by pressing the “Deliver” button, from there will be a notice to show that the product has been delivered to the customer; this will help the admin to check which orders has been delivered and which one has to be delivered.

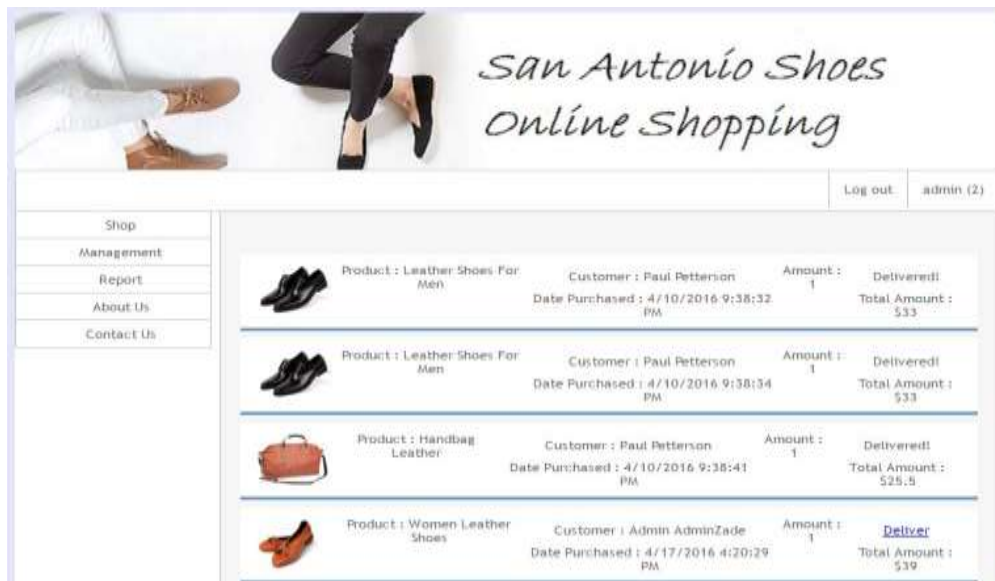


Figure 37:Orders Report Page



Directory Files

There is multiple page through the online shoe shop web application which are traceable from the Master Page navigation menu.

Index.aspx is responsible for the content of the main page including all the products in the shop available to sell.

Product.aspx: as soon as the customer chooses an item in the online shop, it will be redirected to the responsive product page where the customer can add products to his/her shopping cart and also can leave a feedback on a product. Only users who are logged in can leave feedbacks; guests are not allowed to post comments.

ShoppingCart.aspx: is the page where the shopping cart is located; each user can enter this page by clicking on their name after they choose their products to the cart. If the cart is empty, an error message will be displayed on the page. From this page user might continue back on shopping more products or checkout the next success.aspx page where a simulation of online payment will be demonstrated.

Success.aspx: is responsible for the online payment simulation where we will suppose that the user will be redirected to PayPal to make payment.

Login.aspx: this page is the login page where users can enter their username and password to start shopping or leave a feedback for their favorite item on the shop. This page will check whether the user is the admin or a normal user.

Register.aspx: is the page where the customer can make a user profile. And then redirect to the login page where the user can login to their new account.

Management.aspx: this is the admin management page where only admin can access. In this page, admin has the ability to add new product, add new product type, edit product, edit product types, delete product and delete product types. If admin wishes to edit or add product, he/she will be redirect to ManagementProduct.aspx. If admin wishes to add product type, he/she will be redirected to ManagementProductType.aspx.

Report.aspx: is only available to the administrator. This page is responsible for all the placed orders by all customers where the admin can manage product delivery. By clicking the "Deliver", the item will be marked as delivered in the system to demonstrate the delivery operation.

Models

Models are the class handler for the Database classes which handles the insert, delete or modify the data from and to the database. Model classes are:

- CartModel.cs: shopping cart class.
- CommentsModel.cs: feedbacks class.
- ProductModel.cs: product information class.
- ProductTypeModel.cs: product type information class.
- UserInformationModel.cs: user information class.





I used Microsoft OWIN framework to assure the user authentication and authorization.

Conclusion

Summary:

By using the ASP.NET framework, San Antonio Shoe Store was able to meet their customer through Internet. This web application gives the ability to users to add products to their shopping cart and leave comment under their favorite items in the online shop. Administrator also can manage all the products and product types. Admin also can check through all order report to make delivery updates to representative products in the list. In future, I would like to add PayPal integration to this project and make it available for the users to pay with their MasterCard or Visa Card.

Future Work:

This system has the potential to be integrated with online payment systems such as PayPal, Web Money or MoneyGram.

For the next step, I will add payment support in checkout page.

References

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- [2]. <http://www.asp.net/get-started>
- [3]. https://mva.microsoft.com/en-us/training-courses/introduction-to-asp-net-mvc-8322?l=nKZwZ8Zy_3504984382
- [4]. <http://www.tutorialspoint.com/asp.net/>
- [5]. <http://code.tutsplus.com/tutorials/the-best-way-to-learn-aspnet-net-22404>

Appendices

Project Directory	Description
App_Code	Contains all model classes files
Bin	Contains all extra libraries and frameworks
Images	Contains all images, including product images
Pages/Account	Contains Login form and Register form
Pages/Management	Contains Admin Management forms
Styles	Contains CSS files