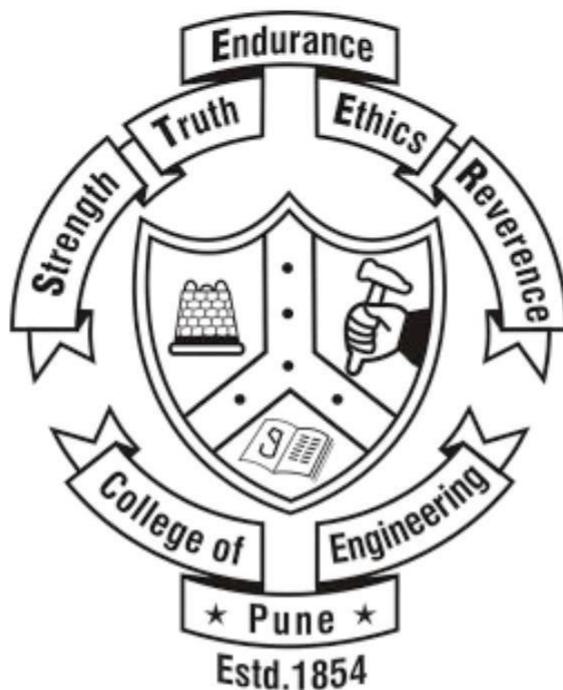


PriceTracer



SOFTWARE ENGINEERING

THIRD YEAR, COMPUTER ENGINEERING



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1. Abstract

To design a web application called Price Tracer - to automate the tracking of prices of products sold on e-commerce websites, allowing users to analyze the trends in the prices, send the price drop alerts, and in addition, incorporated with the product recommendation system.

To solve the above problem, the technique of web scraping is going to be used. Web scraping is an application data-mining technique used to extract information from web services. In the current era of online business, e-commerce has become a huge market for people to buy products online. These rapid advancements in the e-commerce sector have certainly increased the involvement of online buyers in evolving e-commerce business. Many strategies have been developed by analyzing customer's behavior so as to attract more business and participation from people. These large numbers of e-commerce websites put users in turmoil to search and choose to buy a single product from multiple e-commerce websites.

It then becomes difficult for users to choose the best deal for the desired product among the various options made available through e-commerce websites. Modern consumers are becoming increasingly aware of the prospects of the various pricing strategies, which have made their purchase decisions more sophisticated. This portrays an increased tendency among online shoppers to track product prices and wait for price markdowns prior to making their purchase decisions. Most of the e-commerce websites do not have the price tracer for their products inbuilt which leads to even greater demand for applications such as "Price Tracer" which can not only recommend similar products but also notify the users about dropped prices and can even provide a greater aspect to online shopping by providing an interface to analyze the dynamic price trends of the products at e-commerce websites. Thus the proposed solution helps online users to grab the best deal for their product from multiple e-commerce websites through a single web interface. This will in turn save users time, money, and efforts. The proposed system aims to provide solutions for customers to buy products online.

Keywords: Price Tracking, Dynamic Pricing, E-commerce, Strategic Buying, Recommendation system.

Aims

- To track the prices of different products added to the cart/wishlist, thus users can take advantage of different sales from time to time.
- Also, provide the price fall notification system to implement the above.
- To track the prices with the helpful graphs and charts.
- To provide the recommendation system to the user for ease in shopping.

Objectives

To proceed with the solution,

- The first task will be to develop a login authorized system, so to provide each user a dynamic interface (a portfolio specific to each user).

- Next, we'll construct a user interface wherein, they can add the URL of the selected product to the wishlist.
- In the background, a web scraper will continuously scrape the web page after a specific time interval and fetch the price and other useful details and dump them into the database.
- The data retrieved from the database is going to be converted into easily readable graphs and if the required price (price mark set by the user) is achieved then the notification sender comes in picture.
- To achieve this we'll use APIs to send the emails to the user.
- Next section involves the development of a recommendation system interface that will display the user-specified products from various e-commerce websites.

Functional Requirements

- Email authorization login
- Wishlist feature - will contain the products being tracked.
- URL upload feature
- Help/suggestion form through emails.
- Product recommendation interface.
- Notification feature via emails.
- Graphical display for trends in the price of each product being tracked.
- Profile view (user-specific) interface.

Summary of project development

So basically, this web application uses a web scraper that needs a URL to start with. It then fetches the important data regarding products. Data is collected and users can observe various price trends through graphs.

We hope that our application will have our users save a lot of money by doing effective and easy shopping.

2. Introduction

Price Tracer is developed for everyone indulged in online product shopping at various e-commerce websites, who would want to make their online purchase decisions more sophisticated amidst various pricing strategies(product offers and sales) introduced in the e-commerce market. Price Tracer automates the tracking of prices of products sold on e-commerce websites, allowing users to analyze the trends in the prices, send the price drop alerts, and in addition, it is incorporated with the product recommendation system.

3. Software Requirement Specifications

1. Introduction

1.1. Purpose

The purpose of this document is to present a detailed description of the Price tracer web application for its release version 1.0. It will explain the various features of the web application and the interfaces of the application along with its design implementations. All the functionalities of the Price tracer are illustrated in detail with the constraints under which it must operate. This document is intended for naive users of the application as well as the possible potential developers.

1.2 Document Conventions

This document was created based on the IEEE template of documenting software project. The document obeys following font styles and sizes :

- Section Headings - font size:18 ; font style:Times New Roman; color: Black
- Sub-section Headings - font size:14 ; font style:Arial; color:Black
- Text content - font size:11; font style:Arial ; color:Black
- Links to external sources and references - font size:9 ; font style:Arial ; color: Blue

1.3. Intended Audience and Reading Suggestions

- Typical Users, such as shoppers who want to use Price Tracer to save money by purchasing products at a lower cost. All the people who buy products online from various e-commerce websites are the intended audience.
- Programmers who are interested in working on the project by further developing it or fixing existing bugs or testing it.
- A suggestion to the readers is to follow the sequence as in the index for better understanding and maximum absorption of the document.

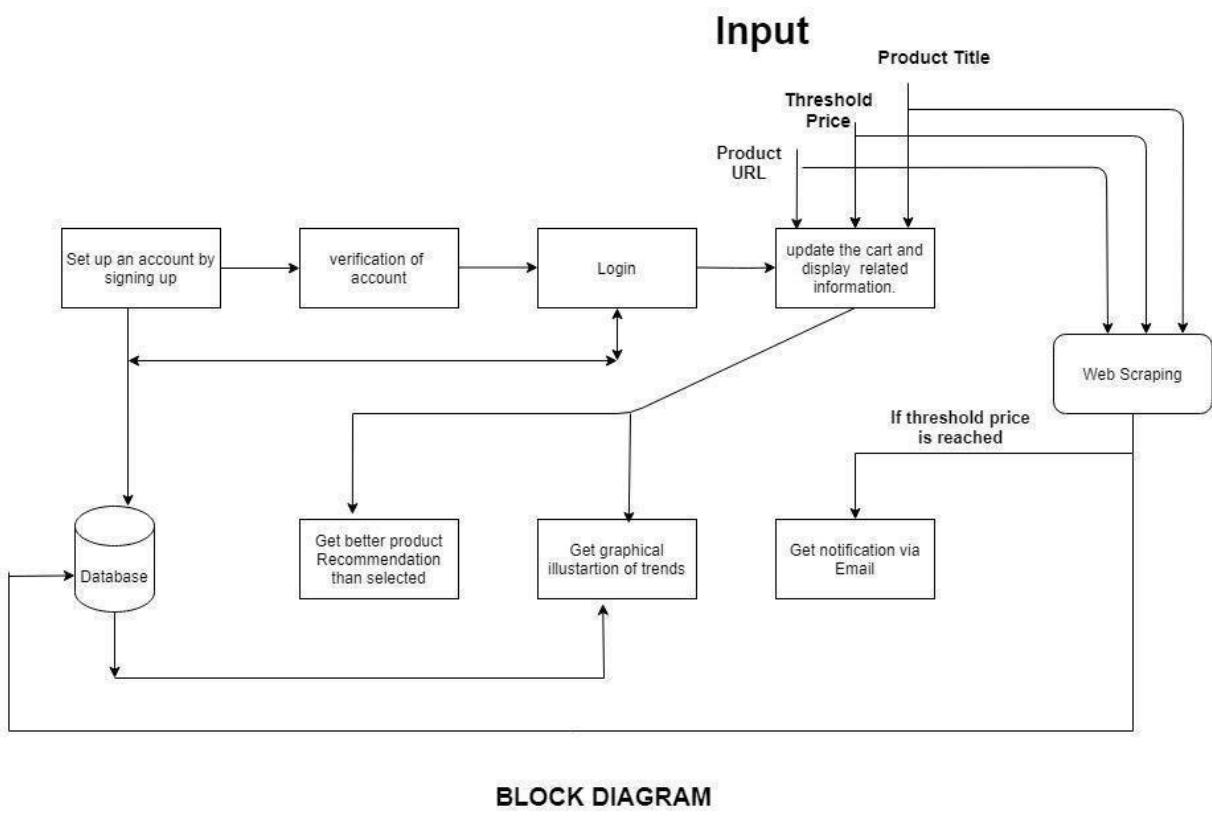
1.4. Product Scope

Price tracer is an application that intends to help shoppers to buy the product from an online shopping site at a reduced cost. It is an extremely user-friendly application with absolute ease to use. The user is required to enter the desired product URL, a suitable title of the product, and threshold price. The major objective is to provide our users with the best price of products they wish to buy, executed by notifying them of price drop and displaying graphical analysis of price trends of the products. A notification is sent via email whenever the price drops below the threshold price as set by the user. The user also gets recommended similar products. This application currently supports price tracking of products from websites like Flipkart, Amazon, eBay, Snapdeal and paytmall .

2. Overall Description

2.1 Product Perspective

Price Tracer is developed for everyone indulged in online product shopping at various e-commerce websites, who would want to make their online purchase decisions more sophisticated amidst various pricing strategies(product offers and sales) introduced in the e-commerce market. Ongoing these pricing strategies, the price of a single product fluctuates greatly over time, taking it into consideration, Price Tracer provides the users with the functionality to get notified when the price of the product drops below the price marked by them so that they can get the best deal for the product. Besides this, it also provides the interface for graphical analysis of trends in the product prices along with the similar product recommendations from various e-commerce websites.



2.2 Product Functions

Major Functionalities:

- Email-based secured authorization to the application, allowing users to create a user-specific account.
- Shopping cart facility - Displaying the user-specific comprehensive product details that are being tracked and allow users to add/remove products from the cart.
- Product URL upload feature in order to web scrape and track the product's price.

- Feature to mark the product's desired price (Threshold price).
- Option to change or update the previously given threshold price.
- Price dropdown notification feature - The system shall maintain customers' email id information as a required part of the customer profile and shall send the price dropdown notification via emails to that id.
- Graphical analysis interface - Displaying the graph for variation in the prices of the product in the form of line chart and bar chart.
- Recommendation system interface - Displays or recommends similar products from various e-commerce websites, which users might be interested to take a look at.

Customer Support:

- About: Displays the relevant information of web applications consisting of the various supported e-commerce websites for tracking the product, scope of application, and other information.

Other Functionalities:

- User profile:
 - The system shall allow users to view their profile information
 - The system shall authenticate the user's crucial information such as email .

2.3 User Classes and Characteristics

- Typical Users, such as people indulging very highly in e-commerce shopping, who want to use Price Tracer to get the best price deal for the product on a particular website to make a profit and save resources.
- Advanced/professional Users, who want to do in-depth analysis to have an insight into patterns and trends in the pricing strategies of a particular product on an e-commerce website
- Programmers/Developers who are interested in further developing the application and fixing the bugs.

2.4 Operating Environment

- Windows XP
- Windows 7
- Windows 8
- Windows 10
- Mac OS
- Linux

2.5 Design and Implementation Constraints

Price Tracer is developed using Javascript frameworks such as Node.js for backend and React.js as the frontend technology built on top of the Visual Studio platform and uses MongoDB as a database technology. It uses the Gmail-based authorization to the application as security to prevent it from errant users. It uses a modular design where every feature is wrapped into separate modules and modules depend on each other through well-written APIs. There are no specific memory requirements.

2.6 User Documentation

As Price Tracer is a web application, an online help system becomes the crucial component of the system which shall provide

The about section of the application specifics guidelines to a user for using Price Tracer application within the system, provides a better understanding of different components of the system and mentions the various e-commerce websites being supported by price tracer.

2.7 Assumptions and Dependencies

It is assumed that the users are familiar with an internet browser and also familiar with handling the keyboard and the mouse. Since the application is a web-based application there is a need for an internet browser. It will be assumed that the users will possess decent internet connectivity. Furthermore, as the application will implement an email-based login authorization, it will be assumed that the users have a valid Email Id.

3. External Interface Requirements

3.1 User Interfaces

The system shall provide a uniform look and feel between all its web pages. The various user interfaces that the system includes are as follows:

- Price Tracers Welcome/Login interface.
- Register/Sign Up Interface
- User-specific profile view.
- Graphical Interface - visualizing product trend analysis using line charts and bar graphs.
- Recommendation System Interface.
- Add and edit product Interface.
- Cart view of the user.

- Help user interface - About interface.

3.2 Hardware Interfaces

Since the application runs over the internet it can be accessed from Desktops supporting web browsers, since the system uses the cloud-based database service no local installation is required, however, the hardware required for internet connectivity is must.

3.3 Software Interfaces

- **Browser support**

Price Tracer being a web application will be compatible with any browser such as Internet Explorer, Chrome, Microsoft Edge, Netscape Navigator, etc.

- **Database cloud service support**

The system will communicate with MongoDB atlas (cloud service-based database) via Nodejs Mongoose library to store the information about users and their products.

- **Packages and Libraries**

The system will use the NPM packages and dependencies which are javascript libraries to implement the UI for the frontend and functionalities for the backend.

3.4 Communications Interfaces

Price Tracer will predominantly use the Hypertext Transfer Protocol (HTTP) for communication over the internet and the MongoDB atlas cloud service over port 80 and intranet communication will be through TCP/IP protocol suite.

4. System Features

The section describes the product's system features and details on how it is going to help the users using the product.

4.1 Authentication and Login

4.1.1 Description and Priority

To provide a customized and user-specific experience to customers, a login feature is set up. Initially, a user is required to do a sign-up to the application by providing an email id, which further is authenticated and verified. This is done to avoid spamming

up. Now a user has an account set up. This is of high priority as it allows differentiating different users, providing hiding of data from others as well. They are a security measure designed to prevent unauthorized access to confidential data. When a login fails (i.e, the username and password combination does not match a user account), the user is disallowed access.

4.1.2 Stimulus/Response Sequences

The user arrives at the home page, finds a sign-up option, provides an email-id, password, and personal information. Entered email id is verified by sending a mail to the input id for verification. After the verification, an account is created. Now, the user has a wide range of features to use, mentioned later in the document.

4.1.3 Functional Requirements

REQ-1: Enter a valid email id to have successful verification while signing up.

REQ-2: Password should be a minimum of 8 digits.

REQ-3: Error Check- If a user tries to sign up with an already registered email-id, an error will pop up. While login into the application, if a user enters a not valid email id or password an error will pop up.

4.2 Cart/Wishlist

4.2.1 Description and priority

Users are provided the feature of having their own personalized cart. They are authorized to add and remove different products ranging from different e-commerce websites and can observe/analyze the price tracking with different graphical illustrations. Its priority is high, as it is the most prominent feature of this application.

4.2.2 Stimulus/Response Sequences

Users can add a product's URL from different e-commerce websites which are supported by the application along with the threshold price and suitable product title. Here threshold price refers to the price at which the user will like to buy a product. Users can later edit the threshold price of any product if they wish to. Product title will be used by the recommendation system to recommend similar products. After adding, a particular response is saved in a database and the process of scrapping starts. Scraping is done at a particular time interval. During scrapping, relevant data is dumped into the database, which later is used to produce different graphs which are easily understandable by people.

4.2.3 Functional Requirements

REQ-1: Needs a valid URL of the product. Valid here means that the URL must be from the listed e-commerce site only. Users can find more about this in the about section.

REQ-2: Needs a valid threshold value as an input. This value has to be a positive number, otherwise, an error will pop-up
REQ-3: Cards will be used to display all the responses.

4.3 Notification

4.3.1 Description and priority

While scraping continuously, the current price of the product is updated simultaneously. Once the current price is equal to or less than the threshold price as entered by the user, a notification is sent to the user via email.

4.4 Recommendation

4.4.1 Description and priority

This feature helps the user get better recommendations similar to the product added to the cart from various e-commerce websites. If a similar product is found, having less price than that of the selected product , then the recommendation is displayed to the user.

4.4.2 Functional Requirements

REQ-1: Will require basic product details like product title, for scraping the details from the web.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Price tracer will require a browser like Google Chrome/Firefox to access the product with stable internet connectivity to enable proper scraping from different websites.

5.2 Safety Requirements

Regular backups will be maintained at the backend side. If at all any bugs or data loss happens on the user side, users can recover from these losses using server-side stored data.

5.3 Security Requirements

To maintain the user-level authentication, while signing up, verification is done. Also, each user can have access to their own data, and not other user's data.

5.4 Software Quality Attributes

Due to its well-designed and easy-to-use interface, it can be used by both experts and typical users. The application is quite easy to use and is flexible as well as portable.

5.5 Business Rules

For now, there is only one level of the role which users can have. A normal user-level view will have access to all the features provided with the application.

6. Other Requirements

This product would require a legal purchase of the database, domain name for further expansions. To launch it in the future as an official web application and host it successfully, copyrights would be needed.

4. Literature Review

4.1 Tabular Representation

Year	Title	Journal or conference details	Methodology used	Proposed idea	Advantages/ achieved objectives in paper	Disadvantages/ Limitations
Mar, 2014	Online shoppers' response to price comparison site	Journal of Business Research	Research design: This study uses a $2 \times 2 \times 2$ (wrt price comparison, product category and price consciousness): factorial mixed design to test the proposed hypotheses. Study conducted over 160 individuals.	The study examines how price comparison sites affect the price and value perceptions of online shoppers across different product types and price consciousness levels of online shoppers.	The results show that the presence of price comparison sites increases both transaction and acquisition value perceptions for non-look-and-feel product categories but not for look-and-feel product categories.	The influence of a price comparison site on value perception differs according to product type. This study lacks technical intervention.

			awareness about dynamic pricing.	impact on the business by sustaining consumer loyalty.	consumers before engaging in price tracking.	The findings and implications of the study are mainly applicable to the consumers in India.
Aug, 2018	Method of extracting appliance pricing factors in e-commerce	22 nd International Conference on Knowledge-Based and Intelligent Information & Engineering Systems	<p>Extraction of price determination factors: First-in first-out is used to calculate the value of inventory on hand.</p> <p>Data classification by using the clustering method. K-means method is applied in classification and the number of clusters is determined by the elbow method.</p>	<p>It investigates the actual purchase and sales data of certain products sold by an EC business and classifies data.</p> <p>The results analysis, extracts factors which fluctuate and determine the price in the EC market.</p>	<p>The paper helps small and medium-sized EC businesses determine the selling price. Focuses on the correlation between gross profit and selling price to classify products. It reveals that price change has a close relationship with the price ranges.</p>	<p>It does not include the price information of plural EC business operators, price changes in price comparison sites, and switching of the top operator in those sites.</p>
Nov, 2019	Web scraping for food price research	British food Journal	Explains the technical procedure of web scraping, reviews, the existing literature, and identifies areas of application.	To better deal with the technical and legal challenges of web scraping and to exploit its scalability, joint data collection projects in the field of agricultural and food economics should be considered.	<p>Low costs. Good data sets can be expensive. Collecting prices via web scraping is basically free if done.</p> <p>Frequent, real-time sampling</p>	<p>No historical data.</p> <p>Web scraping means collecting real-time data.</p>
May, 2019	Scraping and Visualization of Product Data from E-commerce Website	JCSE International Journal of Computer Sciences and Engineering	<p>The work consists of three phases. The first phase of the work is web scraping.</p> <p>The second phase of the work is data analysis.</p> <p>The third phase of the work is visualization.</p>	Exploratory data analysis (EDA) or analysis allows the analyst to build up a potential relationship between the attributes and the target variable.	<p>The main advantages of the scrapping are inexpensive, easy to implement, low maintenance and speed.</p> <p>The main objective of the work is to scrap the data from websites and store the extracted data in CSV format for analysis.</p>	<p>One limitation is that research is limited to only flipkart and snapdeal here.</p> <p>And visualization is restricted to bar charts.</p>

Sept 2019	Effectiveness of email-based reminders to increase vaccine uptake: a systematic review	Department of Translational Research, New Technologies in Medicine & Surgery, University of Pisa, Italy	It extracts data on study design, population, vaccine type and details of email-based interventions. Data were pooled by type of comparison. These studies provide quantitative comparative data on any measure of vaccine uptake.	Email communication offers many advantages: it is cheaper and faster, it can be automated and linked to electronic immunization registries, and reach people on the move.	email communication succeeds in increasing vaccine uptake when compared with no email intervention. It integrates email communication with technical infrastructure & normative frameworks suitable to embrace innovation.	This study is majorly focused on the effectiveness of the email-based remainder. However, it lacks to include other technologies like SMS, app notifications etc.
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4.2. Conclusion

Following the literature review, it can be concluded that the scheme described in the research paper i.e. Scraping and Visualization of Product Data from E-commerce Websites would better approximate the scheme of our application since it provides effective web scraping technique and visualization of the scraped data, both of which are important components of our application.

Paper 8 provides better insight into technical details of the web scraping scheme and various advantages and flaws that come with the scheme. These papers reaffirm our methodology as it is seen to perform well and as well as has small flaws which are easily correctable with minute changes to the model.

Paper 1 and 3 explores some other strategies that we can take into consideration to ensure that no good alternative has been left out.

Further, few of the papers come with the application of web scraping to different E-commerce products and few of them analyse the various pricing strategies employed by e-commerce websites which forms the very basic reason for us to implement this project.

5.

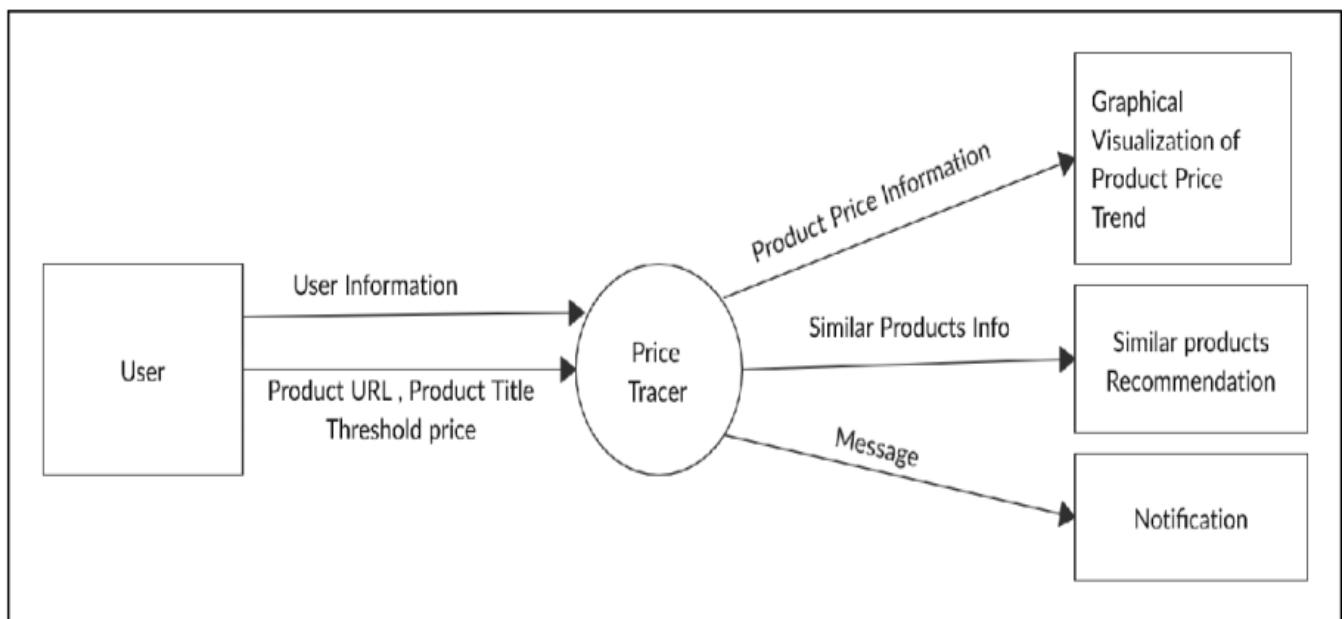
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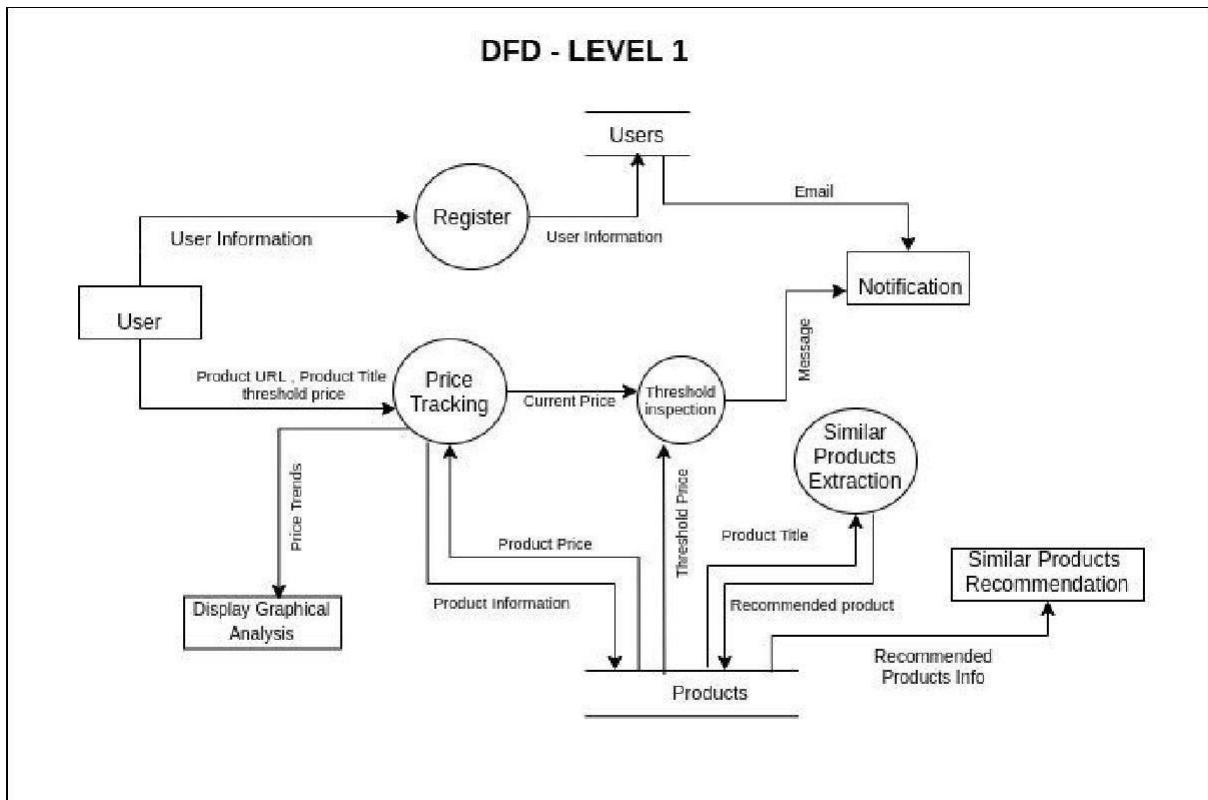
7.

Design 7.1. Data Flow Diagrams

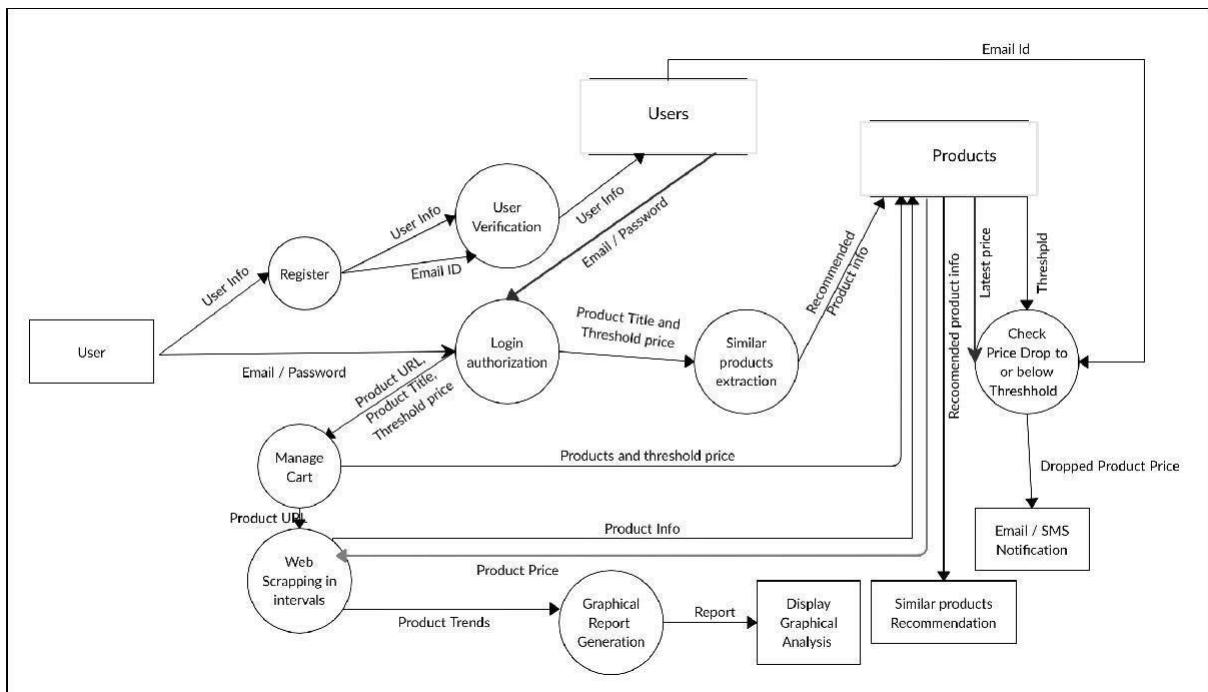
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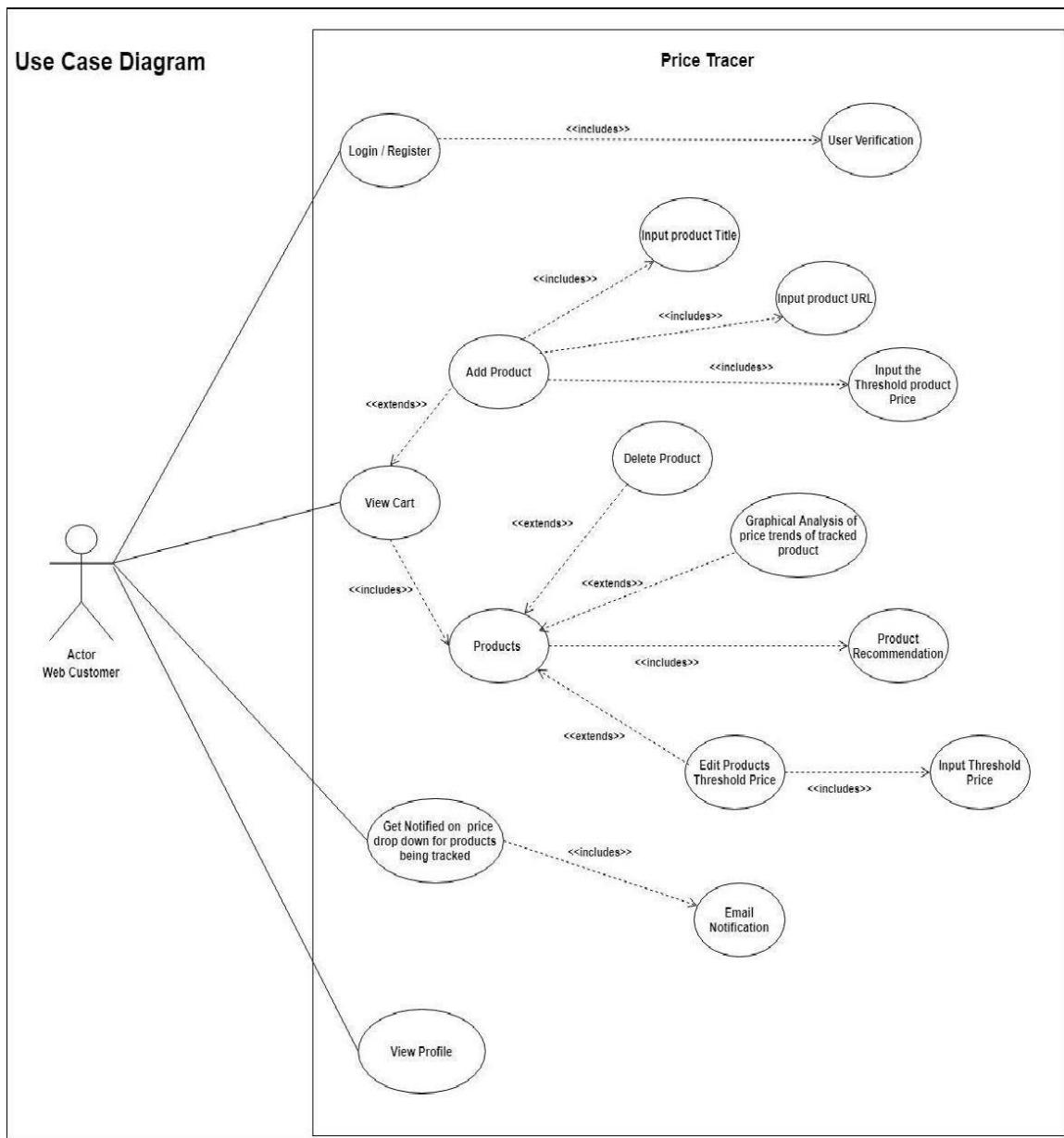
DFD Level 1



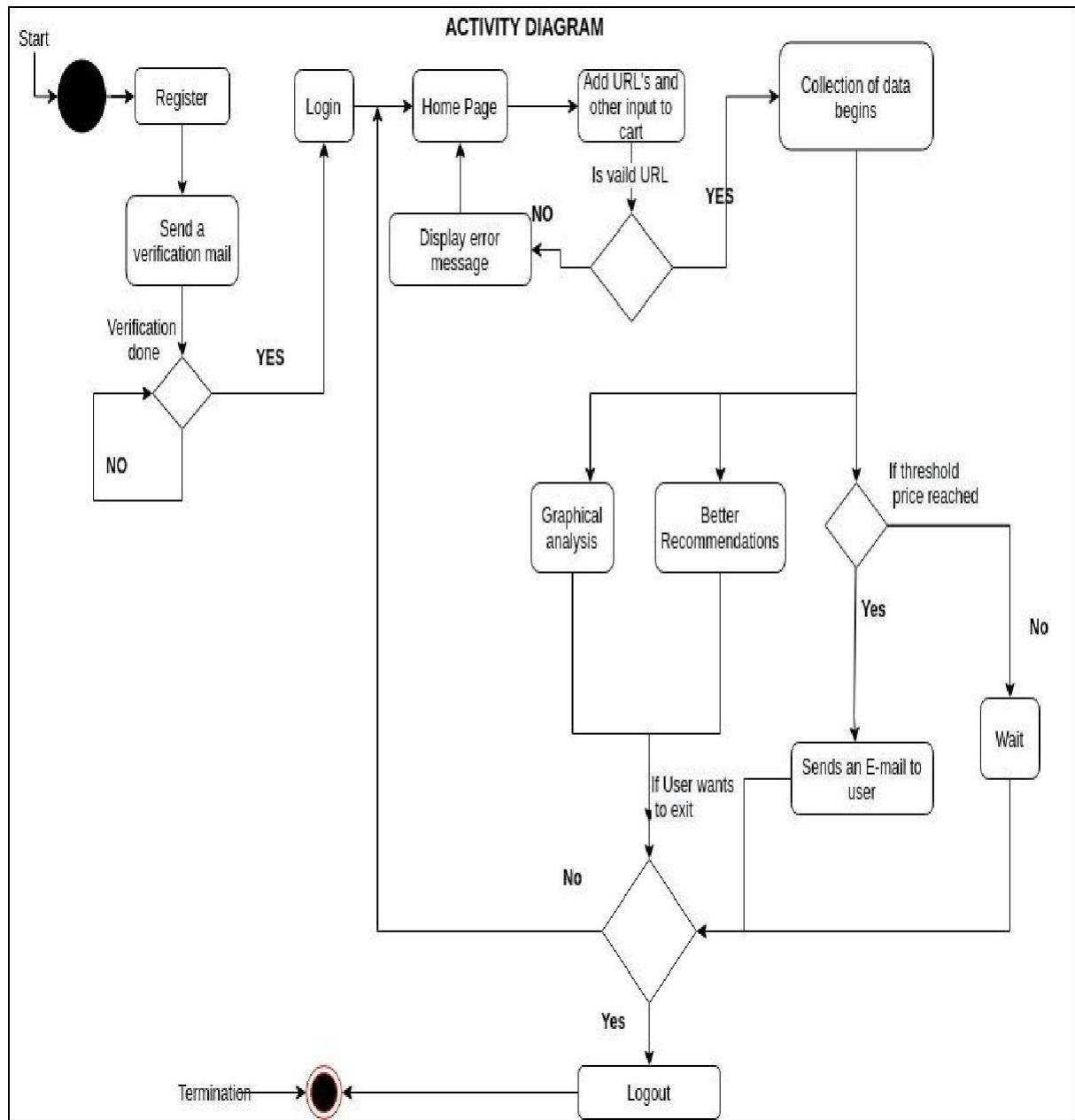
DFD Level 2



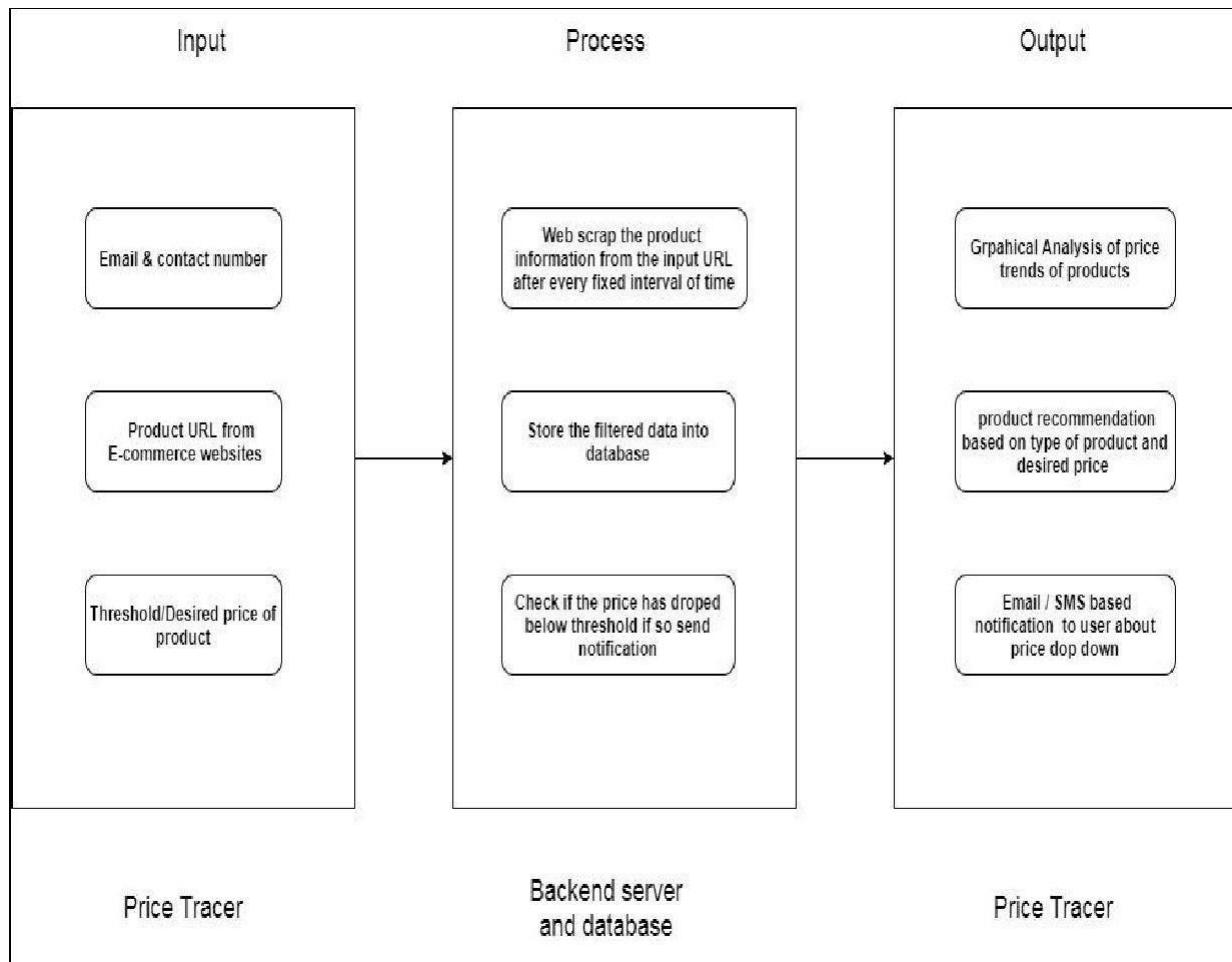
Use Case Diagram



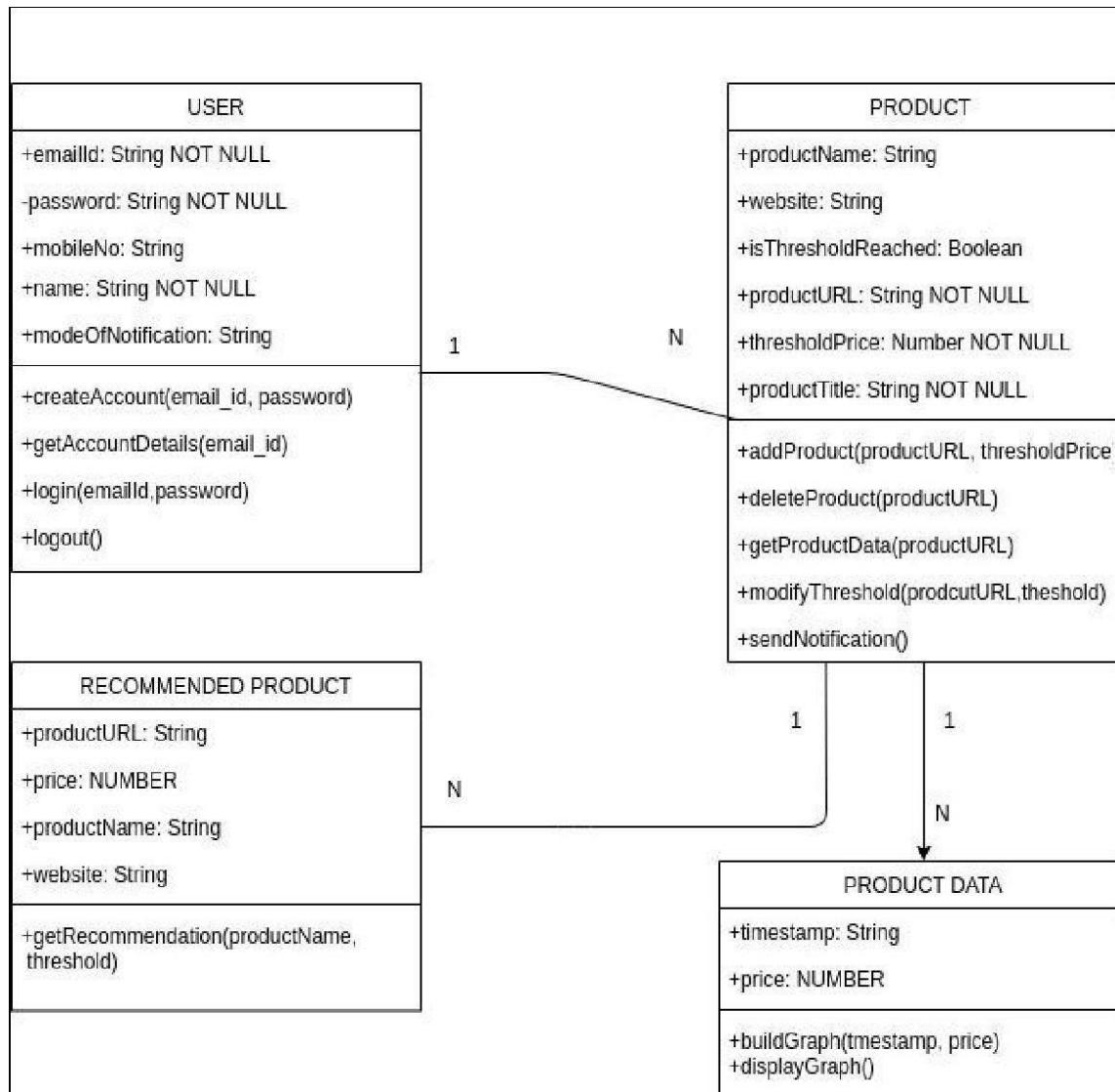
Activity Diagram



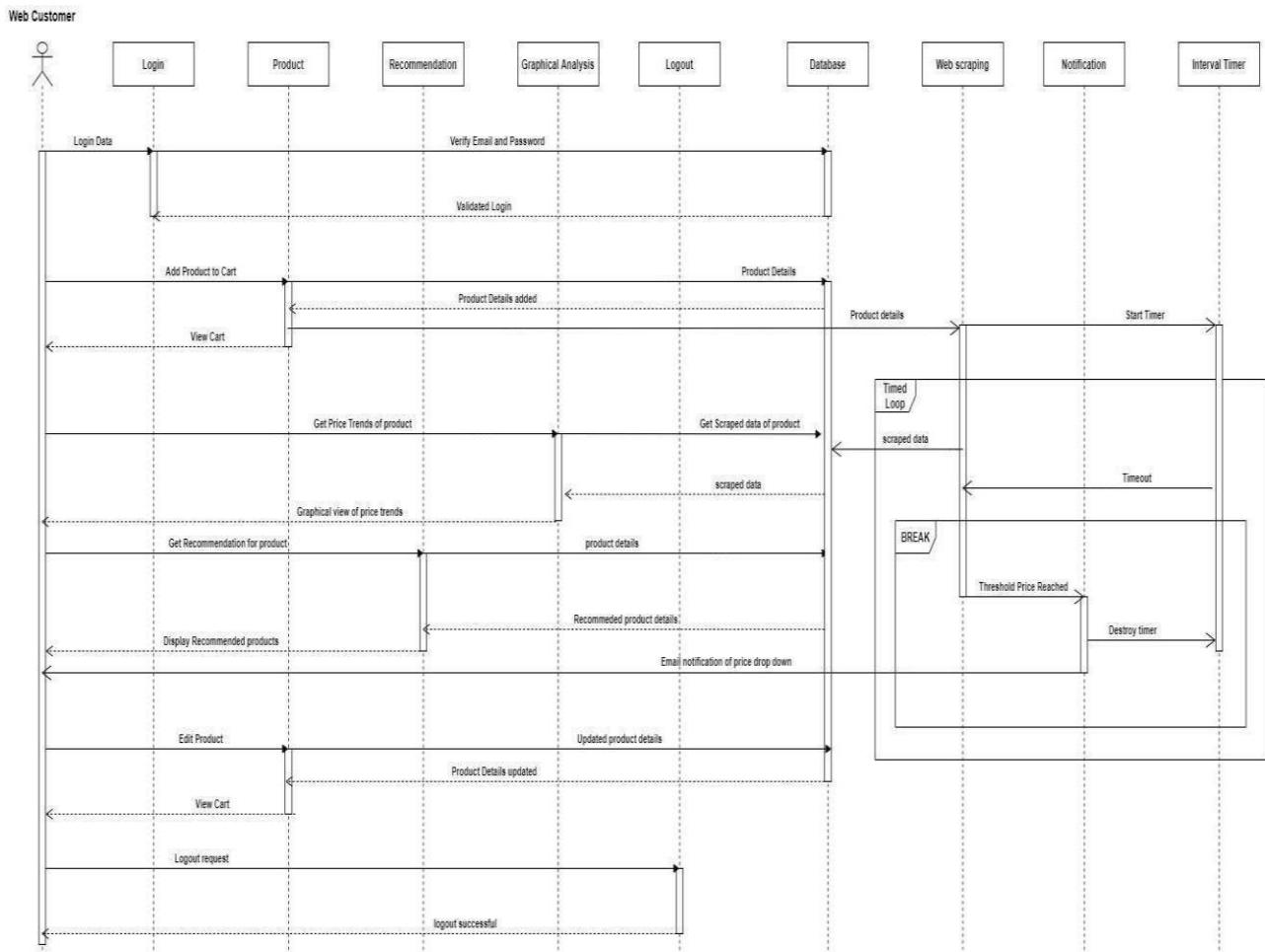
System Architecture



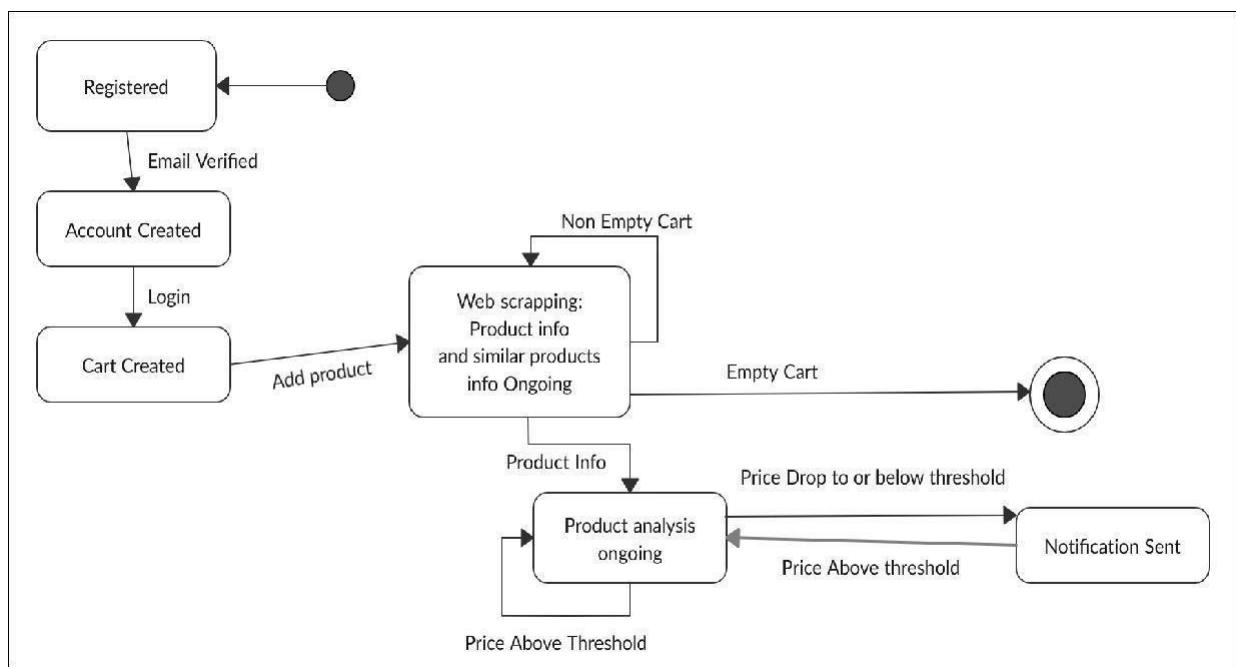
Class Diagram



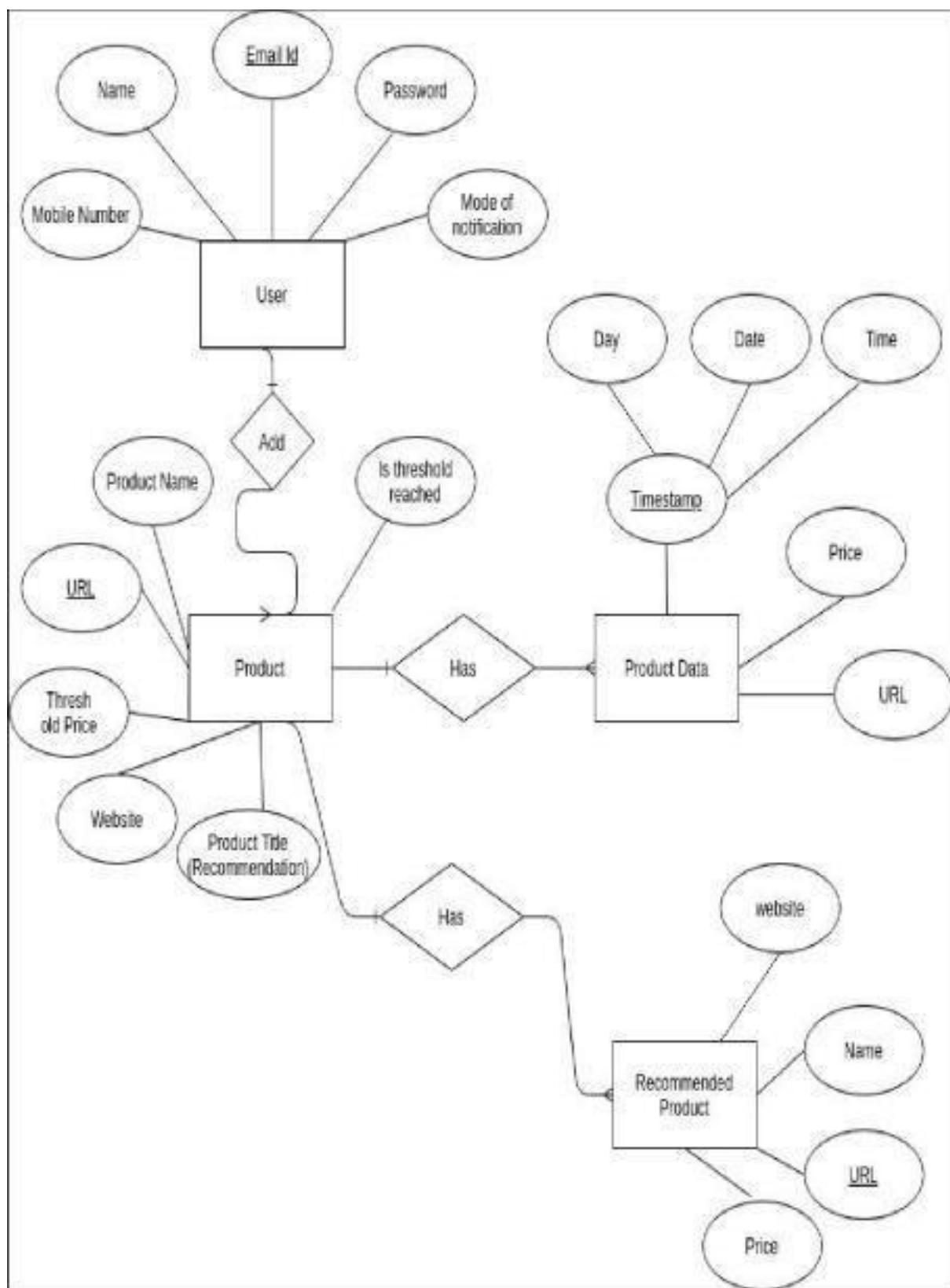
Sequence Diagram



State Diagram



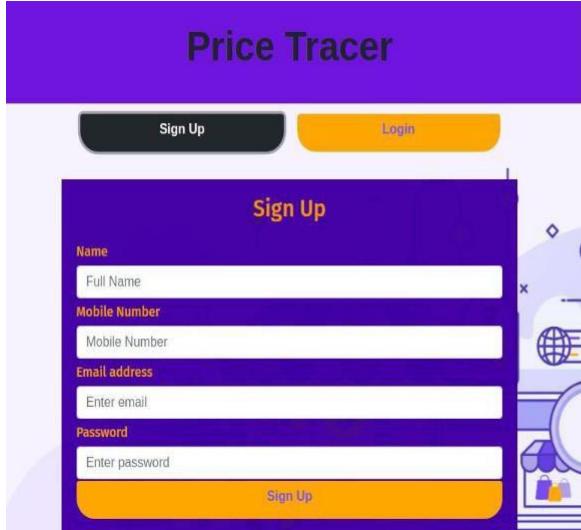
ER Diagram



8.

Implementation

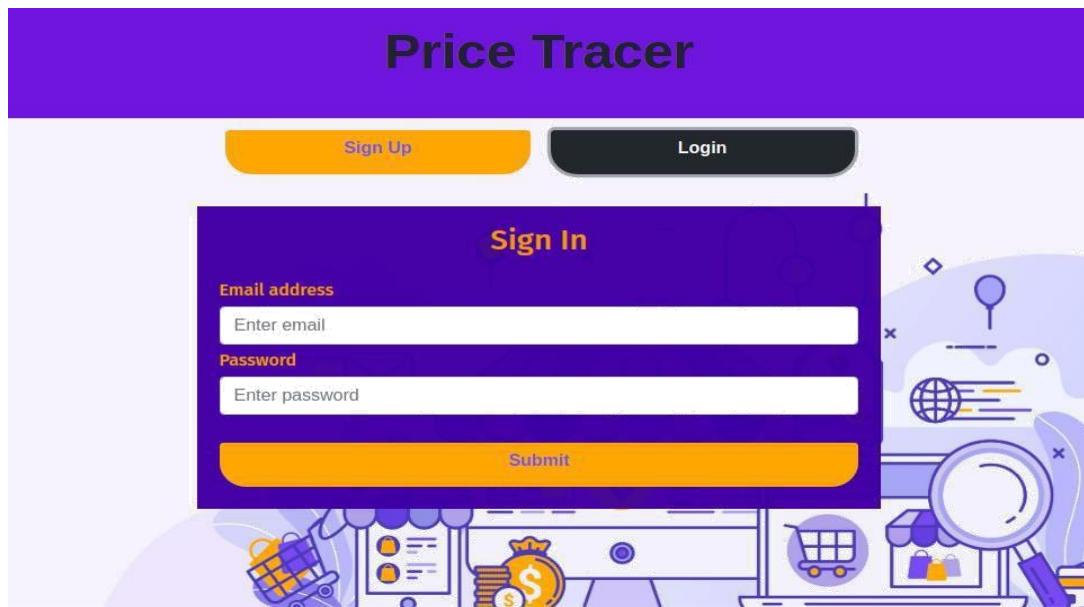
8.1 Register Module



```
router.route('/adduser').post((req,res) => {  
  const newUser = new User();  
  newUser.password = newUser.generateHash(req.body.password);  
  newUser.name = req.body.name;  
  newUser.email = req.body.email;  
  newUser.contactNo = req.body.contactNo;  
  rand=Math.floor((Math.random() * 100) + 54);  
  
  newUser.save()  
    .then(() => {  
      sendMail(rand,newUser.email)  
      res.json("Please verify the account to login")  
    })  
    .catch(err => res.status(400).json('Error: ' + err));  
});
```

8.2 Login

```
router.route('/login').post(async (req,res) => {  
  await User.findOne({email:req.body.email})  
  .then(user => {  
    console.log("User", user)  
    if(!user) {  
      return res  
        .status(400)  
        .json({ msg: "No account with this email has been registered." });  
    }  
  
    const isMatch = user.comparePassword(req.body.password);  
    const isValidUser = user.userVerified;  
    console.log("In login "+isValidUser);  
    if (!isValidUser) return res.status(400).json({ msg: "No account with this email has been registered." });  
    if (!isMatch) return res.status(400).json({ msg: "Invalid credentials." });  
  
    const token = jwt.sign({ id: user._id }, process.env.JWT_SECRET);  
    console.log("token",token);  
    res.json({  
      token,  
      user: {  
        id: user._id,  
        name: user.name,  
        email: user.email,  
      },  
    });  
  })  
  .catch(err => res.status(500).json('Error: ' + err));  
});
```



8.3 Cart

```
router.route('/getproducts').post( async(req, res)=>{
  const email = req.body.email;

  User.findOne({email : email}).then(user =>{

    if(user){
      const products = user.Cart;
      console.log(user.Cart);

      if(products.length == 0){
        return res.json({success: true, value: []});
      }

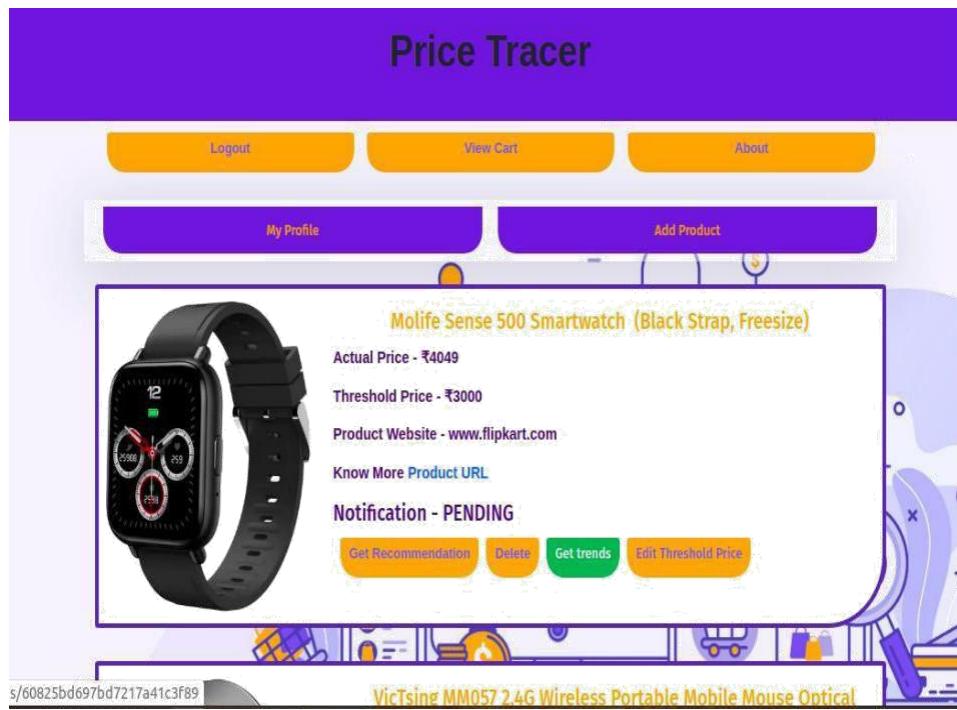
      var list = [];
      products.map(product_id =>{

        Product.findOne({_id: product_id}).then(product =>{
          if(product){

            const data = {
              productName : product.productName,
              productImage : product.productImage,
              productURL : product.productURL,
              productWebsite : product.productWebsite,
              thresholdPrice : product.thresholdPrice,
              productPrice : product.productPrice,
              product_id : product._id,
              isThresholdReached : product.isThresholdReached,
            }

            list.push(data);

            if(list.length == products.length){
              return res.json({success: true, value : list});
            }
          }
        })
      })
    }
  })
})
```



8.4 Add Product

```
router.route('/addproduct').post( async(req, res) => {

    const productURL = req.body.productURL;
    const thresholdPrice = req.body.thresholdPrice;
    const email = req.body.email;
    const name = req.body.name;
    const title = req.body.title;

    const url = productURL;

    //validate the url
    if(!validURL.isUri(productURL)){
        return res.json({success: false, msg : "invalid url"});
    }

    //fetch the host name
    const website = fetchWebsite(productURL);
    console.log(website);

    if(!process.env.WEBSITES.includes(website)){
        return res.json({success: false, msg : "Website not supported !"});
    }

    //const productDetails = await fetchProdDetails(productURL);
    try{
        var {productName, productPrice, productimgURL} = await fetchDetails(website, productURL);
    }
}
```

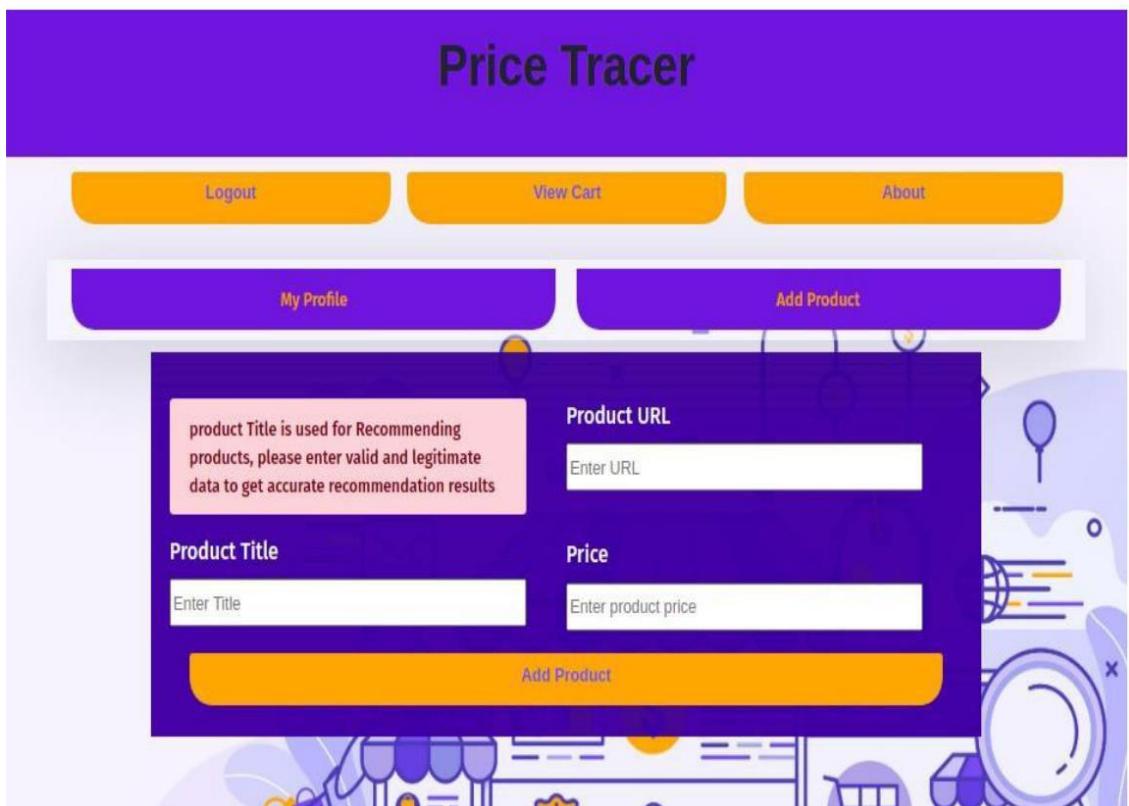
```

newProduct.save()
    .then(() => {
        res.json({success : true , msg: "product added successfully"});
        user.Cart.push(newProduct._id);
        user.save()
            .then(()=>{
                console.log("pushed product to user cart successfully");
            })
            .catch(err =>{
                console.log("couldnot update the cart");
            });
    });

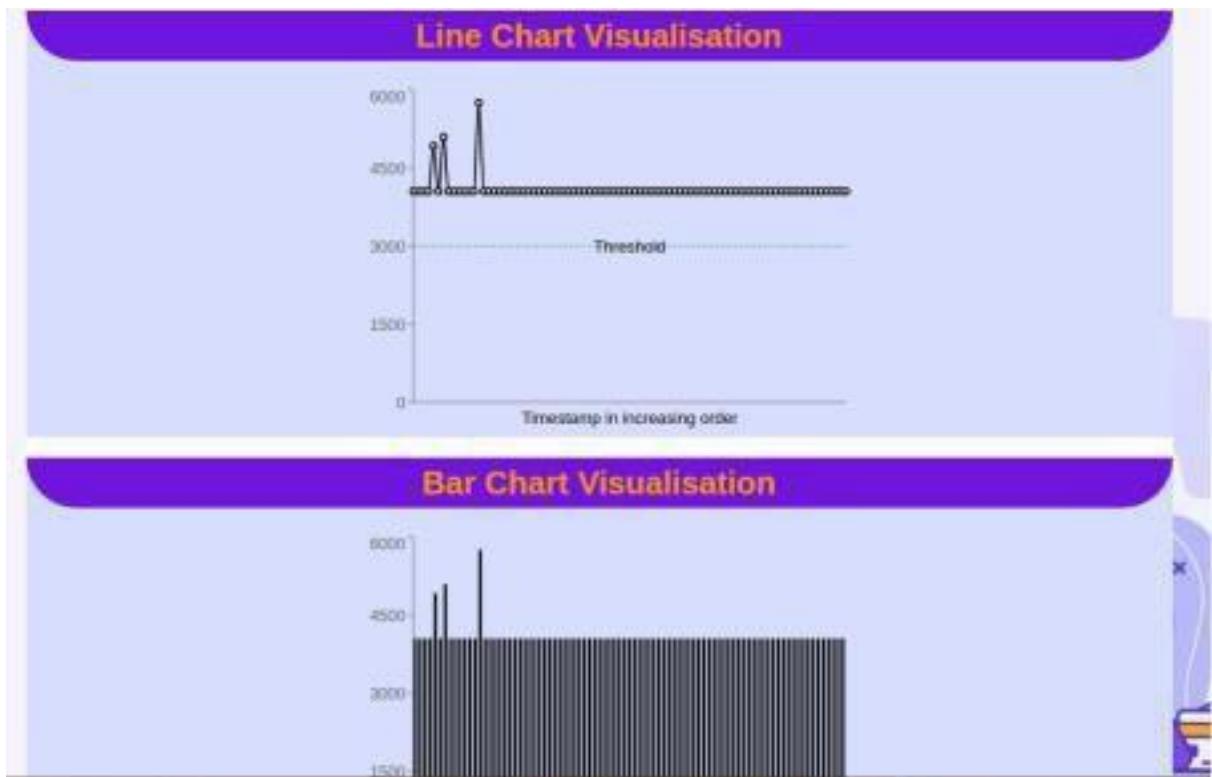
    //start price tracing here
    priceTracking(website, productURL, thresholdPrice, productName, newProduct._id);

    //starts recommendation scraping and stores the data
    (async ()=>{
        const data = await getRecommendation(website, title, Number(productPrice) );
        console.log("data :", data);
        const newRec = new RecProduct();
        newRec.owner = newProduct._id;
        newRec.data = data;
        newRec.save().then(()=> console.log("saved")).catch((err)=> console.log("save error : ", err));
        newProduct.recProducts = newRec._id;
        newProduct.save().then(()=> console.log("saved")).catch((err)=> console.log("save error : ", err));
    })()
})
}

```



8.5 Graphs



8.6 Recommendations

```
router.route('/getRecommendation').post(async (req, res) => {  
    const pid = req.body.product_id;  
    const uid = req.body.user_id;  
  
    if(uid){  
        Product.findOne({_id: pid}).then(product =>{  
            if(product){  
                const price_array = [];  
                RecProduct.findOne({owner : pid}).then(rec =>{  
                    if(rec){  
                        return res.json({success : true, value : rec.data});  
                    }  
                });  
            }  
            else{  
                return res.json({success : false, msg : 'No such Product Exsits'});  
            }  
        })  
    }  
    else{  
        return res.json({success : false, msg : "User not Authenticated"});  
    }  
})
```

www.amazon.in



Product Name - Amazfit Bip S Lite Smart Watch, 30 Days Battery Life, 150+ Watch Faces, Always-on Display, 30g Lightweight, 5 ATM Water Resistance, 8 Sports Modes (Charcoal Black)

Product Price - ₹2999

Product URL - [Know More](#)



Product Name - Mi Smart Band 4 0.94-inch AMOLED Color Display, 20 Days Battery Life, Unlimited Watch Faces, 5ATM Water Resistant, Music Control

Product Price - ₹2099

8.7 About

Price Tracer

[Logout](#) [View Cart](#) [About](#)

About The Website

This website - [Price Tracer](#) helps users by notifying them by Email (given by them at the time of Registration) of fall in price of a product that they have registered for tracking.

This happens in three simple steps -

- Users have to register to site with valid Email ID
- Then they have to mention the url of the product to be price tracked from E-commerce websites and enter the thresholdprice for the same.
- On price drop down the user gets notified about the same via an email through email id registered

Additional features -

The users can also review the on demand graphical analysis of the price trends of the products that are currently being tracked by them and in addition to that can also be recommended the same product from various e-commerce websites.

List of Websites supported -

- Flipkart
- Amazon
- Snapdeal
- eBay
- Paytmall

Price Tracer - 2021

8.8 Web Scraping Module

```
if (website == "www.amazon.com" || website == "www.amazon.in"){
    Nightmare()
        .goto(url)
        .Amazon()
        .end()
        .then(async (Amazon) => {
            try{
                await comparator(Amazon.price, thresholdPrice, pid, jobs_array);
            }
            catch(e){
                console.log("error: ", e);
            }
        })
    })
}

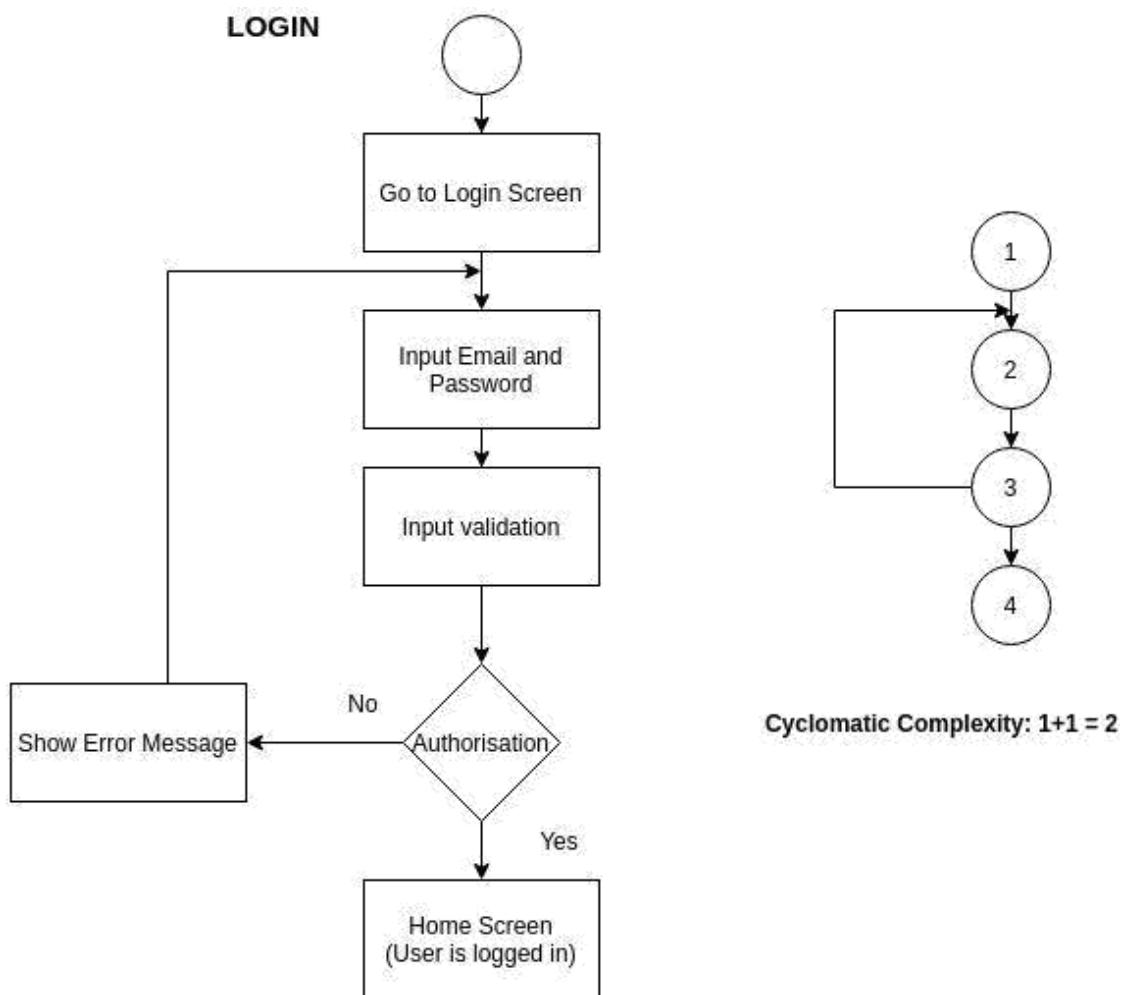
Nightmare.action('Amazon', function(done) {
    this.evaluate_now(() => {
        try{
            var classes= ["priceblock_dealprice", "atfRedesign_priceblock_priceToPay", "priceblock_ourprice", "a-price-whole", "priceblock_saleprice"];

            for(var i = 0; i< classes.length; i++){
                try{
                    var priceString = document.getElementById(classes[i]).innerText;
                    break;
                }
                catch(err){
                    priceString = "null";
                }
            }

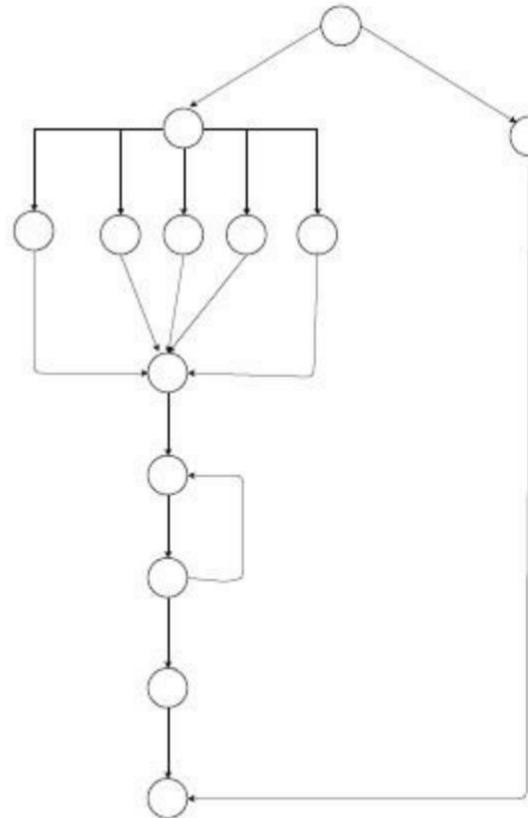
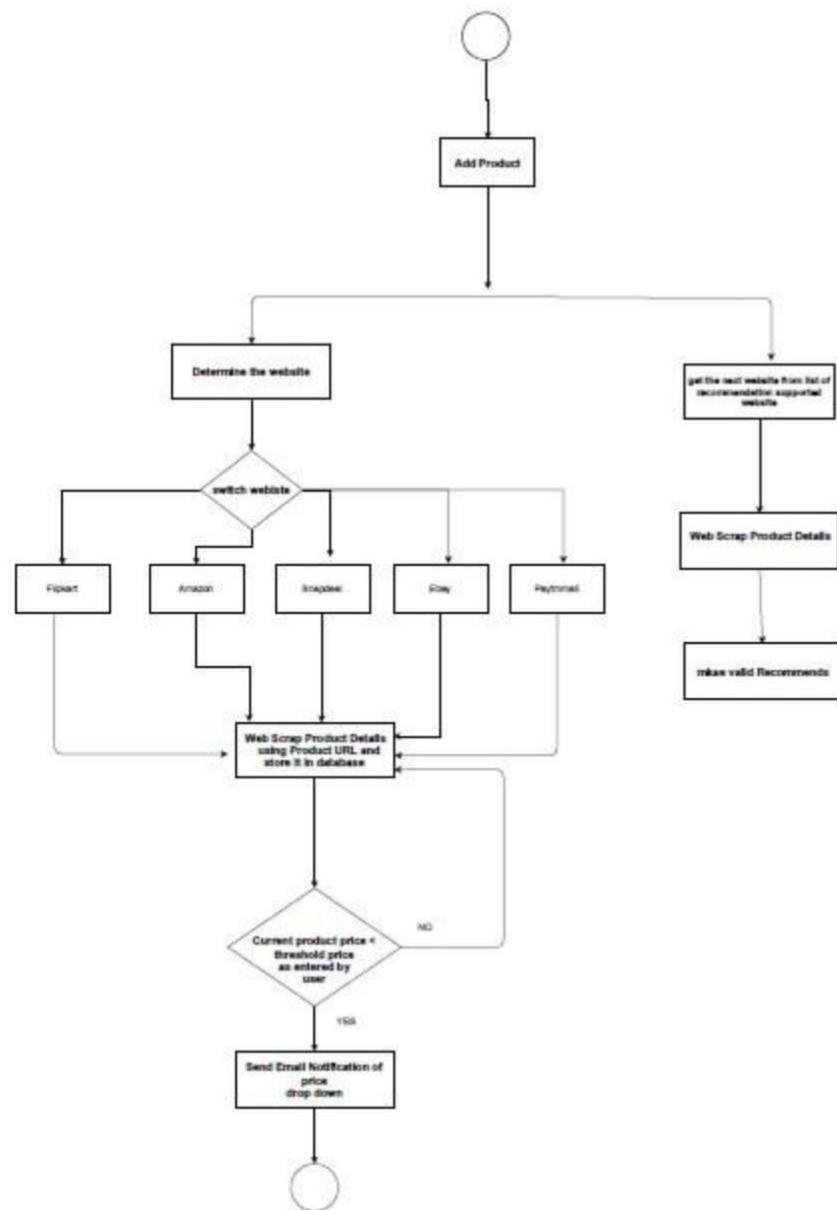
            if(priceString.includes("-")){
                priceString = priceString.split("-")[0];
            }

            const priceNumber = Number(priceString.replace(/[^0-9.-]+/g, ""));
            return {
                price: priceNumber,
            }
        }catch(e){
            console.log("error : ", e);
        }
    }, done)
})
})
```

The above code snippet can scrape the amazon website for details required. Similarly different scripts are written for different websites .



Price Tracer



No of Edges = 18
 No of Nodes = 13
 cyclomatic complexity = $18 - 13 + 2 = 7$

Price Tracer

Verify Notification	TC_PRICE_TRACER_Web ScrapingModule_006	check for notification on price drop down	1. Click on Add product 2. Enter valid product details 3. submit	Actual product price should be less than products Threshold Price entered.	Product Title: Smart Watches User will be redirected to view cart. Product URL: https://www.flipkart.com/evolve-nextfit-talk-full-touch-bit-calling-smartwatch/p/itm39fe1703421ba Threshold Price: 4500	User should get email notification of price drop down on registered email id and status of notification changes to sent.	User received email notification on registered email id and status of notification changed to sent.	PASS
Verify Recommendation	TC_PRICE_TRACER_Web ScrapingModule_008	check for valid product recommendation based on price from list of recommendation supported websites	1. Click on Add product 2. Enter valid product details 3. submit 4. Search for added product in view cart and click on Get Recommendation.	Valid URL test data	Product Title: Smart Watches User will be redirected to view cart. Product URL: https://www.flipkart.com/evolve-nextfit-talk-full-touch-bit-calling-smartwatch/p/itm39fe1703421ba Threshold Price: 3500	On click to Get Recommendation User should only get recommendation of similar product whose actual price is less than added product actual price.	similar products with price less than actual product price are recommended	PASS

9.2 Black Box Testing

Register Module

Equivalence Classes = 12	
1) Register Name	
Invalid Class	Less than 3 characters
Valid Class	3-25 Characters
Invalid Class	Greater than 25 characters
2) Register Email	
Invalid Class	Less than 4 characters
Valid Class	4-125 Characters
Invalid Class	Greater than 125 characters
3) Register Mobile Number	
Invalid Class	Less than 10 characters
Valid Class	10 Characters
Invalid Class	Greater than 10 characters
4) Register Password	
Invalid Class	Less than 8 characters
Valid Class	8-15 Characters
Invalid Class	Greater than 15 characters

Price Tracer

Test Scenario ID	Test Scenario Description	Test Case ID	Test Case Description	Test Steps	Preconditions	Test Data	Post Conditions	Expected Result	Actual Result	Status
1) Register Name				BVA Classes						
Invalid Class	Less than 3 characters			Invalid Class	1					
Valid Class	3-25 Characters			Valid Class	3-25					
Invalid Class	Greater than 25 characters			Invalid Class	26					
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Name_001	Enter valid name, Mobile number, email id,password,	1. Enter name(length< 3) 2.Enter Mobile number 3. Enter email 4.Enter password 5. Click on Sign up button	Valid URL test data	Name: A Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Error Message: Please enter 3 to 25 characters	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Name_002	Enter valid name, Mobile number, email id,password,	1. Enter valid name(length between 3 -25) 2.Enter Mobile number 3. Enter email 4.Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Name_003	Enter valid name, Mobile number, email id,password,	1. Enter name(length > 25) 2.Enter Mobile number 3. Enter email 4.Enter password 5. Click on Sign up button	Valid URL test data	Name: AnjaliAnjaliAnjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Error Message: Please enter 3 to 25 characters	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS

Price Tracer

BVA										
TS_PRICE_TRACER_001	Verify Register functionality	TC_PT_Register_Name_001	Enter valid name, Mobile number, email id,password,	1. Enter name(char length = 2) 2. Enter Mobile number 3. Enter email 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: An Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Error Message: Please enter 3 to 25 characters	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Name_002	Enter valid name, Mobile number, email id,password,	1. Enter name(char length = 3) 2. Enter Mobile number 3. Enter email 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: Anj Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Name_002	Enter valid name, Mobile number, email id,password,	1. Enter name(char length = 25) 2. Enter Mobile number 3. Enter email 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: AnjaliAnjaliAnjaliA Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Name_003	Enter valid name, Mobile number, email id,password,	1. Enter name(char length = 26) 2. Enter Mobile number 3. Enter email 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: AnjaliAnjaliAnjaliAnjaliAn Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Error Message: Please enter 3 to 25 characters	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS

Price Tracer

BVA Classes											
2) Register Email											
Invalid Class	Less than 4 characters			Invalid Class	3						
Valid Class	4-125 Characters			Valid Class	4-125						
Invalid Class	Greater than 125 characters			Invalid Class	126						
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Email_001	Enter valid name, Mobile number, email id,password,	1. Enter name 2. Enter Mobile number 3. Enter email (char < 4) 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : NA password: pass@321	Error Message: Please enter email id with 4 to 125 characters	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS	
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Email_002	Enter valid name, Mobile number, email id,password,	1. Enter name 2. Enter Mobile number 3. Enter email(char between 4 - 125) 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS	
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Email_003	Enter valid name, Mobile number, email id,password,	1. Enter name 2. Enter Mobile number 3. Enter email(char > 125) 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : {= 222 char} password: pass@321	Error Message: Please enter email id with 4 to 125 characters	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS	
BVA											
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Email_001	Enter valid name, Mobile number, email id,password,	1. Enter name 2. Enter Mobile number 3. Enter email(char = 3) 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : com password: pass@321	Error Message: Please enter email id with 4 to 125 characters	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS	
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Email_002	Enter valid name, Mobile number, email id,password,	1. Enter name 2. Enter Mobile number 3. Enter email(char = 4) 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : mail password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS	
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Email_002	Enter valid name, Mobile number, email id,password,	1. Enter name 2. Enter Mobile number 3. Enter email(char = 125) 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : {= 125 char} password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS	
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Email_003	Enter valid name, Mobile number, email id,password,	1. Enter name 2. Enter Mobile number 3. Enter email(char = 126) 4. Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : {= 126 char} password: pass@321	Error Message: Please enter email id with 4 to 125 characters	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS	

Price Tracer

3) Register Mobile Number				BVA Classes							
Valid class: no of digits = 10				Valid class: no of digits = 10							
Invalid class: no of digits < 10				Invalid class : no of digits = 9				Invalid class: no of digits = 11			
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Mobile_001	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number(digits < 10) 3. Enter email 4.Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 987654321 email : validmail@gmail.com password: pass@321	Error message: Please enter 10 digit mobile number	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS	
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Mobile_002	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number(digits = 10) 3. Enter email 4.Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS	
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Mobile_003	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number(digits > 10) 3. Enter email 4.Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210000 email : validmail@gmail.com password: pass@321	Error message: Please enter 10 digit mobile number	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS	
BVA											
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Mobile_001	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number(digits= 9) 3. Enter email 4.Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 987654321 email : validmail@gmail.com password: pass@321	Error message: Please enter 10 digit mobile number	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS	
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Mobile_002	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number(digits = 10) 3. Enter email 4.Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS	
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Mobile_003	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number(digits =11) 3. Enter email 4.Enter password 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 98765432109 email : validmail@gmail.com password: pass@321	Error message: Please enter 10 digit mobile number	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS	



Click on Tools PDF.

4) Register Password										
Invalid Class	Less than 8 characters			BVA Classes						
Valid Class	8-15 Characters			Invalid Class	7					
Invalid Class	Greater than 15 characters			Valid Class	8-15					
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Password_001	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number 3. Enter email 4.Enter password (char < 8) 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass	Error : Password should be 8 to 15 characters long	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Password_002	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number 3. Enter email 4.Enter password (char between 8-15) 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Password_003	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number 3. Enter email 4.Enter password (char > 15) 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@1234567 8900000	Error Password s	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS
BVA										
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Password_001	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number 3. Enter email 4.Enter password (char = 7) 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@32	Error Password s	Unable to register with invalid length of characters	Unable to register with invalid length of characters	PASS
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Password_002	Enter valid name, email, Mobile number, password, confirm password	1. Enter name 2.Enter Mobile number 3. Enter email 4.Enter password (char = 8) 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@321	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS
TS_PRICE_TRACER_001	Verify Register functionality	TC_PRICE_TRACER_Register_Password_002	Enter valid name, Mobile number, email id,password,	1. Enter name 2.Enter Mobile number 3. Enter email 4.Enter password (char =15) 5. Click on Sign up button	Valid URL test data	Name: Anjali Mobile no: 9876543210 email : validmail@gmail.com password: pass@1234567 890	Alert:Please check your mail for validation	On clicking ok , Go to Landing page	On clicking ok , Go to Landing page	PASS

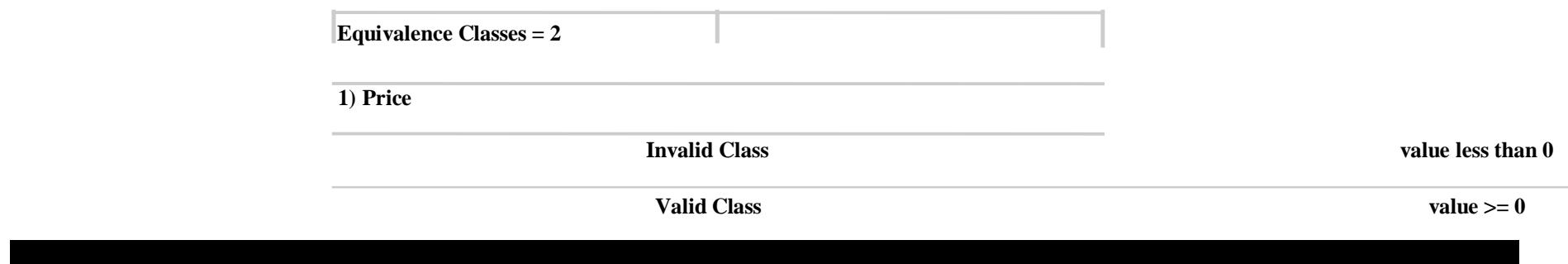
Login Module

Equivalence Classes = 6	
Login Email	
Invalid Class	Less than 4 characters
Valid Class	4-125 Characters
Invalid Class	Greater than 125 characters
Login Password	
Invalid Class	Less than 8 characters
Valid Class	8-15 Characters
Invalid Class	Greater than 15 characters

Add Product Module

Equivalence Classes = 7	
Product Title	
Invalid Class	Less than 5 characters
Valid Class	5 - 30 Characters At least one character must be alphabetical
Invalid Class	Greater than 30 characters
Product URL	
Invalid Class	Less than 8 characters
Valid Class	Characters >= 8
Price	
Invalid Class	value less than 0
Valid Class	value >= 0

Edit Threshold Price Module



10. References:

- https://www.researchgate.net/publication/337186825_Web_scraping_for_food_price_research
- <https://blog.bitsrc.io/how-to-perform-web-scraping-using-no-de-js-part-2-7a365aeedb43>
- <https://aakashgoel.com/a-guide-to-building-your-own-price-tracking-engine-65b2db4b47c7>