FINAL PROJECT REPORT

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1. Introduction

1.1. System Introduction

E-commerce is a huge trend. In 2017, E-commerce sales have continued to accelerate seeing a 16% year-on-year growth, while in-store retail has only seen a 3% year-on-year growth. Mobile shopping sessions grew 54% year-on-year which represented the fastest growing. Since E-commerce has becoming more and more popular among people, our group decide to build an online shopping website for clothes and make sure our website can also be mobile-responsive.

Our team wants to build an E-commerce website to provide a platform for convenient online shopping. We are focusing on young customers and our products are all clothes. By using our website, not only can customers buy their favorite clothes easily, but also administrator can edit the information of customers and products and view the sales information and sales performance.

Our system has 2 types of users: Customer and Administrator. These 2 types of customers need to register in our system first in order to receive an account to access the system. After that, our website provides a series of basic functions for customers, including login, log out, viewing and modifying customer profile, searching products, browsing products, adding products to the shopping cart, placing orders, viewing past orders, etc. Moreover, administrators are responsible to manage the users, managers and products. For senior managers who need to know the big picture of the sales performance, detailed sales numbers and charts can be provided for deep analysis and exploration.

In order to achieve our goal, we use MEAN stack to build our website. Also, we use bootstrap and jQuery to make our website more aesthetic and interactive and use session to build our shopping cart. What's more, we use google map API to get locations.

1.2. Scope of work

- **Data storage:** By connecting with MongoDB, the website can store the information of products, users and orders.
- **Providing multiple users with different interfaces to achieve different goals:** From users' view, users can sign in their account, browse various products, collect their favorite

products, add products to their shopping cart and shop online freely. From administrators' view, administrators are able to manage products (including updating storage, changing price and editing attributes of products etc.) and view detailed information of orders.

- **Mobile-responsive:** All of the contents and images are mobile responsive for purpose of smooth user flows on different devices.

- **MVC Structure:** We use Model-View-Controller Model to build the whole project so that the layers of a project in Model, View and Controller can be differentiated for re-usability of code and easy maintenance.

- **RESTful Web service:** We follow the RESTful to set different layers for the project, as well as make use of URI, HTTP Method, etc.

- **Location awareness**

- **Well-designed and aesthetic pages:** We follow principles of web design to arrange every page and ensure our website usable for both first-time users and repeat users.

1.3. Site Structure

Our website have these following pages：

Users' view:
- Home/Contact
- Shopping page for customer browsing (including Men's Clothes, Women's Clothes, etc.)
- Shopping cart & Check-out
- Customer profile
- Sign in & Sign up
- Registration

Administrators' view:

- Check all managers
- Set up new managers
- Check all users
- Add new products
- Check all products
- Check all transaction history
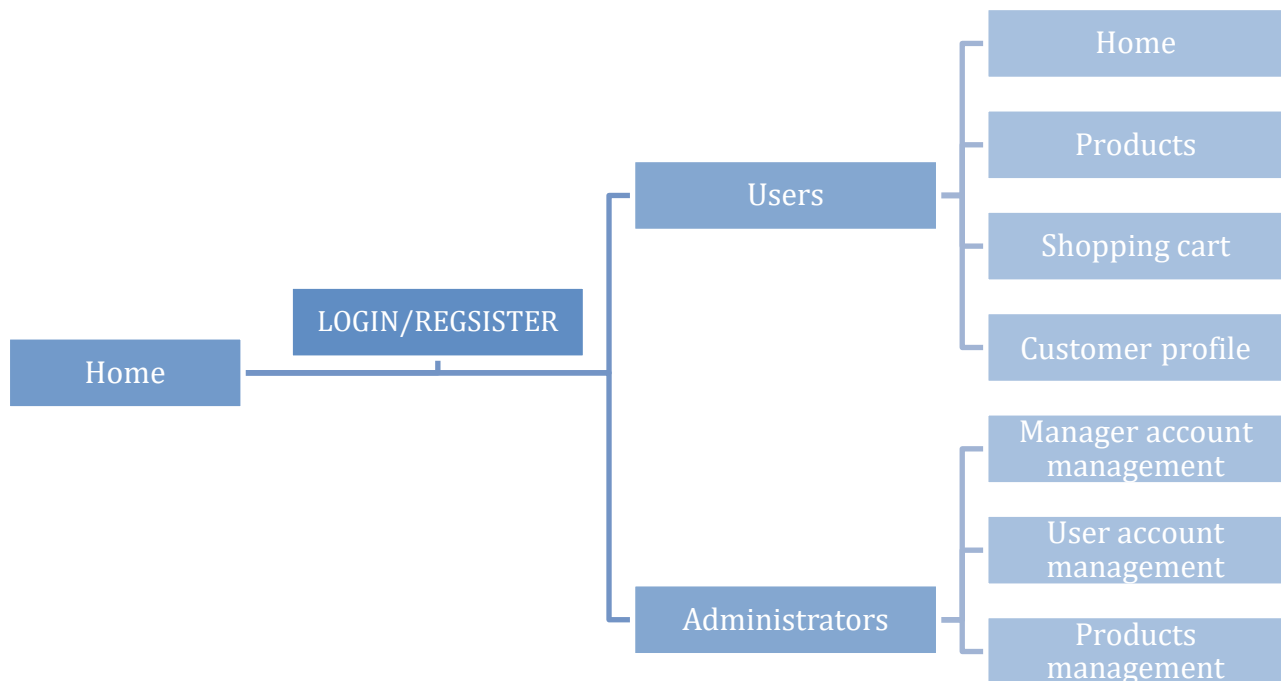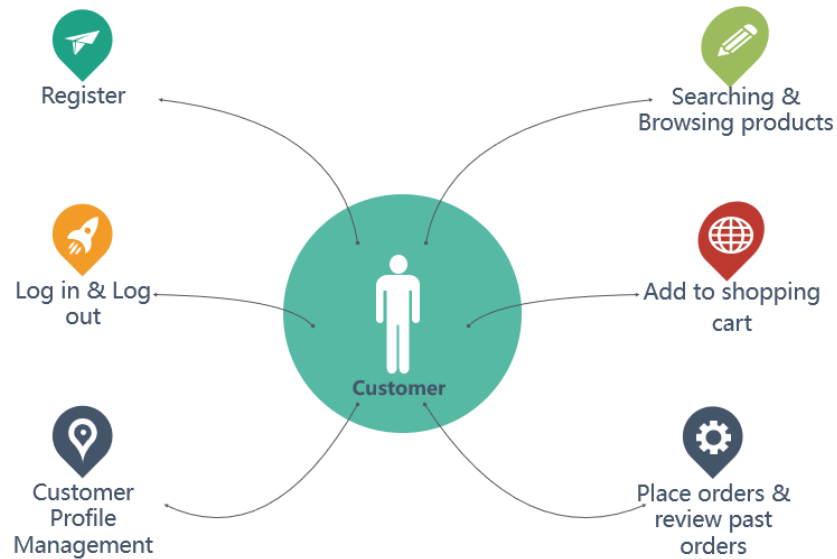

1.4. Workflow & Timeline

Planning & Website Design	09/28-10/05
In this step, we write a proposal to help us clarify what your site's goals are before designing or creating content. Also, we used a wireframe as a basic visual interface to design the structure of an interface and the relationships between pages.	

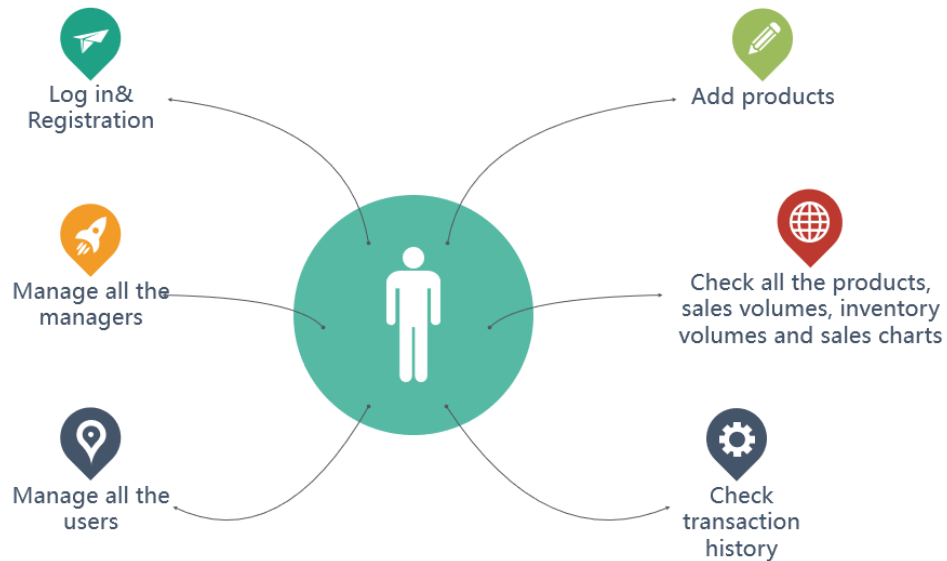| Front-end Design	10/06-10/25
Front-end development is the part where we code the front-end user interface for the website. Here we deal with colors, fonts, images, layout, informational structure and organization, navigation, etc. We use HTML, Bootstrap, AngularJS and CSS. This can also include web content development, e-commerce development, etc. Plus, we will set different interfaces for different users, including Admin Managers, Users, Visitor, etc	
Database Design	**10/25-11/10**
In this part, we build database using MongoDB to store all the data related to the project. We design a graphical schema of the database in order to ensure store the information of customers and transaction and make sure this database is easy to maintain.	
Back-end and full functionality	**11/10-11/30**
In this part, we provide connection between front-end and back-end, for example, by using administrator page, manager can access to the database and manipulate the products, monitor the profit and build function that allows customer to browse the products. We use Nodejs and ExpressJS to build this part.	
Testing & Adjustment	**11/30-12/10**
The system must be robust and support various application-dependent integrity constraints, therefore, a testing demonstrates to identify whether the system can detect and handle those erroneous cases, based on the testing result, adjustment can be made to ensure the functionality of the whole system.	

2. Objectives

2.1. Functional Requirements Analysis
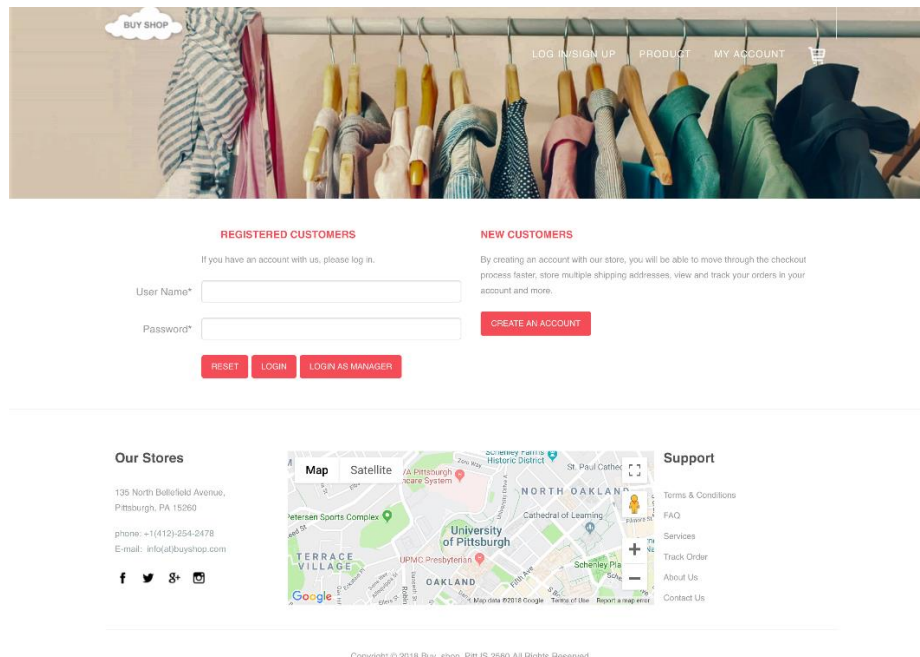
- Customer Use Case Diagram

Register

Log in & Log out

Customer Profile Management

Customer

Searching & Browsing products

Add to shopping cart

Place orders & review past orders

- Administrator Use Case Diagram

Log in& Registration

Manage all the managers

Manage all the users

Add products

Check all the products, sales volumes, inventory volumes and sales charts

Check transaction history

2.2. Web design

- **Meet business objectives:** Since our target customer is young people, we choose bright color as primary color. We choose to put a Jumbotron on our index to show most important information, such as sales information, new arrivals or important advertisements. Also, we use mobile-responsive design to make sure the smooth user flow on their mobile devices so that they can shop online anytime and anywhere.

- **Be intuitive and easy for users to understand:** We tend to use more pictures rather than words to convey information. Besides, important business information is easy to find, which might be helpful for our users to find whatever they want.

- **Be easy to navigate and manipulate:** Our navigation bar is on the top of every page. It is obvious for users to click. The administration system is also very friendly for everyone to use.

- **Provide sufficient capacity to meet peak needs and growth**

- **Provide sufficient capability to meet expected user needs:** Based on the function requirement analysis, we achieve our goals and provide all the functions we mentioned in the previous part.
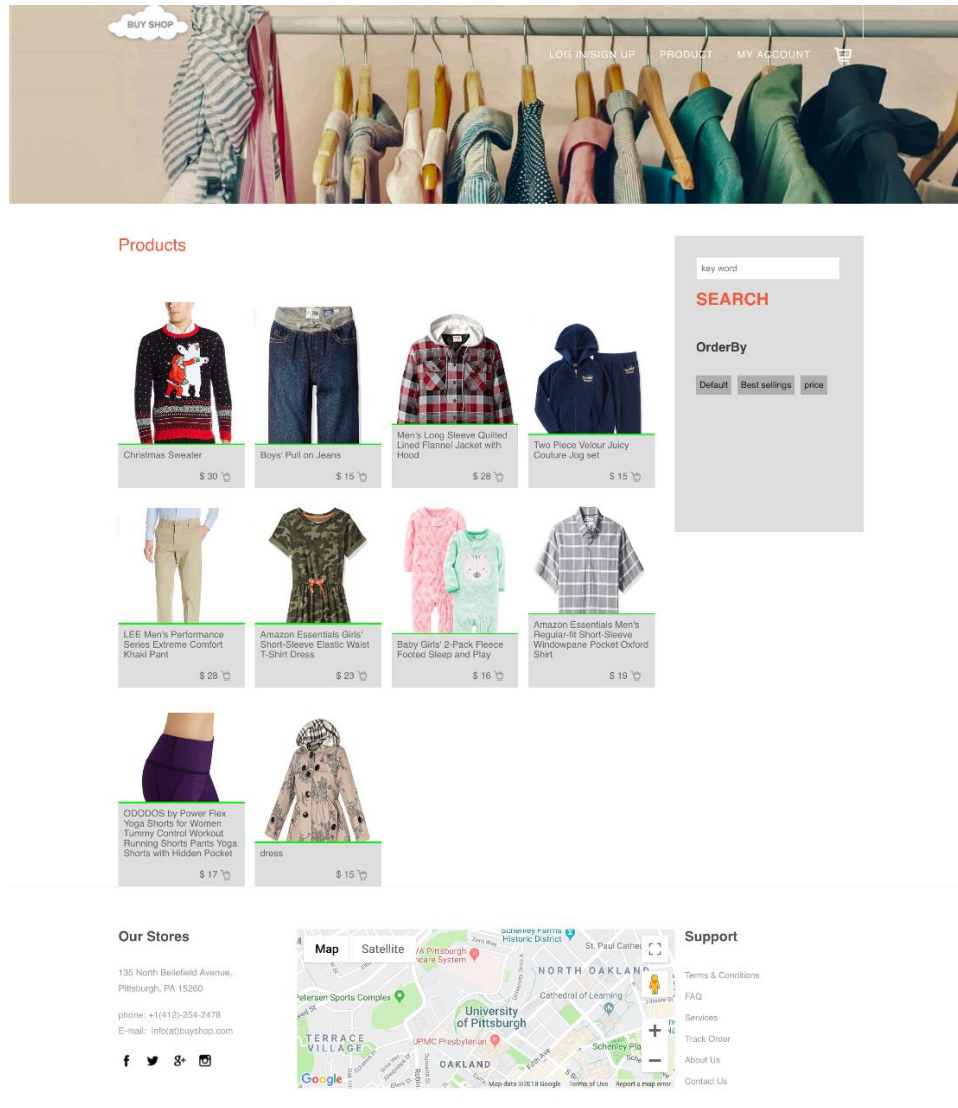

User login/registration design
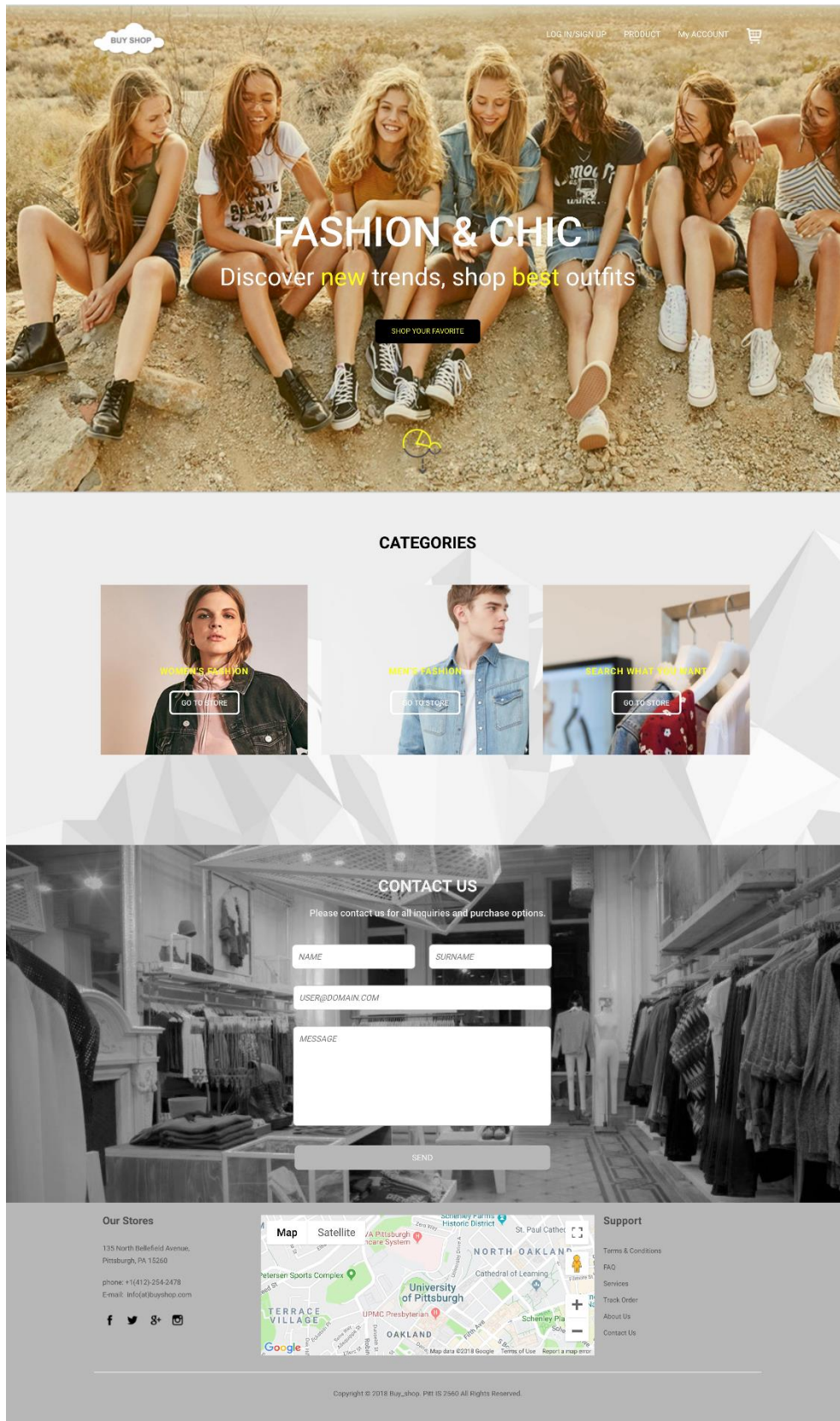
User homepage design

User shopping page design

2.3.Database Scheme

- **Cart**

```
var mongoose = require('mongoose');
var CartSchema = new mongoose.Schema({
    uId: String,
    cId: String,
    cName: String,
    cPrice: Number,
    cImgSrc: String,
    cQuantity: Number
});

module.exports = mongoose.model('Cart', CartSchema);
```

- **Manager**

```
var mongoose = require('mongoose');
var ManagerSchema = new mongoose.Schema({
    name: String,
    username: String,
    password: String,
    email: String,
    tel: String,
});
module.exports = mongoose.model('Manager', ManagerSchema);
```

- **Product**

```
var mongoose = require('mongoose');
var ProductSchema = new mongoose.Schema({
  productName: String,
  kind: String,
  size: String,
  inventory_amount : Number,
  price : Number,
  img: String,
  description: String,
  volume: {type: Number,default: 0}
});
module.exports = mongoose.model('Product', ProductSchema);
```

- **Transaction**

```
var mongoose = require('mongoose');
var TransactionSchema = new mongoose.Schema({
  transaction_date: {type: Date,default: Date.now},
  user_ID: String,
  product_ID: String,
  price : Number,
  quantity : Number,
});
module.exports = mongoose.model('Transaction', TransactionSchema);
```

- **Users**

```
var mongoose = require('mongoose');
var UserSchema = new mongoose.Schema({
    name: String,
    address: String,
    marriage_status: String,
    gender: String,
    age : Number,
    income : Number,
    username: String,
    password: String,
    email: String,
    tel: String,
});
module.exports = mongoose.model('User', UserSchema);
```

3. Web Implementation

3.1. Front-end design and connection

The system implements MEAN stack (MongoDB, expressJS, AngularJS, NodeJS) along with the MongoDB database, and follow the MVC structure, as shown below.


(1) The front-end HTML display the information the user needed, and the user can interact with the elements in that page.

(2) The controller detects the change users made and send a request to the MongoDB database to retrieve or modify the records.

(3) The database then sends a response with the information contained in a corresponding model.

(4) The controller receives the model from the database and modifies the front-end page correspondingly.

3.2. Implementation with example screenshots
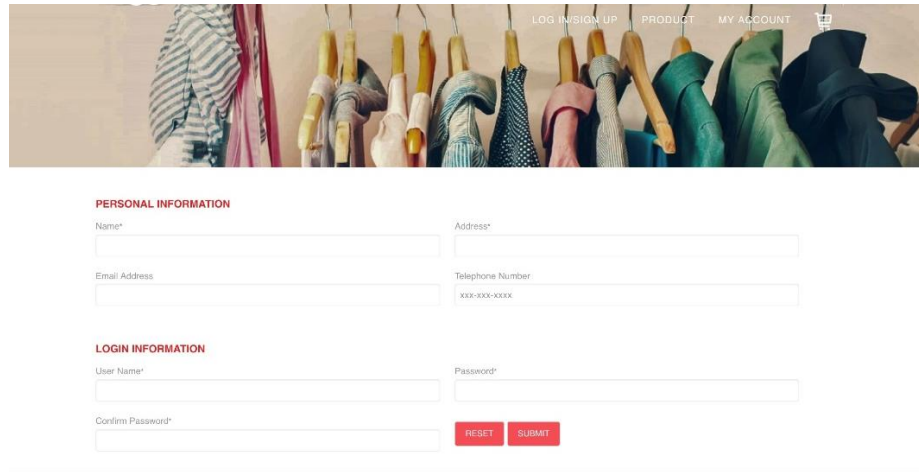
3.2.1. User

3.2.1.1 Login and Create an Account

By inputting the username and password and clicking the button "LOGIN", customers can easily log in our websites. We can also click the button "Create an account" to register a new account.
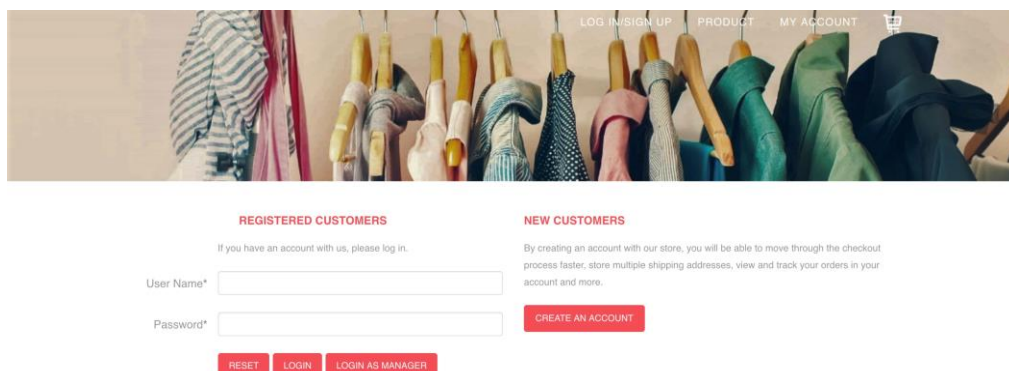
User login/registration

After clicking the button "CREATE AN ACCOUNT", we can create an account by inputting some basic information. Individual customer page is shown as below.
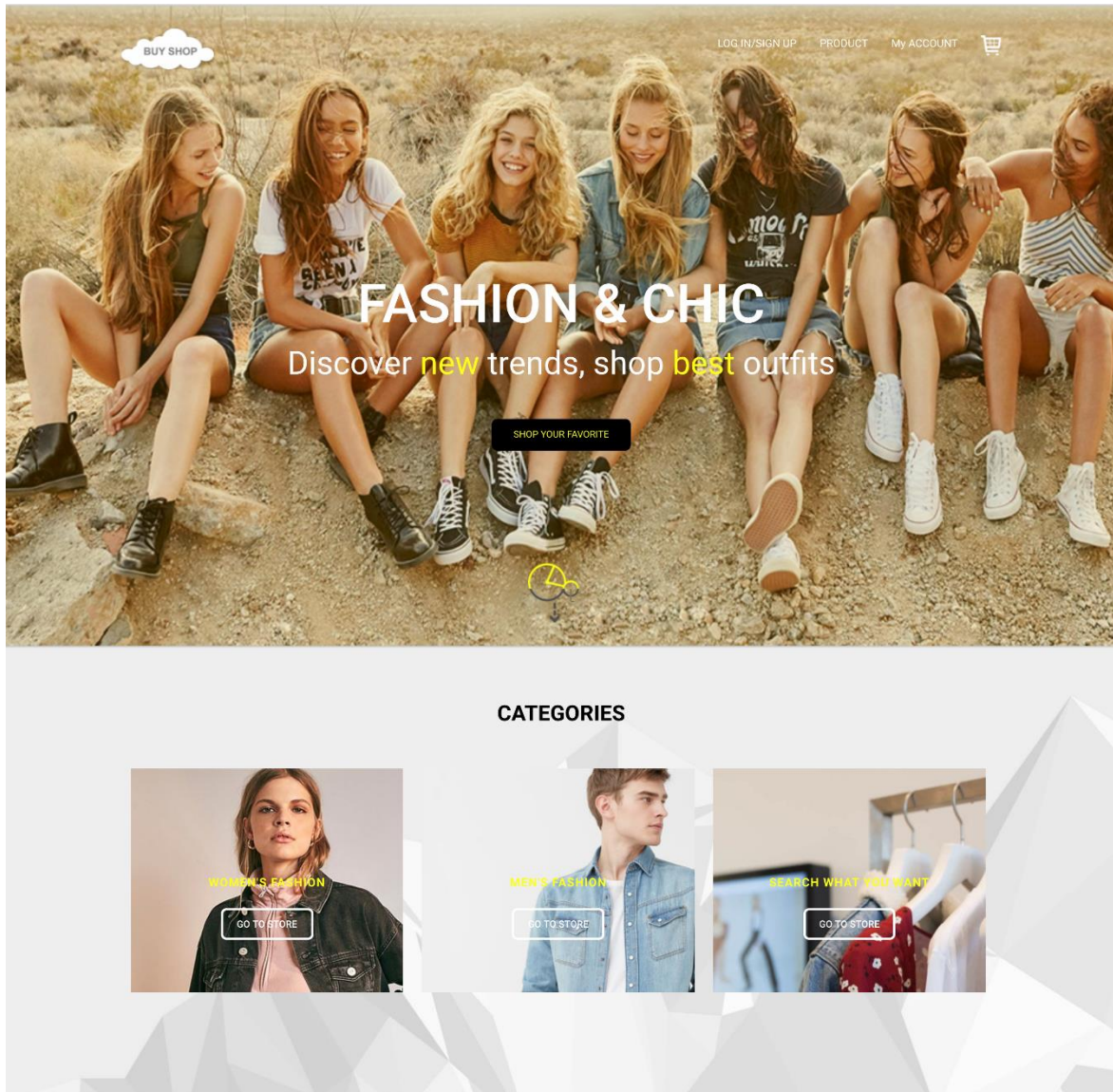

User registration

3.2.1.2 Shopping

After entering the main interface, the important information, such as advertisements and slogans, can be displayed. We can click the buttons on the top or the buttons on our Jumbotron to enter the product page.

This is part of our home page.

Home

After clicking the "product" button on the navigation bar or click the "SHOP YOUR FAVORITE" button on the Jumbotron or click any button on the category part, we will enter the product interface.
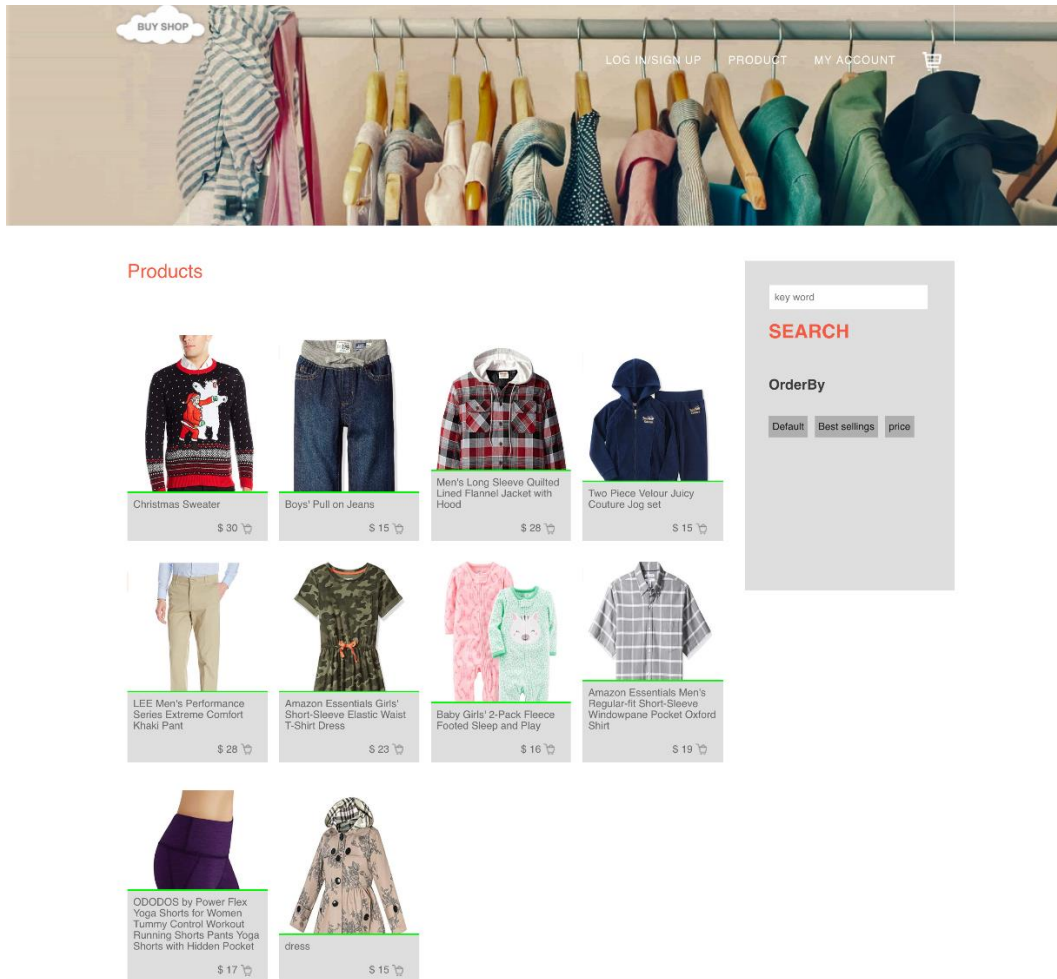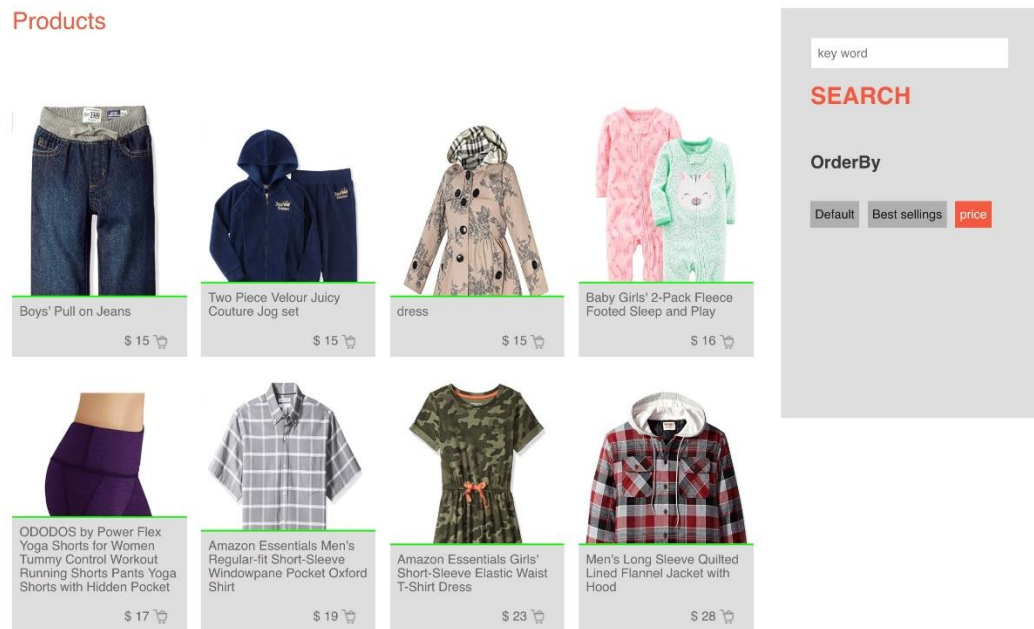
Product lists

After inputting some words in the search box, we could find all the products with this key word.
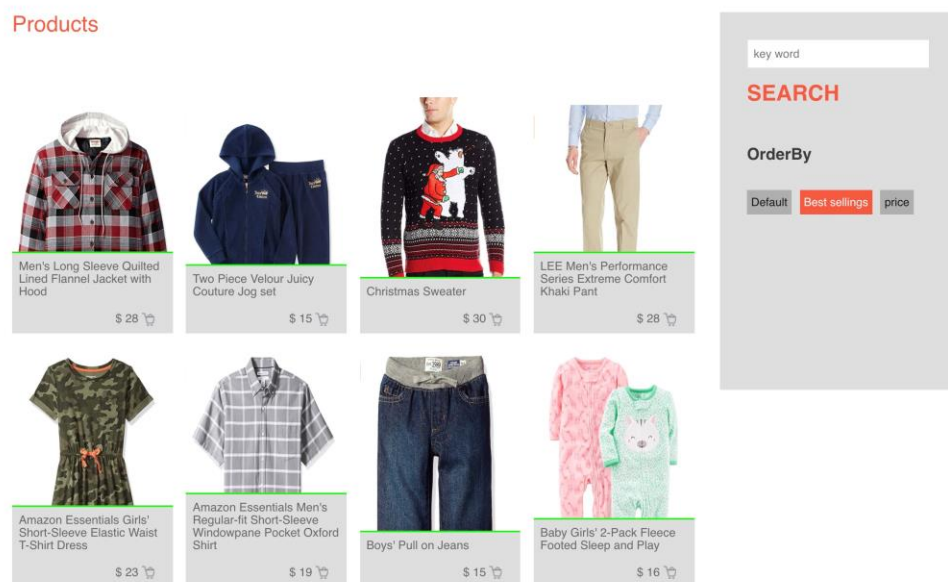

Search a product

After clicking the button "price", we could browse the product selected by price from low to high.
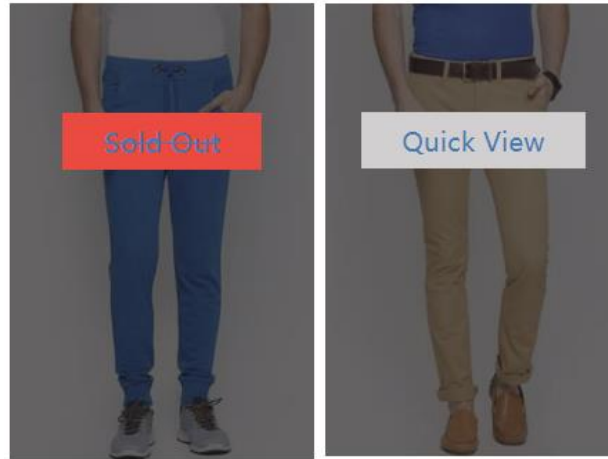

Order by price

After clicking the button "best sellers", we could browse the product selected by sales volumes from high to low.

Order by sales volumes

If the product is sold out, we could not click the picture to enter this product' page.

Sold out

After clicking the image of the product, we can understand more details of the products. If you want to add something into your shopping chart, you can input the quantity and click the "Put into cart" button.
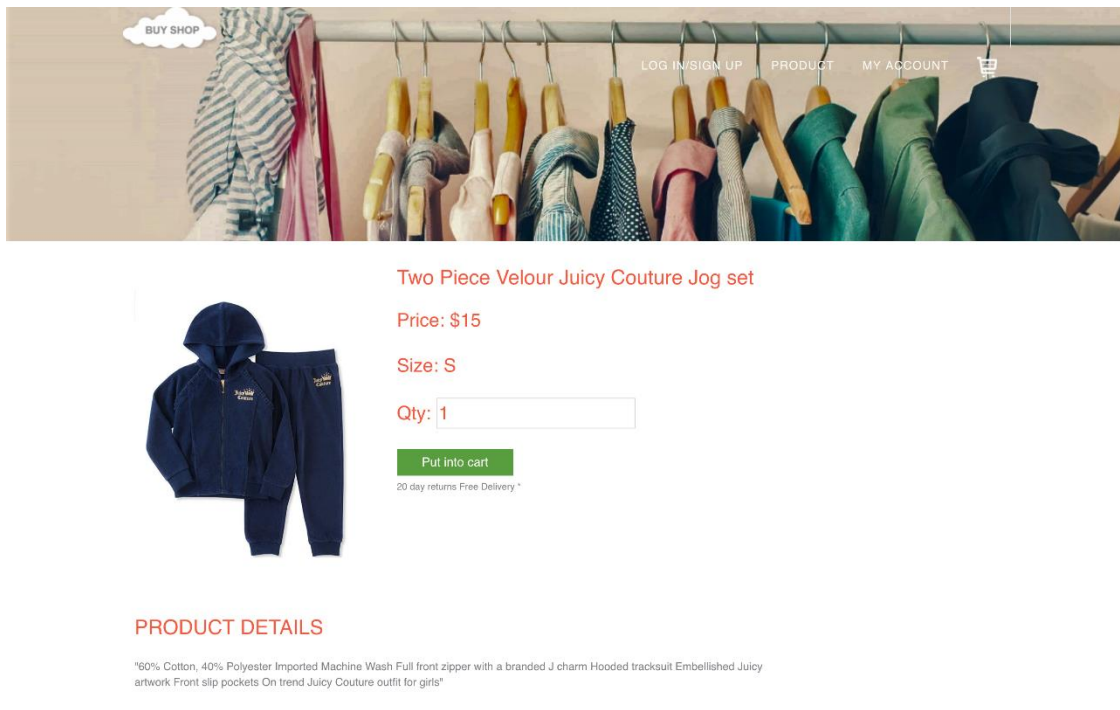
Product detail

3.2.1.3 Shopping cart

Click the button "CART" on the top, we can see all the products in the shopping cart, delete items from the cart, continue to basket or place an order.

My Shopping Cart

Christmas Sweater
No: 1

Price : $30   Qty : 1

Service Charges : $5.00   Delivered in 2-3 bussiness days

Boys' Pull on Jeans
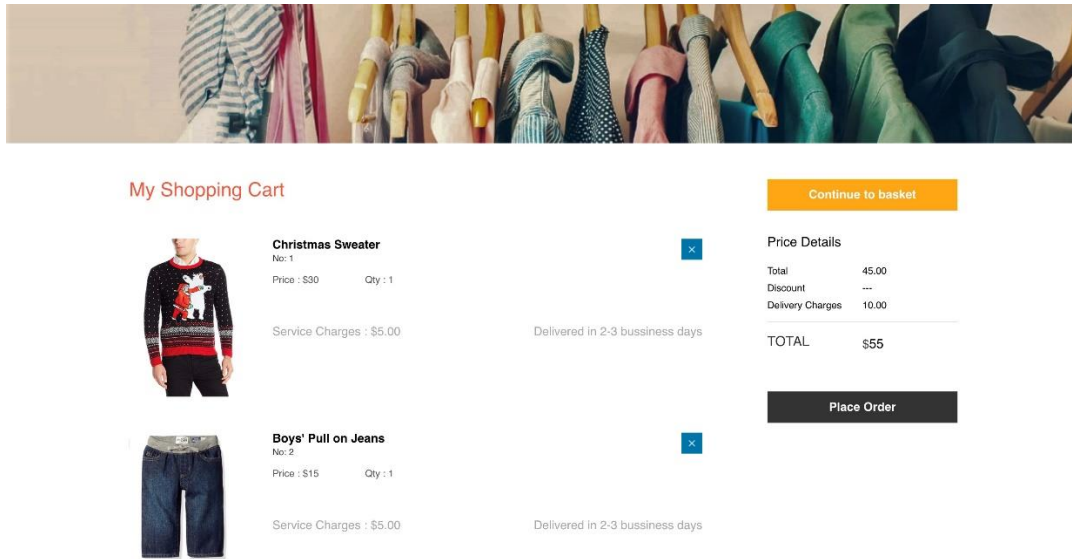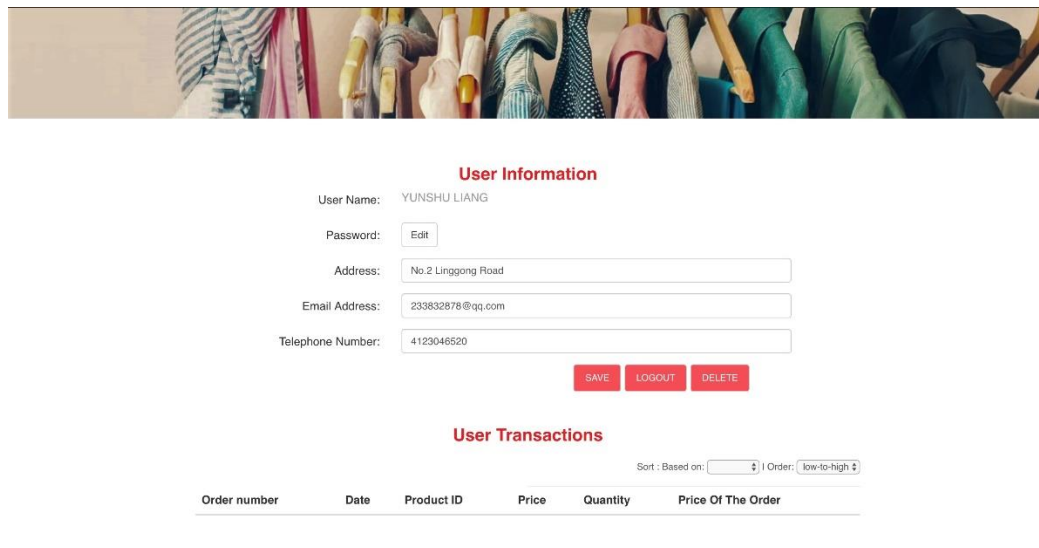No: 2

Price : $15   Qty : 1

Service Charges : $5.00   Delivered in 2-3 bussiness days

Continue to basket

Price Details

Total   45.00
Discount   ---
Delivery Charges   10.00

TOTAL $55

Place Order

Add products into the shopping cart

3.2.1.4 User Profile Management

Click the button "MY ACCOUNT" on the top, we can update user information here. We can also see user transactions here and the transaction can sort. We can delete the user account.

User Information

User Name: YUNSHU LIANG

Password: Edit

Address: No.2 Linggong Road

Email Address: 233832878@qq.com

Telephone Number: 4123046520

SAVE   LOGOUT   DELETE

User Transactions

Sort : Based on: [   ] I Order: [low-to-high]

Order number	Date	Product ID	Price	Quantity	Price Of The Order

Edit users' information

3.2.2 Administrator

3.2.2.1 Administrator Login

Store managers can log in by entering the manager ID, password and then click the button "LOGIN".

Manager login

3.2.2.2 Managers management

Click the button "Check all managers" . Then you can see a list of all the managers.

Manager list

Click the button "Setup new managers" .

BUYSHOP   WELCOME, MANAGER YUNSHU LIANG   MY INFO   LOG OUT

NEW MANAGER
Please complete required information below to build a new manager.

Real Name *

[Enter Real Name]

UserName *

[Enter UserName]

Email *

[Enter Email]

Telephone *

[Enter Telephone]

Reset   Okay   Cancel

Manager registration

3.2.2.3 Users management

Click the button "Check all users" . Then you can see a list of all the users.

BUYSHOP   WELCOME, MANAGER YUNSHU LIANG   MY INFO   LOG OUT

USERS LIST

User ID	User Name	Email	Telephone	Address	
5c0de9218ef07c3fe67481f7	YUNSHU LIANG	233832878@qq.com	4123046520	No.2 Linggong Road	🗑

Back To Home Page

Users list

3.2.2.4 Products management

Click the button "ADD new products". Fill out the form, upload the picture and click the button.
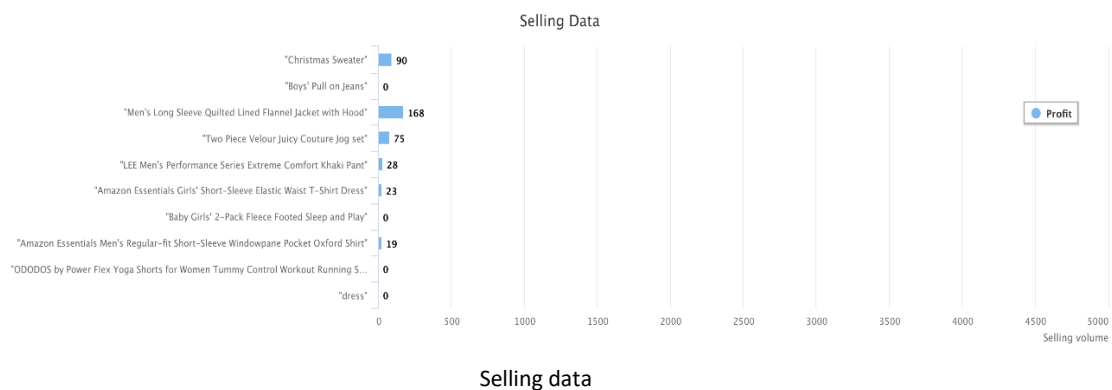
Fill the form

We can see from the table that the new product has been added to the store.

Click the button "Check all products" . Then you can see a list of all the products and the sales volumes.

Selling data

View All Products

View all products here and click product ID to update information.

Product Information

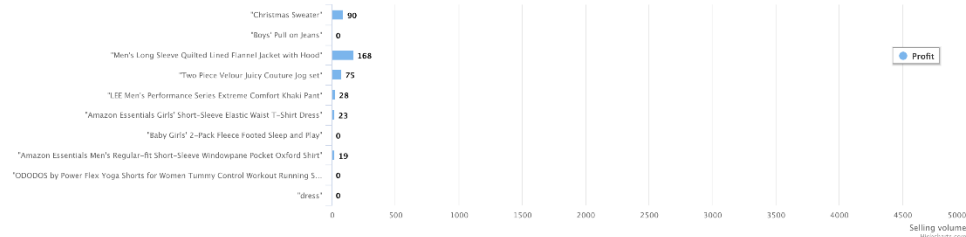| Product ID	Product Name	Kind	Size	Inventory Amount	Price	Volume	Img	Description
5c0defede5da9440655eb906	Christmas Sweater	Sweater	M	1097	30	3		100% Cotton Imported Pull On closure Machine Wash Festive and humorous patterns help bring holiday cheer Made with a soft knit for a comfortable and easy fit
5c0df064e5da9440655eb907	Boys' Pull on Jeans	Jeans	S	0	15	0		"100% Cotton Pull On closure Machine Wash They'll love this style - you'll Love This Place Our PLACE is always in style Value-prices clothes and apparel that are fun and easy to put together"
5c0df0a0e5da9440655eb908	Men's Long Sleeve Quilted Lined Flannel Jacket with Hood	Clothes	L	1114	28	6		"RELAXED FIT. Perfect for layering in the winter or during cool fall evenings, this relaxed fit hooded flannel doesn't restrict movement and leaves room for layering on colder days INSULATED WARMTH. Crafted with diamond black quilted polyester padding, and a hood lined with a soft jersey knit material, this flannel is guaranteed to provide extra warmth and comfort FUNCTIONAL STYLE. This 100% cotton brushed flannel with a 100% polyester lining, is made with style in mind. Wear it on the job or out to lunch, this essential closet staple can be worn for many occasions DURABLE FINISHINGS. Finished with heavy-duty plastic buttons, this flannel is built to last. Button cuff closure designed to keep the warmth in, and the cold air out UPDATE YOUR LOOK.Available in (4) color options, and various sizes to fit anyone and everyone"
5c0df194e5da9440655eb90a	Two Piece Velour Juicy Couture Jog set	Sports	S	926	15	5		"60% Cotton, 40% Polyester Imported Machine Wash Full front zipper with a branded J charm Hooded tracksuit Embellished Juicy artwork Front slip pockets On trend Juicy Couture outfit for girls"
5c0df1c3e5da9440655eb90b	LEE Men's Performance Series Extreme Comfort Khaki Pant	Man	XL	1899	28	1		"Forest/Navy/Stone/Original Khaki/Iron/Black: 98% Cotton, 2% Spandex Imported Zipper closure Machine Wash LIVE IN CLASSIC COMFORT: The Extreme Comfort Khaki offers work-to-play versatility. Athletic details like mesh pockets, a flex waistband & Active Comfort Fabric are combined with a classic khaki look for maximum comfort & style from the office to the club STYLISH DESIGNS: Lee's full line of men's shorts, men's jeans, men's khakis, men's jackets and more provide you with a stylish wardrobe all year round. With cargo shorts for summer hiking trips and denim jackets for windy fall days, Lee keeps you going. MORE THAN DENIM: You already trust Lee to bring you your favorite jeans, but we're so much more than that! Lee makes quality, stylish jeans, khakis, dresses, skirts, jackets, belts, shorts, shirts, uniforms and more! Fill your closet with Lee quality."
5c0df20ae5da9440655eb90c	Amazon Essentials Girls' Short-Sleeve Elastic Waist T-Shirt Dress	Girl	S	10	23	1		"100% Cotton Imported Pull On closure Machine Wash Fill her closet with versatile essentials with this year-round cotton playwear dress Includes one elastic-waist dress Everyday made better: we listen to customer feedback and fine-tune every detail to ensure quality, fit, and comfort"
5c0df2d1e5da9440655eb90d	Baby Girls' 2-Pack Fleece Footed Sleep and Play	Kids	S	1706	16	0		"Fabric content: 100% varies by size and color - please refer to the specific size of the color desired for fabric details Imported Machine Wash Two long-sleeve footed sleep-and-play suits in baby-soft fleece Ankle-to-chin snaps or zipper with snap-over tab and scalloped picot trim at necklines Fold-over cuffs featured only on sizes preemie and newborn. Product sizes 0-3M, 3-6M, and 6-9M do not feature fold-over cuffs. Trusted Carter's quality, everyday low prices, and hassle-free packaging"
5c0df311e5da9440655eb90e	Amazon Essentials Men's Regular-fit Short-Sleeve Windowpane Pocket Oxford Shirt	Man	XL	1827	19	1		"100% Cotton Imported Machine Wash A windowpane plaid highlights this clean and classic short-sleeve Oxford shirt Features a button-down collar and a single chest pocket Everyday made better: we listen to customer feedback and fine-tune every detail to ensure quality, fit, and comfort"
5c0df337e5da9440655eb90f	ODODOS by Power Flex Yoga Shorts for Women Tummy Control Workout Running Shorts Pants Yoga Shorts with Hidden Pocket	Underwear	XXL	1630	17	0		"87% NYLON / 13% SPANDEX , 87% POLYESTER / 13% SPANDEX Made in USA or Imported Choose between solid, Heather You decide what's best for you. You're covered by our 100% full money-back guarantee. If you don't love our products, simply return them without question within 30 days. Select your favorite color and *"'*"Add to Cart*"*" now. Using 4 way Stretch & Non See-through Fabric. Perfect for yoga, exercise, fitness, any type of workout, or everyday use. ODODOS RePower Flex Yoga Shorts combine fashion, function and performance. These ODODOS Power Power Flex Yoga Shorts for women are made from the highest quality fabrics designed to remove moisture from your body, providing maximum comfort. Fabric is designed to contour perfectly to your body, giving you a streamlined look."
5c0ef942a3e06448cfa95097	dress	dress	s	11111	15	0		beautiful

Back

Selling Data

Product	Value
"Christmas Sweater"	90
"Boys' Pull on Jeans"	0
"Men's Long Sleeve Quilted Lined Flannel Jacket with Hood"	168
"Two Piece Velour Juicy Couture Jog set"	75
"LEE Men's Performance Series Extreme Comfort Khaki Pant"	28
"Amazon Essentials Girls' Short-Sleeve Elastic Waist T-Shirt Dress"	23
"Baby Girls' 2-Pack Fleece Footed Sleep and Play"	0
"Amazon Essentials Men's Regular-fit Short-Sleeve Windowpane Pocket Oxford Shirt"	19
"ODODOS by Power Flex Yoga Shorts for Women Tummy Control Workout Running S..."	0
"dress"	0

Profit

Selling volume
Highcharts.com

View all the products

Click the "Transaction Record" on the top. We can choose home or business transactions.

It can sort by price from low to high.

Transaction list

3.2.2.5 Manager Account

Click the "Manager Account" on the top.

Manager profile

3.2.2.6 Logout

Click the button "Logout" on the top, it will go to the Login page.

3.3.Testing efforts and erroneous cases to ensure that your system can detect and handle

3.3.1 User

3.3.1.1 User Login and Create an Account

When we login, If we forget to fill the field, use username that does not exist or use incorrect password, there will be prompt information.

When we create an account, if the something wrong exists, there will be prompt information.

3.3.1.2 Shopping

If we buy a product which exceeds its quantity, there will be prompt information and the button "put into cart" will disappear.

3.3.1.3 Shopping cart

If we click the button "cart" without login, there will be a pop-out window.

3.3.1.4 User Account Management

If the format of the email address or telephone number is incorrect, there will be prompt information and the button "save" could not choose.

User Information

User Name: YUNSHU LIANG

Password: [Edit]

Address: No.2 Linggong Road

Email Address: 233832878

Telephone Number: 4123046

Illegal email

Illegal phone number

[SAVE] [LOGOUT] [DELETE]

3.3.2 Administrator

When store manager input wrong username or password, there will be prompt information

BUYSHOP   PLEASE LOG IN

MANAGER LOGIN

Please input your name and password to login to your manager account

Name

asdasd

Password

....

username not found

Reset   Login

BUYSHOP   PLEASE LOG IN

MANAGER LOGIN

Please input your name and password to login to your manager account

Name

YUNSHU LIANG

Password

....

username and password do not match

Reset   Login

4. Team members' contributions

- Zhixiang Liu: Analyzed the requirements of the website, discussed the function and the pages of the website, designed the web pages, built the users' pages (font-end and back-end) and assisted in writing report
- Alan Chu: Analyzed the requirements of the website, discussed the function and the pages of the website, designed the web pages, built the managers' pages (font-end and back-end) and assisted in writing report
- Yunshu Liang: Analyzed the requirements of the website, discussed the function and the pages of the website, designed the web pages, assisted in building the managers' pages(font-end and back-end)and assisted in writing report
- Xiaoqian Xu: analyzed the requirements of the website, discussed the function and the pages of the website, designed the web pages, assisted in building the users' pages(font-end and back-end) and wrote final report.

5. Technology used

1. Front-end Technology
   - HTML
   - CSS
   - Bootstrap
   - JavaScript
   - AngularJs
   - jQuery
2. Back-end Technology
   - MongoDB
   - ExpressJS
   - NodeJS

6. Setups

1. Unzip the whole zipped file

2. Use "set port=xxxx & npm start" to start the server (make sure MongoDB is running)

3. Use Postman with path "/ManagerAccount/newrole" to build the first manager

4. Run the front-end: the homepage is localhost xxxx

5. Log in as a manager to add some products

6. Register as an user

7. Log in as an user(make sure you login with your real name registered instead of your username)

8. Now you can do everything!

7. Challenges

1. Draw plots for managers to see the volume of each products.

2. Enable managers to insert images and automatically build the images' paths when managers want to insert new products or update existed products.

3. Build the shopping cart, especially modifying inventory volumes and editing sales volumes

4 . Use Google map API for our website

8. Conclusion

In conclusion, we use MEAN stack framework(MongoDB, ExpressJS, AngularJS, NodeJS) to build our e-commerce website, which can meet the requirements of both users and administrators. Our website provides the following functions: login, log out, viewing and modifying customer profile, searching products, browsing products, adding products to the shopping cart, placing orders, viewing past orders, managing the products inside the store, adding products, updating products, deleting products, managing users' information and managing transactions. We use the web design principles from the lecture to design our website and achieve the scope of this

project: data storage, multiple users with different interfaces to achieve different goals, mobile-responsive, MVC Structure, RESTful Web service, location aware and aesthetic pages.

After this project, we gain hands on-experience on how to build a whole online-shopping website so that we can comprehensive the previous homework and lectures better. Also, it is a good opportunity for us to solve questions independently and cooperate with team members during the project.

9. Future Improvements

1. The shipping fee cannot change now. The shipping fee can be depended on the distance from the store address to the user address.

2. We don't have the order placement interface, which requires the customers to enter their billing information for order processing.

3. We should include more charts to make the website more interactive and serves better for managers.

4. We should add more categories for products in order to filter a specific type of product more conveniently.