



Artificial Intelligence Based Personal Computer Parts and Laptop Recommending Assistant

Software Requirement Specification Document

Comprehensive Design & Analysis Project – 2019

B.Sc. Special (Honors) Degree in Information Technology

Project ID: 19-069
Date of Submission: 13/05/2019

“TechRing” – SRS | Software Requirement Specification

Authors:

Student ID	Name	Signature
IT16010390	H.K.S.P.Gunadasa	
IT15146816	Sewwandi E.D.D.	
IT16055186	M.A.V.L.Gunathilaka	
IT16054578	Tharaka K.K.S.	

Supervisor:

.....

Prof. Koliya Pulasinghe

Table of Contents

List of Figures	v
List of Tables	vi
1 Introduction.....	1
1.1 Purpose	1
1.2 Scope	2
1.2.1 Objective	3
1.2.2 Other objectives	3
1.2.3 Benefits.	3
1.3 Definitions, Acronyms, and Abbreviations.....	4
1.4 Overview	4
2 Overall Descriptions	6
2.1 Product perspective	7
2.1.1 System interfaces	9
2.1.2 User interfaces	9
2.1.3 Hardware interfaces	10
2.1.4 Software interfaces.....	10
2.1.5 Communication interfaces	10
2.1.6 Memory constraints	10
2.1.7 Operations	11
2.1.8 Site adaptation requirements.....	11
2.2 Product functions.....	12
2.2.1 Sign Up	13
2.2.2 Validate User(Sign in)	13
2.2.3 Build PC for User Requirment.....	14
2.2.4 Suggest Best Laptop	14
2.2.5 Selection Laptops.....	15
2.2.6 Facebook Access.....	15
2.2.7 Comment Analysis.....	16
2.2.8 Rating Product	16
2.2.9 View Laptops	17
2.2.10 Compare two Laptops	17
2.2.11 Recommend Best Products	18
2.2.12 Build PC for Optimum Budget	18

2.2.13 Notify Price Drop.....	19
2.2.14 Compare PC Part Prices.....	19
2.3 User characteristics	20
2.4 Constraints.....	20
2.5 Assumptions and dependencies.....	21
2.6 Apportioning of requirements	21
3 Specific requirements.....	22
3.1 External interface requirements	22
3.1.1 User interfaces	22
3.2 Performance requirements.....	32
3.3 Design constraints	32
3.4 Software system attributes	32
3.4.1 Reliability.....	32
3.4.2 Availability	33
3.4.3 Security	33
3.4.4 Maintainability	33
3.5 Other requirements	34
4 Supporting information.....	35
4.1 Appendices	35
5 References	40

List of Figures

Figure 2. 1 - Use Case Diagram.....	12
Figure 3. 1 - User Interface: Home page.....	22
Figure 3. 2- User Interface: Sign Up.....	23
Figure 3. 3- User Interface: Sign In	24
Figure 3. 4- User Interface: Product categories browse page (Graphics)	25
Figure 3. 5- User Interface: System Build for game system requirement	26
Figure 3. 6- User Interface: Browse Laptop	27
Figure 3. 7- User Interface: Result display for a Laptop Comparison.....	28
Figure 3. 8- User Interface: Display Search Results.....	29
Figure 3. 9- User Interface: Display compatible product list for user budget	30
Figure 3. 10- User Interface: Display Item details.....	31
Figure 4. 1 : Activity Diagram: Get compatible PC parts for user requirement.....	35
Figure 4. 2 : Activity Diagram: Comment Analysis	36
Figure 4. 3 : Activity Diagram: Laptop Comparison	37
Figure 4. 4 : Activity Diagram: Search and sort product list	38
Figure 4. 5 : Activity Diagram: Get product list for user budget.....	39

List of Tables

Table 1. 1 - Acronyms and Abbreviations	4
Table 2. 1 - Comparison of current available systems with TechRing.....	8
Table 2. 2 - Use Case Scenario: Sign Up.....	13
Table 2. 3 - Use Case Scenario: Validate User	13
Table 2. 4 - Use Case Scenario: Build PC for User Requirement	14
Table 2. 5 - Use Case Scenario: Suggest Laptop	14
Table 2. 6 - Use Case Scenario: User Selection Product/ Laptop.....	15
Table 2. 7 - Use Case Scenario: Facebook Access	16
Table 2. 8 - Use Case Scenario: Comment Analysis	16
Table 2. 9 - Use Case Scenario: Rating Process	17
Table 2. 10 - Use Case Scenario: View Laptop	17
Table 2. 11 - Use Case Scenario: Compare two laptops.....	18
Table 2. 12 - Use Case Scenario: Recommend best product	18
Table 2. 13 - Use Case Scenario: Build PC for user budget	18
Table 2. 14 - Use Case Scenario: Notify Price Drops.....	19
Table 2. 15 - Use Case Scenario: View PC part prices.....	19

1 Introduction

1.1 Purpose

This Software Requirement Specification document contains a detailed documentation of the final year research project belonging to the group 19-069 of 2019, Software Engineering and Information System Engineering Batch.

Our main goal of preparing this document is to provide the detailed overview about the final product that we plan to develop in the end of our research project. This document mainly focuses on,

- Software Requirements.
- Project Scope.
- Project Purpose.
- Target Audience.
- Functional Requirements.
- Nonfunctional Requirements.
- Methodologies.
- References.

In order to finalize the decisions taken in each iteration, this document will be utilized throughout the software development lifecycle as a reference. Thus, this will be a useful key reference document to,

- Developers.
- Software testing groups.

In brief the purpose of this document is to provide an in depth insight of the Artificial Intelligence based Personnel Computer parts and Laptop recommending assistant.

1.2 Scope

This provides explanations depicting the clear boundaries of the user requirements addressed in the project. Attention to both functional and non-functional requirements are given in this document.

We plan to introduce the final product of our research by the name “TechRing” to the market. More precisely it will be addressed as TechRing – Artificial Intelligence based personal computer parts and laptop recommending assistant. This is a platform available for any person who needs assistance in assembling a PC or in purchasing a laptop.

From the identified requirements we divided the main product into four components. These four components will contribute to the main aspect of recommending the best option to the customers. The components are,

- Assembling assistant
- Customer review analysis
- Price comparison & optimization
- Laptop recommender

The assembling process for personal computers is long and a complex task [1]. This is common problem faced by majority of current society. Thus, we will provide the assemble sequences customized for games. Because majority of the assemblers were from gaming community. But we are limited only for gaming customization and we plan to extend the customization based on specific purposes (E.g.: Videos editing purposes) and different software requirements.

In purchase of the products one of the main considerations is the Price. Our platform will provide the assistance of having an assembling plan according to the budget. All the suggestions we provide for user requirements will be displayed in an order where the price optimization is considered. Thus, the product display will not be in ascending or descending order but in the best possible way. We also have the option where the users will get notified when there is price drop of a product they were searching. To be more customized we provide the facility where user enters the price at which they are looking the product.

Since the best product cannot be decided only by the price, we have included the next best recommending source, Customer reviews when recommending the products. Because they reveal their experiences with the product. Thus, by having an analyzed customer reviews in a rating format makes it easier for the new customers decide on their choice based on the results.

Our platform assists in the selection of the best laptop for user requirement. We recommend the best laptop to be used in playing a particular game the user is interested. This service also provides the capability where the user can compare two laptops that they have a doubt

and our platform will recommend the better of the two considering their computational power, customer review ratings and price optimization aspects.

1.2.1 Objective

Analyze the PC or Laptop requirement the user has along with their limitations such as budget and recommend the most suitable products for them by utilizing the price optimization and sentiment analysis techniques.

1.2.2 Other objectives

- To provide solutions customized according to computer games (For both laptops and PC parts).
- Recommendations based on the customer comments posted on Facebook.
- To generate solutions based on the budget limitations.
- Recommend the best laptop from two models.
- To make a user-friendly website where the users find it easy to navigate and they find what they require easily and faster.
- To develop a system which has a high accuracy, security, efficiency, understandability and flexibility which will act as the supporting roles for the non-functional requirements.

1.2.3 Benefits.

- Ability to get PC part list which satisfy the user requirement.
- Can build the full PC to particular game system requirement.
- Users can get the compatible PC parts list.
- Ability to ensure users to build pc satisfy their requirement.
- Users can view analyzed overview of previous customer's experiences in a summarized format. Thus, the hassle of going through the comments is reduced.
- Saves user's time on searching the items. Because our platform will provide the recommendations by utilizing the data sources.
- Users will be able to compare prices.
- Ability of getting a compatible product list for assembling a PC for the user budget.
- Users will be able to sort and get the best products in a given product list.
- Ability of getting a notification when a price drop happened of a specified product.
- Users can compare and view two laptops then he/she inform best laptop.
- Users can view suggestions according to compared best laptop.
- Tech Ring laptop compare save user's time.

1.3 Definitions, Acronyms, and Abbreviations

Abbreviation	Explanation
PC	Personal Computer
AMD	Advanced Micro Devices
GHz	Gigahertz
GB	Giga Byte
RAM	Random Access Memory
CPU	Central Processing Unit
IT	Information Technology
POS	Part of Speech
MVC	Model View Controller
AWS	Amazon Web Service
SRS	Software Requirements Specification
HTTP	Hyper Text Transfer Protocol

Table 1. 1 - Acronyms and Abbreviations

1.4 Overview

This section focusses on the main goals and tasks that is to be delivered via TechRing for all the future users. By incorporating these aspects, we expect to deliver a valuable service to every user. Also, this section provides the future content of Software Requirements Specification (SRS) document.

Main Goals.

1. To be the most reliable source of recommending tool available to find the best PC parts and laptops that suits user’s requirements. Since the base of recommending tool consider many aspects like customer reviews, price and performance it comprises of high reliability.
2. Provide the best assembling plan for people who plan to assemble their PC’s by themselves. This will save the time users have to spend in searching for the compatibility and suitability of the components.
3. To reduce the burden of people in finding the PC parts and assembling plans aligning with their budget limitations.

Tasks

1. Get the game system requirement from Steam.com to get compatible part list.
2. Develop build sequence to identify the compatible pc parts.
3. Using expert system choose the pc part which satisfy the game system requirement.
4. Extract the relevant customer comments from Facebook using the Graph API to access Facebook.
5. Classify the comments into positive or negative comments by analyzing them. Later on, taking a count of each classified comments.
6. Obtain a list of sorted products considering their features. Customers will be able to identify the best products in a product list.
7. Analyze the compatibility of products and get a list of products to assemble a PC for the optimum budget plan of user selected price.
8. Identify and send a notification to the users if a price drop has happened for a selected product.
9. Get laptop details calling Noteb.com REST API and save.
10. Implement compression algorithm for compare laptop.
11. Identifying the best laptop then generate users' suggestions.

SRS document will be mainly consisting of three sections. Each section will be considering different parts of the final product.

Chapter 1: This section will be explaining the core purpose of creating the SRS. This will give a detailed idea of what the final product will be capable of doing and not capable of doing in the implementation stage. Also discuss about the goals, objectives, benefits and tasks of the final output. The overview section will be demonstrating the rest of the SRS content and how the content will be organized.

Chapter 2: This describes the non-technical way of focusing the end users of the final product. The purpose of this section is to give the users a clear idea of what the system does. Since most of the end users might not be technically knowledgeable this section gives the idea of the final product. This includes Product Perspective which identifies the existing recommending assistants similar to the one that is being developed, Product Functions which includes details about the functions that are available in the developing system, User Characteristics describes the targeted user base, Constraints will discuss about the limitations that controls the developers options, Assumptions and Dependencies includes the assumptions utilized during the designing and implementation phase.

Chapter 3: This describes the technicality of the system. This describes the system in a developer's point of view. Main purpose of this section is to provide a better technical understanding for other or future developers or maintainers of the system. Thus this uses numerous technical terms that will be familiar to software engineers, developers and maintainers.

2 Overall Descriptions

Nowadays computers play major role in almost all the industries. Initially, computers were used as a tool for calculations, but now computers help people finish many aspects in life [2]. As previously mentioned computerd have simply become a multi tasking device. In addition to computers, laptops also come into play enhancing the portability aspect.

There are preset PC's available around the world. But people prefer assembling their PC's by themselves rather than going for a preset one. Because most of the preset PC's fail to cater the exact user requirement as they have been assembled to perform common tasks. This becomes an issue when it comes to the Gaming industry. Ten years ago, this industry is just an entertainment field. But today it is one of the highest profits earning industry. Majority of the population is Gaming community. Thus, the gamers prefer assembling their PC's by themselves. But they find it difficult to find the necessary parts, compatible parts. Simply it is tedious and time consuming for them to create the assembling plan to match the gaming requirements. TechRing has solution for this. This will assist the users in building and displaying the assembling plan once the Game name is entered. We guarantee the reliability of the recommendation that is provided.

Any customer irrespective of the products they are looking will consider the previous customer's experiences before purchasing a product. Because who better knows about the product rather than a customer who have already used the products. But there numerous social media platforms available that contains bulk information about the customer experiences in each product. In practical scenario people do not have time to spent on social media platforms and analyze them. Thus, the concept sentiment analysis is used in “TechRing”. Sentiment Analysis is important in understanding the people's opinion on matter by analyzing a large amount of data [4]. TechRing also display an analyzed graphical overview of the customer feedbacks which helps the customer to get an idea of the user experiences at a glance.

Since there are multiple vendors, brands and versions available for each PC part there might be price variations that is created. Thus, always the best product is neither the expensive or cheap one. It has to be decided through price optimization. Price optimization is the use of price elasticity of demand and the enterprise manufacturing cost per unit to create economic efficiency [3]. TechRing utilize the price optimization concepts in recommending the products for a user when they type a name of the product. This also helps the vendors to reach their customers beyond geographical boundaries.

As previously mentioned laptops also have a similar demand like for PCs. Even in laptops have different versions and brand in the market. Thus, people get confused when the want to purchase laptop. Thus “TechRing” recommends the best laptop considering the computational power and analyzed customer reviews. When the user selects the two laptops they want to compare from the two best one will be recommended. This save up the user's time of researching the laptop details and analyzing them.

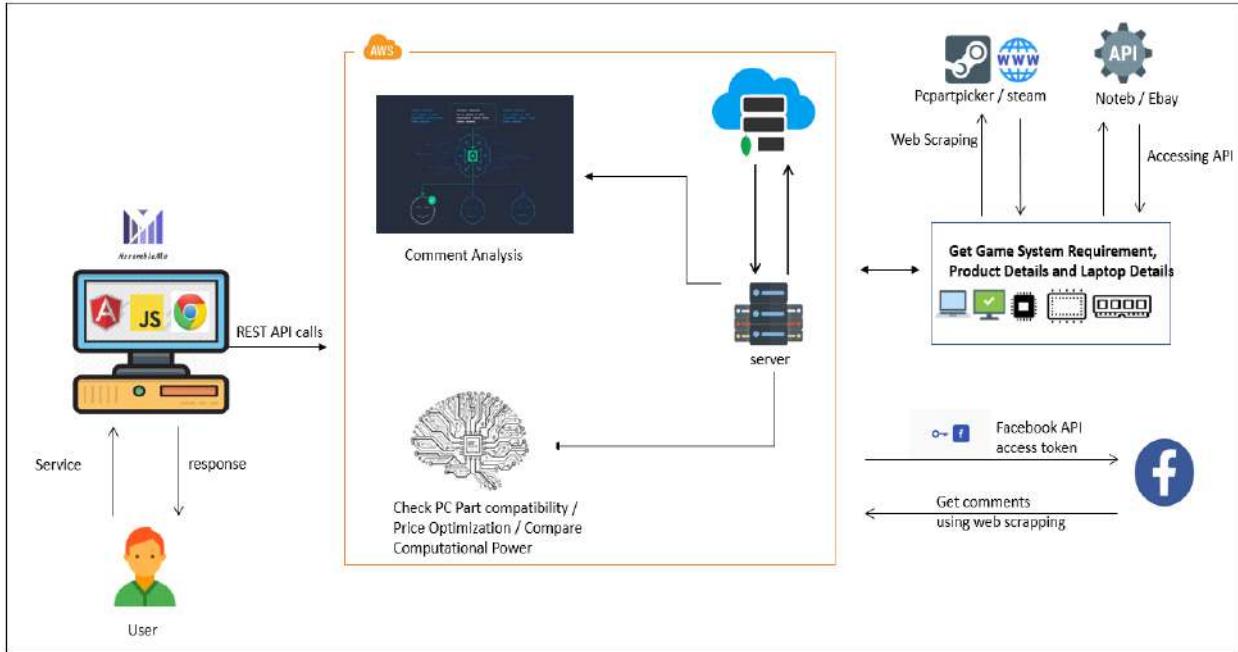


Figure 1.1- High Level Architecture Diagram

2.1 Product perspective

By analyzing and reviewing the research articles and conducting the literature review, our attention was drawn to following noticeable platforms which cater for similar requirements.

- PCpartpicker
- Noteb.com
- Newegg.com

Above mentioned platforms assist users in finding the PC parts and Laptops for their requirements. But these differ from one another due the availability of their functionalities. Below is a comparison we conducted among “TechRing” and the above mentioned platforms. All these mentioned features are planned to be implemented in “TechRing” in the completions of the research.

Functions	PCPartPicker.com	NewEgg.com	Noteb.com	TechRing
Select Compatible PC-Parts	✓			✓
Build PC according to a System requirement Of a Game				✓
Display prices and compare of different vendors	✓			✓
Analyze Comments and display rating based on that				✓
Recommends assemble plan according to budget	✓	✓		✓
Recommend the best PC part in a price range				✓
Notify Price Drops to user	✓	✓		✓
Laptop comparison			✓	✓
Recommending the best laptop				✓

Table 2. 1 - Comparison of current available systems with TechRing

As presented in above table, none of the current platforms are capable of providing a generalized solution to the users. It is either they provide suggestions to PC parts or laptops. But these sectors go in together. Thus, having a platform as TechRing is vital.

TechRing platform is designed to overcome the main problem many PC assemblers face. That is having a reliable source to get a PC assembling plan for the user requirements. Even though the current platforms suggest the suitable PC parts individually they do not have an integrated platform which will consider the compatibility of whole set of PC parts and build a PC assembling as needed. TechRing will be designed to overcome this issue. At the moment our functionality will be limited to in building the PC plan according the Game requirements.

Most of the site display the customer reviews as it is. Even in the above mentioned platforms, they either display the comments the customers have posted on their sites or in another social media platforms. In noteb.com as the reviews they just display the blogs that are available on the internet. Users find it difficult in getting an overview of the product through such sources. Thus “TechRing” will provide an analyzed overview of the

comments, showing the percentages of positivity and negativity of the comments. In order to identify the nature of the comments, sentiment analysis will be conducted on the extracted comments. For this NLP toll kits will be utilized along with the deep learning techniques. Comments will be accessed Real Time. Thus, the comments will be extracted via the selected social media platform using Web Scraping when it's required. Users find this display of the reviews much more effective in making their purchasing decisions rather than referring to paragraphs.

Comparison is one of the functionalities that most of the platform provide. But these sites don't recommend the best from the comparison. Users find it less effective having a detailed overview of the functionality comparison. It will be much more effective if the users can have functionality comparison along with a recommendation as to what is most suitable or ideal from the compared ones. This can create a huge impact to the users.

2.1.1 System interfaces

“TechRing” will be using below mentioned interfaces.

- Spring Boot REST API
- Facebook Graph API
- Noteb REST API
- OAuth 2.0 API

2.1.2 User interfaces

The final product of “TechRing” is a web application. Detailed description of the user interfaces will be described in Section 3.1.1. Main user interfaces in “TechRing” are as follows,

- Web Application
 - Home Page
 - Register
 - Login
 - Individual PC parts page
 - System build page
 - Build for game requirement page
 - Build for budget pages
 - Laptop Comparison page
 - View Laptop details page
 - Laptop compare result page
 - User profile page
 - Vender profile page

2.1.3 Hardware interfaces

In order to run “TechRing” without any trouble there are hardware requirements that need to be available. Below are the hardware requirements we have identified that need to be available during the designing, implementation and testing phases.

- Desktop Computer / Laptop
- 64-bit (x64) Dual-core 2.4GHz or faster processor
- 1 GB RAM
- Windows 7, 8 or 10

2.1.4 Software interfaces

These software and frameworks will be utilized in developing the platform.

- Software
 - Windows 10 Operating System
 - Robo- Mongo (MongoDB)
 - Spring Tool Suite 4
 - Visual Studio Code
 - Anaconda Navigator
 - Jupiter Notebook
 - Adobe Photoshop
- Frameworks
 - Spring Boot
 - Angular

2.1.5 Communication interfaces

- For data transmission between server and the client web app need to use internet or Wi-Fi connection to the devices.
- HTTP protocol is used to communicate web server and the client devices.

2.1.6 Memory constraints

- To deploy, the web application needs 2GB RAM and 10 GB space in server machine
- 1 GB RAM is recommended for the run the client app in the browser
- For client requests server machine is expected to use less than 1 GB RAM and 10 GB of HDD space.

2.1.7 Operations

- Login to the System
- Sign up
- View and edit profile
- Assemble complete PC for gaming requirement
- Get compatible PC part list for customer budget
- Compare and select best price for a product
- Analyze user comments and give final feedback of the product
- Compare computational power of a laptop and select best laptop

2.1.8 Site adaptation requirements

- From the initial user interaction, User SignUp session appropriate guidelines should be provided to assist in the user registration process.
- Prior to using “TechRing” user devices should have access to internet. This is necessary to communicate with the server.
- Platform should be designed focusing on easiness and friendliness user will experience when using “TechRing”.
- User must always input accurate and valid details to the platform when using “TechRing”
- Outputs, solutions and recommendations should be displayed in a meaningful and accurate order.

2.2 Product functions

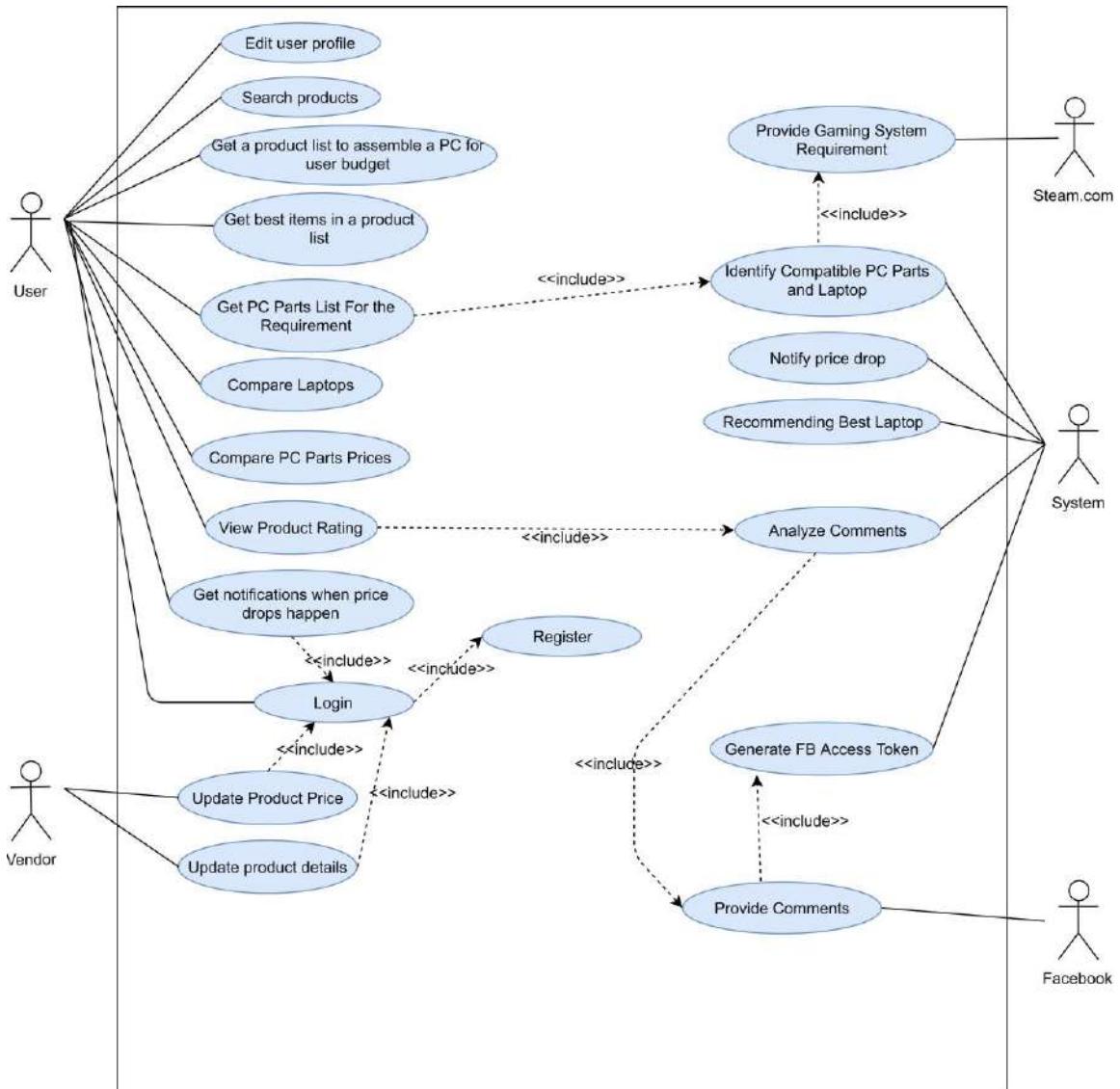


Figure 2. 1 - Use Case Diagram

2.2.1 Sign Up

Use case Name	Sign up user
Description	Sign up to “TechRing” to get more services from our platform
Actors	Site visitors/ users / vendors
Pre-conditions	Valid Email, unique username
Main Flow	<ol style="list-style-type: none"> 1. User visit the site. 2. Navigate to sign up page 3. Enter the required details 4. Show registration status and navigate to home page
Post Conditions	Display registration status and send email
Extensions	3.a 1. If user enter invalid details prompt errors and attempt again to enter valid data

Table 2. 2 - Use Case Scenario: Sign Up

2.2.2 Validate User(Sign in)

Use case Name	Validate user
Description	Validate user who already signed up with “TechRing”
Actors	users / vendors
Pre-conditions	Users should have a “TechRing” account
Main Flow	<ol style="list-style-type: none"> 1. User visit the site. 2. Navigate to sign in page 3. Enter the username and password 4. Details verified by the system
Post Conditions	User log in to the account successfully
Extensions	3.a 1. If user provide invalid details then prompt error messages

Table 2. 3 - Use Case Scenario: Validate User

2.2.3 Build PC for User Requirement

Use case Name	Build PC for requirement
Description	Get the compatible PC part list that satisfy the gaming requirement
Actors	Site visitors/ users
Pre-conditions	Users should have the name of the game to get pc part list for that game system requirement
Main Flow	<ol style="list-style-type: none"> 1. User visit the “TechRing” platform 2. Go to the system build section and choose build PC for the gaming requirement 3. Enter the keyword of the game 4. Show the requirement of the game 5. System check compatible PC part and show the list
Post Conditions	User get the compatible PC part list
Extensions	3.a 1. If user provide invalid keywords system prompts error message

Table 2. 4 - Use Case Scenario: Build PC for User Requirement

2.2.4 Suggest Best Laptop

Use case Name	Suggest laptop
Description	System will suggest the compatible laptop for the gaming requirement when user searches for the compatible PC part list
Actors	Site visitors/ users
Pre-conditions	Users should have the name of the game to suggest the laptop to satisfy that requirement
Main Flow	<ol style="list-style-type: none"> 1. User visit the “TechRing” platform 2. Go to the system build section and choose build PC for the gaming requirement 3. Enter the keyword of the game 4. Show the requirement of the game 5. System suggest the laptops that satisfy the requirement of the game
Post Conditions	User get the laptop details that suggest by our platform
Extensions	3.a 1. If user provide invalid keywords system prompts error message

Table 2. 5 - Use Case Scenario: Suggest Laptop

2.2.5 Selection Laptops

Use case Name	User selection of products/laptop
Description	System identify user requirements based on the user's selection
Actors	Site visitors/users
Pre-conditions	Name/ keyword that is already existing is entered by the users.
Main Flow	<ul style="list-style-type: none"> 1. User visit the site. 2. System allow the user to choose the option either PC part/ laptop. 3. System identify the key words/tags in the name entered to the system by the user. 4. System checks for matching record in the database. <ul style="list-style-type: none"> 4.1 Display of matching products will be displayed to the user. 5. Step 2 will be repeated by the user until they find a product they wish.
Post Conditions	Display of matching product list to the users.
Extensions	<p>3.a 1. Unavailability of matching record from the database will result a notifying the customer about the unavailability or asking to reenter the name.</p>

Table 2. 6 - Use Case Scenario: User Selection Product/ Laptop

2.2.6 Facebook Access

Use case Name	Facebook Access
Description	Preparation of access requirements by the system to access Facebook.
Actors	System.
Pre-conditions	Having a Facebook access token.
Main Flow	<ul style="list-style-type: none"> 1. User selects a product. 2. System retrieves the key words from the selected item. 3. Generate the Facebook access token using the Graph API. 4. Comment search and extraction is conducted if the access is successful.
Post Conditions	Comment search for matching keywords.
Extensions	<p>4.a 1. If the access is not granted the regeneration of the access token is conducted.</p>

Table 2. 7 - Use Case Scenario: Facebook Access

2.2.7 Comment Analysis

Use case Name	Comment Analysis.
Description	Using sentiment analysis the comment analysis will be conducted.
Actors	System.
Pre-conditions	System should have set of related comments with them. Having sets of positive and negative word set to train the system to conduct the analysis.
Main Flow	<ol style="list-style-type: none"> 1. Collect set of comments related to the search. 2. Separate each word in comment. 3. Analyze the comments using the algorithms and training data. 4. Categorize each comment considering their positivity and negativity of each comment.
Post Conditions	Categorized set of comments as positive and negative.
Extensions	4.a 1. If a comment does not fall under any category the system will ignore the comment.

Table 2. 8 - Use Case Scenario: Comment Analysis

2.2.8 Rating Product

Use case Name	Rating Process.
Description	Analyzed and categorized comments will undergo a counting process to get a summary of the customer reviews.
Actors	System.
Pre-conditions	System should have a set of categorized and tokenized comments with them.
Main Flow	<ol style="list-style-type: none"> 1. Total count of positive comments will be taken. 2. Total count of negative comments will be taken. 3. Generate a final graphical representation of the final results received by the system.
Post Conditions	Display of the reviews as rating of positive and negative nature.

Table 2. 9 - Use Case Scenario: Rating Process

2.2.9 View Laptops

Use case Name	View Laptop
Description	Users can view different types laptop.
Related requirements	Internet connection
Actors	Site visitors
Pre-conditions	User should access through tech ring.com
Main Flow	<ol style="list-style-type: none"> 1. User visit the tech ring web application. 2. Click button compare laptop at the top nav bar. 3. Select brand of laptop at left side bar 4. User redirect selected laptop brand page 5. System display laptops
Post Conditions	Display user selected laptops

Table 2. 10 - Use Case Scenario: View Laptop

2.2.10 Compare two Laptops

Use case Name	Compare two laptops
Related requirements	Laptop one, Laptop two
Description	User can compare two laptops which he/she selected, then he/she can inform which one is best laptop among them.
Actors	Site visitors
Pre-conditions	User should two laptops model, it can be same brand or different brand.
Main Flow	<ol style="list-style-type: none"> 1. Select first laptop 2. Select second laptop 3. User click compare laptop button 4. User redirect new page 5. System display best laptop and suggestions
Post Conditions	Display user selected laptops
Extensions	3.a.1 system will display “please select two laptops”

Table 2. 11 - Use Case Scenario: Compare two laptops

2.2.11 Recommend Best Products

Use case Name	Recommend the best products in a product list.
Description	Get a sorted product list according to the features of products.
Actors	Customers
Pre-conditions	Relevant data should be there in the database.
Main Flow	<ol style="list-style-type: none"> 1. User searches a product. 2. User get the product list. 3. User selects the option and get the sorted list according to product features.
Post Conditions	Display the sorted product list.

Table 2. 12 - Use Case Scenario: Recommend best product

2.2.12 Build PC for Optimum Budget

Use case Name	Build a PC for the optimum user budget and recommend the PC parts.
Description	Users are able to get a list of products to build a PC and where they can purchase them for the optimum budget plan after they gave a price range.
Primary Actors	Customers
Pre-conditions	User has to give a price range.
Main Success Scenarios	<ol style="list-style-type: none"> 1. User gives a price range. 2. User gets a list of product details to build a PC for the optimum budget plan.
Extensions	2a. If the price range is not enough to build a PC, system shows nothing.
Post Conditions	Display a product list.

Table 2. 13 - Use Case Scenario: Build PC for user budget

2.2.13 Notify Price Drop

Use case Name	Notify customers the price drops.
Description	Customers are able to track the price drops and system will notify them if that happens.
Primary Actors	Customers
Pre-conditions	User has to login to the system.
Main Success Scenarios	<ol style="list-style-type: none"> 1. User selects the price tracking option of that product. 2. If the price drops to users' expected budget, system notifies them.
Post Conditions	User gets an email.

Table 2. 14 - Use Case Scenario: Notify Price Drops

2.2.14 Compare PC Part Prices

Use case Name	Compare PC part prices
Description	Customers are able to compare different vendors prices for same part
Primary Actors	Customers
Pre-conditions	User needs to select the PC part for compare prices
Main Success Scenarios	<ol style="list-style-type: none"> 1. User visit the individual parts section on “TechRing” 2. Select the part that he need to compare the prices 3. System show the prices from different vendors and show the best price for the part
Extensions	2.a 1 System will show error if you enter invalid details

Table 2. 15 - Use Case Scenario: View PC part prices

2.3 User characteristics

“TechRing” is an online assistant which will assist anyone who is looking for a PC part or a Laptop to purchase. Our user base consists of an age gap starting from 10 to 60yrs and more. The reason for having such a huge user base is that all most everyone needs a computer or a laptop to function daily. We have categorized our user base as below,

- Students.
- Gaming Society.
- Employees.
- PC parts and Laptop Vendors.
- Ordinary People.

Basically “TechRing” will provide assistance for anyone with both expert and average technical knowledge personnel in making purchase decision for both PC parts and Laptops. In addition, our platform help people in need of proper guidance for finding compatible PC parts to assemble their PC’s matching their requirements.

2.4 Constraints

One of the common constraints for any user of this online assistant is the availability of Internet. Since the systems needs to access online data apart from the data from the database and the output of the system will be provided via a web portal Internet connection for the functioning of “TechRing” is a must.

- Software Constraints

‘TechRing’ is a web application so that using any web browser which supports relevant Javascript, should be able to access the site. Mobile devices should also be able to access the website because of the responsiveness. Python use for machine learning algorithm to analyze user comments, price optimization, Compare computational power and recommend best laptop and suggest the PC part using build sequence.

- Time Constraints

Final product should be produced by November 2019.

- Data Constraints.

There will be two sources of data. Set of data will be stored in the databases. Data will be stored using MongoDB. Some of data will be updated manually by the system administrator or vendors. Other set of data will be extracted real time since the system needs to access the updated data content.

2.5 Assumptions and dependencies

Assumption

- The details that are provided by the user to the system will be names and details already available in the market.
- The device has access to the Internet before accessing “TechRing”.
- Individuals who access “TechRing” possess considerable computer literacy to operate and use functionalities that are offered in the platform.

Dependencies:

- Users’ accessing devices must be connected to the Internet prior to the use of “TechRing”.
- Users’ should visit the site via a web browser in order to experience the services provided by “TechRing”.

2.6 Apportioning of requirements

The first release of “TechRing” consists of the functions that are mentioned in the section 1 and 2. In section 1 and 2 more focus is given to the overall description about the system and its requirements. Section 3 is focusing on the requirements that needs to be followed in designing the final product.

It is possible to modify “TechRing” by expanding the services provided by the online assistant. Currently the PC assembling plans are built only according to the game specifications. But in future we can expand this function in to other areas like video editing, drafting, designing and more.

Moreover, we can allow the users a separate section where they can express their views about the product in “TechRing” itself.

3 Specific requirements

3.1 External interface requirements

3.1.1 User interfaces

User interfaces are the access points for users. The interface layout determines the friendliness of the platform. Lesser the number of interfaces more user friendlier the software will be.

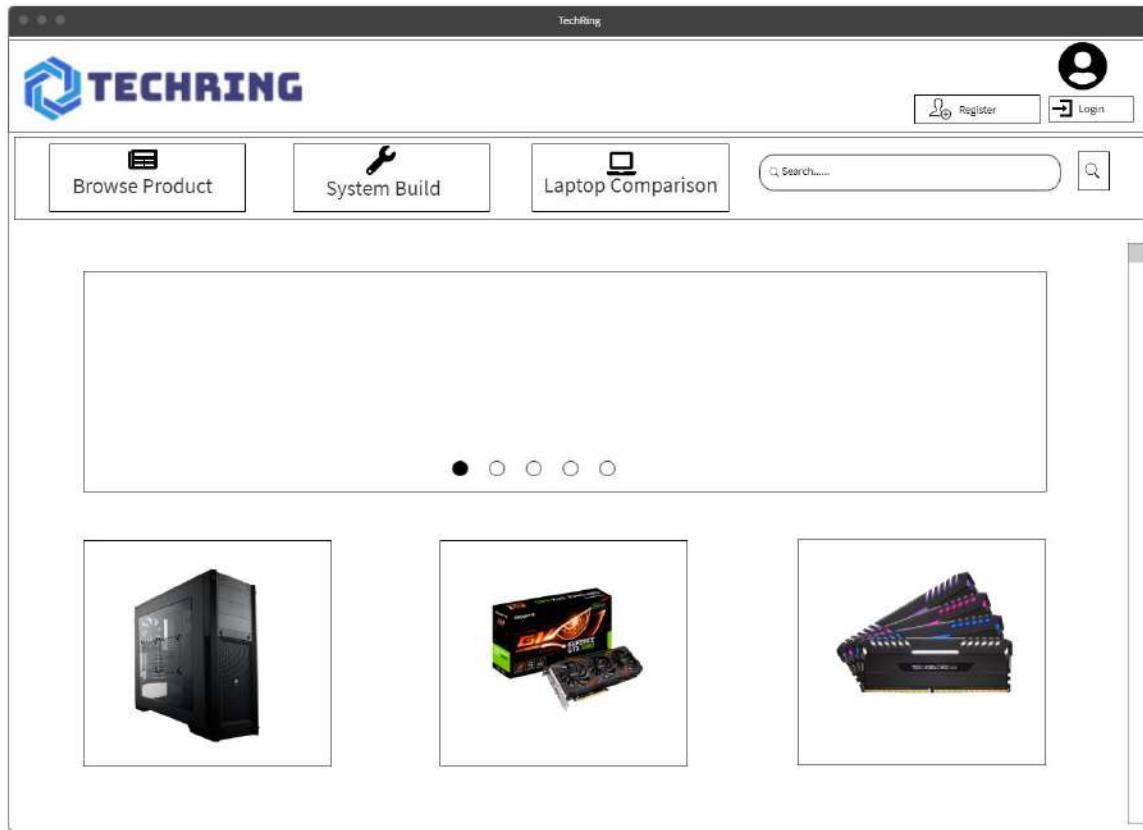


Figure 3. 1 - User Interface: Home page

When the user visit “TechRing” through a web browser the first interface they interact is displayed in Figure 3.1. This interfaces provide the user with access points which will direct them to their next step depending on their requirement.

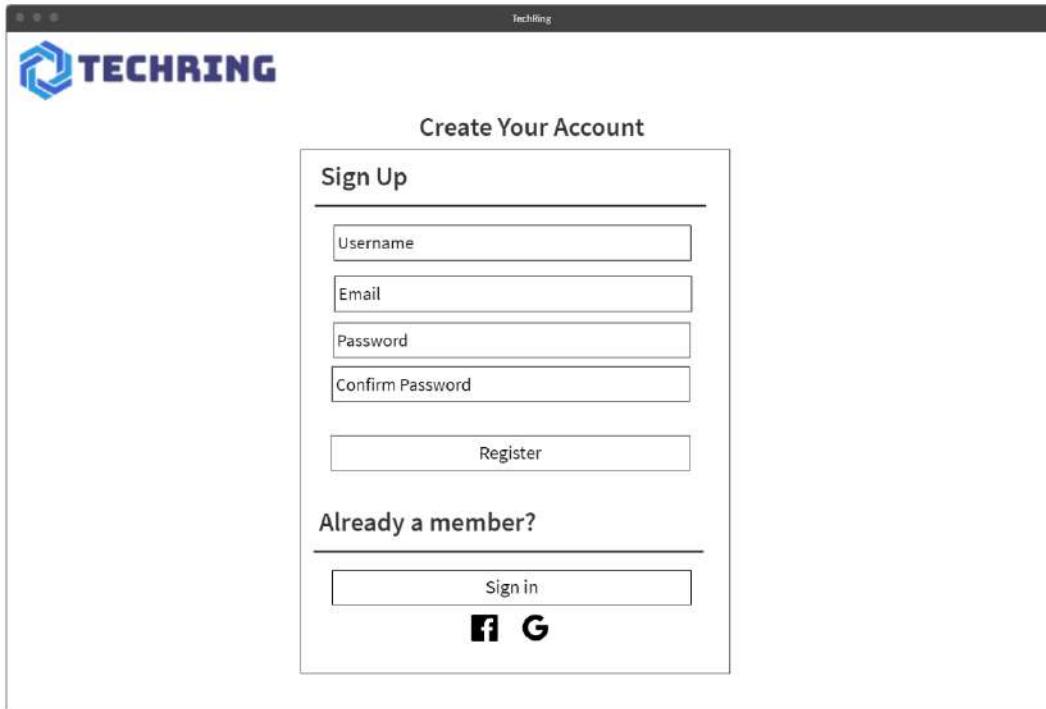


Figure 3. 2- User Interface: Sign Up

This is the Register interface. Non-registered user can get registered with “TechRing” through this interface. User can register either by providing the required details to the system or they can register using their Facebook or Gmail accounts.

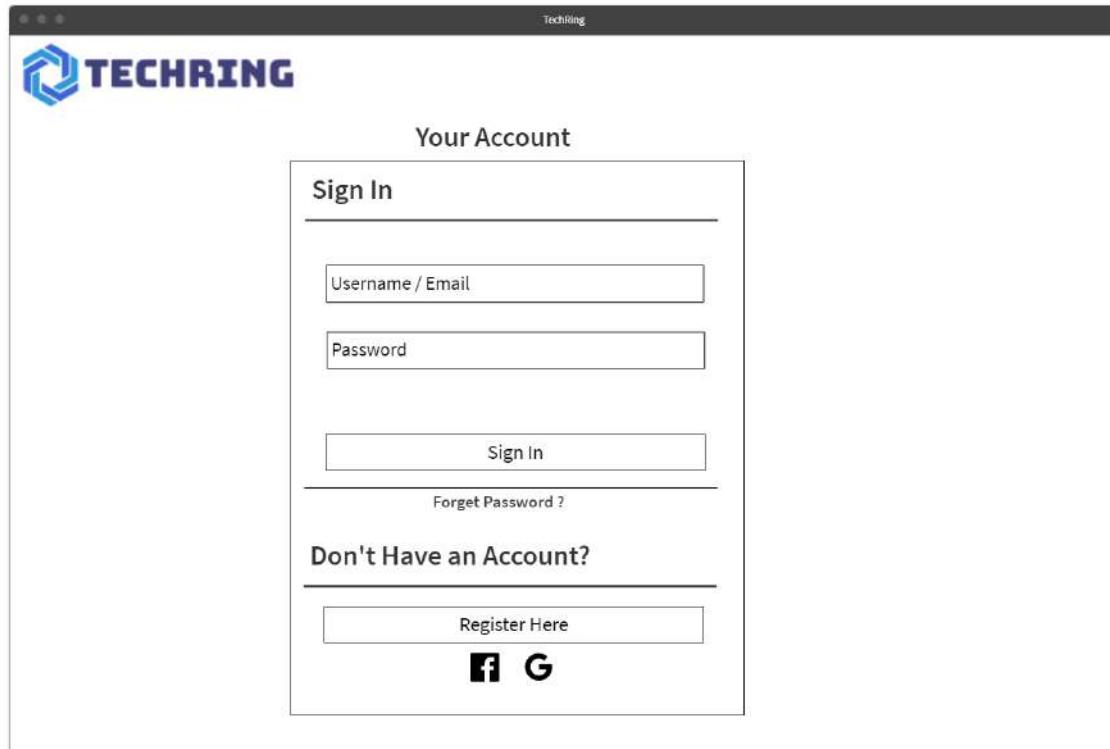


Figure 3. 3- User Interface: Sign In

Above figure is the sign in interfaces. For any registered user can enter their username and password and sign in to the platform. If the user has not registered there is option to direct the user to Register interface (Figure 3.2). If the user does not remember the password the option to reset the password is also provided.

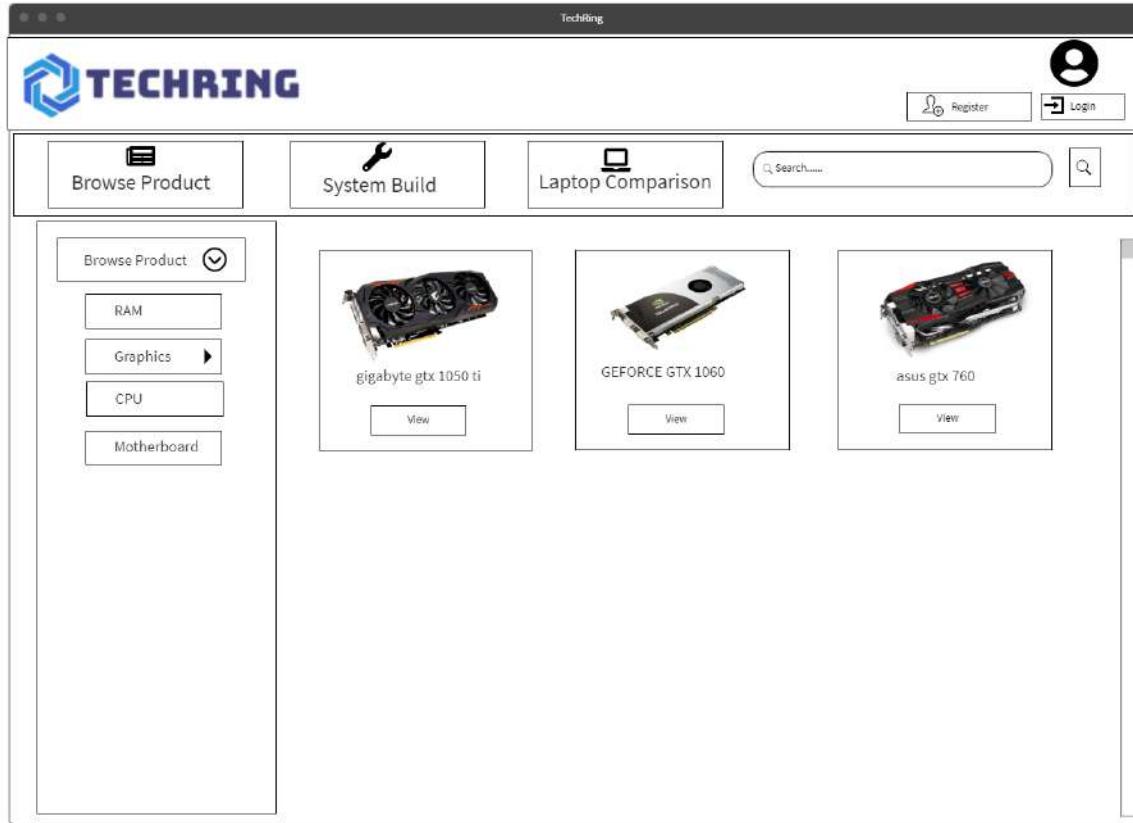


Figure 3. 4- User Interface: Product categories browse page (Graphics)

This is the Browse Product page in Figure 3.5. There is an option where the user can select the product category from a drop-down list. Once user selects a category related to the product will be displayed.

“TechRing” – SRS | Software Requirement Specification

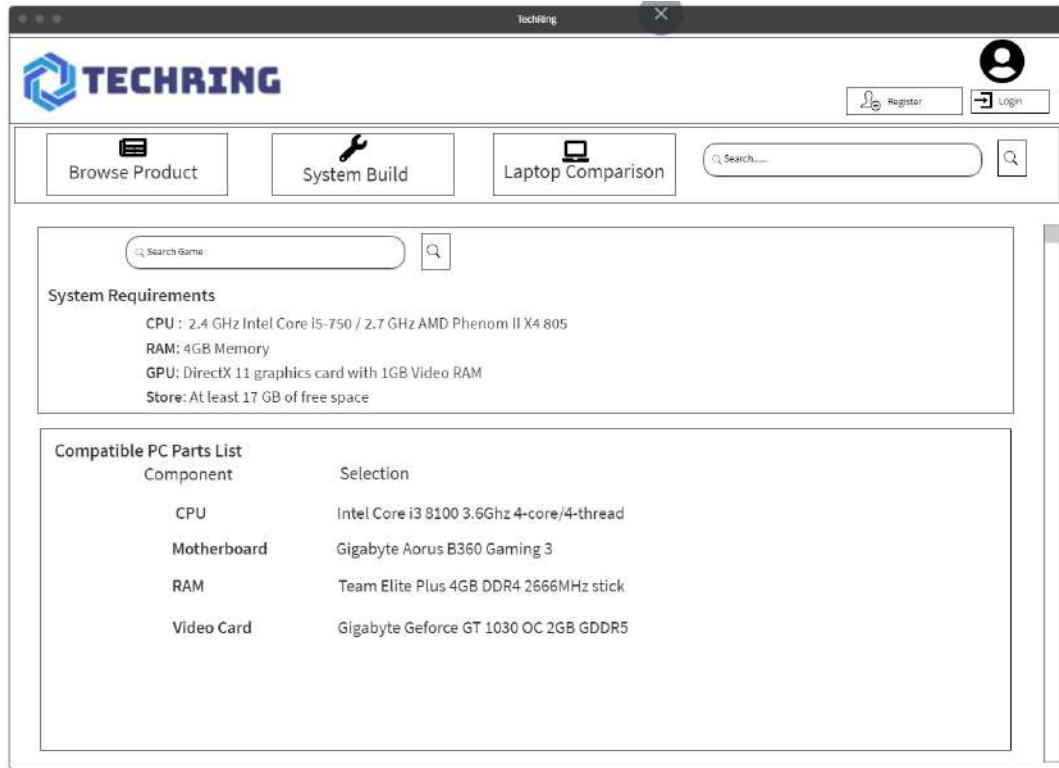


Figure 3.5- User Interface: System Build for game system requirement

The Figure 3.6 represent the System Build interface. Search field is available for the users to enter the game they are interested. Then the matching requirement will be displayed below. Further down will be the required compatible parts to build the PC.

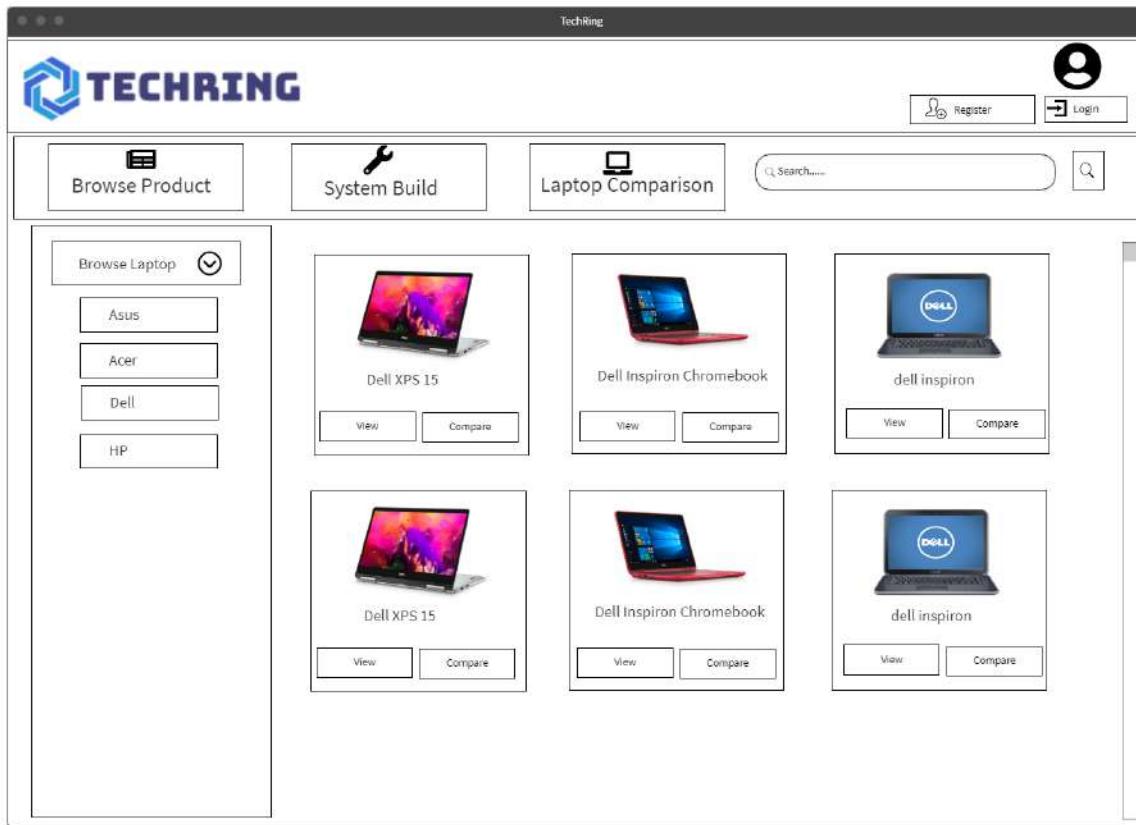


Figure 3. 6- User Interface: Browse Laptop

This is the Laptop Comparison interface. When the user click on Laptop Comparison option they will be directed to this interface. Users are given the two options view product details or compare. Users can sort laptops brand vice using the drop box in the side.

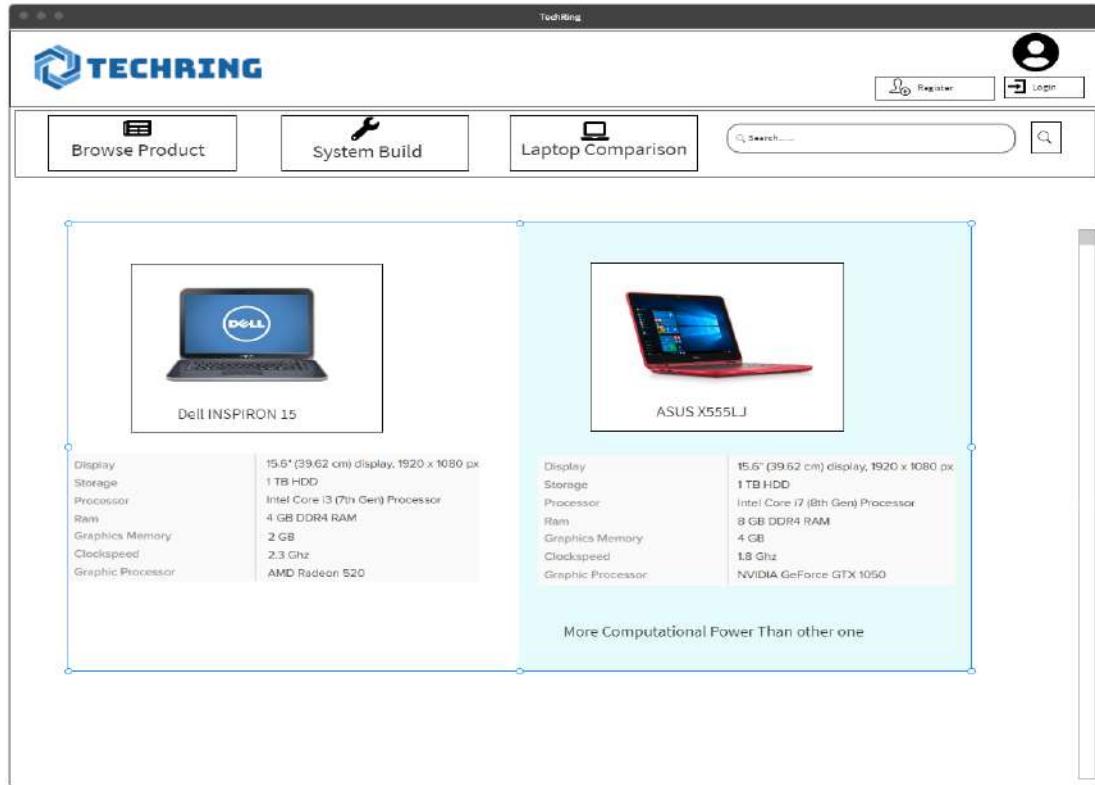


Figure 3. 7- User Interface: Result display for a Laptop Comparison.

Once the user select the option, compare in Figure 3.6 and select two laptops to compare they will be directed to the above interface, Figure 3.7. This shows the comparison results of each model and recommended laptop will be highlighted in light blue color.

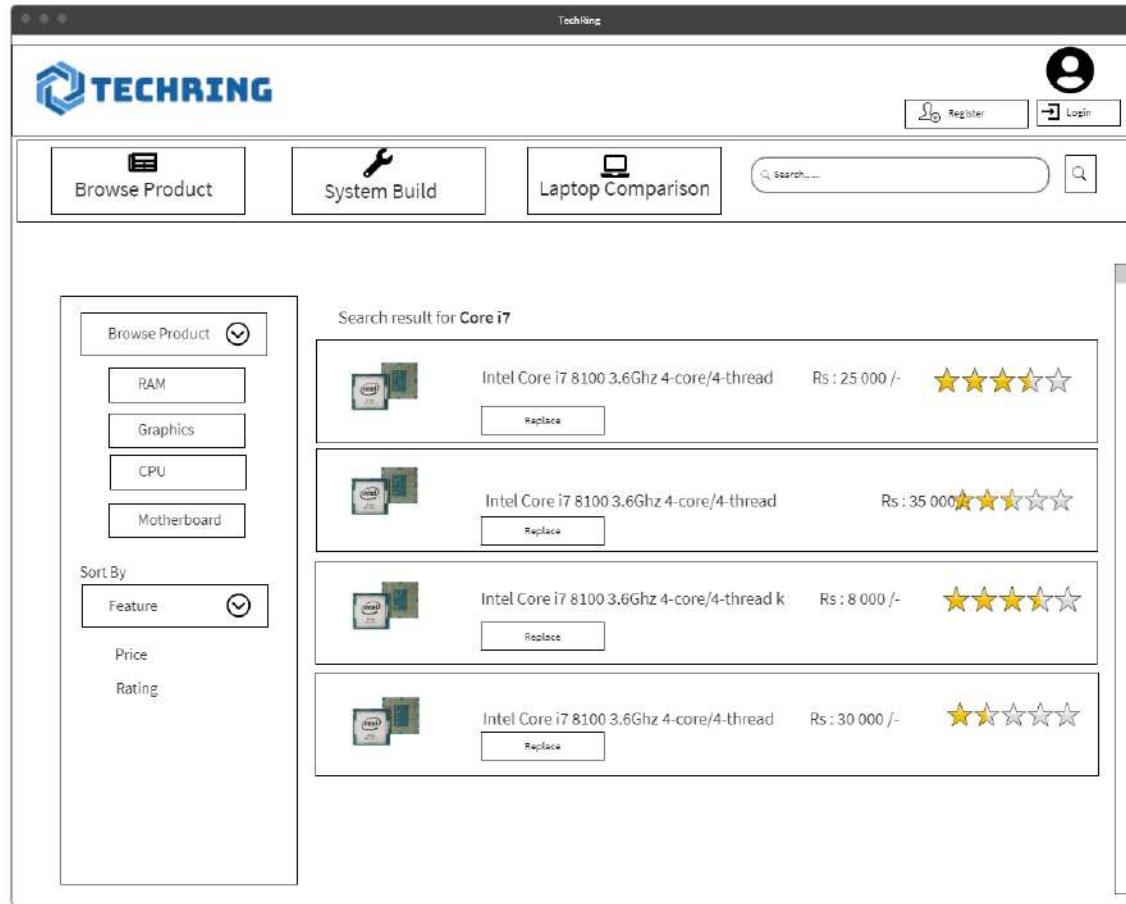


Figure 3. 8- User Interface: Display Search Results

After user select the Product type from Figure 3.4 They can search the product either based on price or ratings. Once the user select ratings above figure (Figure 3.8) will be displayed. Product list is displayed in descending order of the ratings each product received.

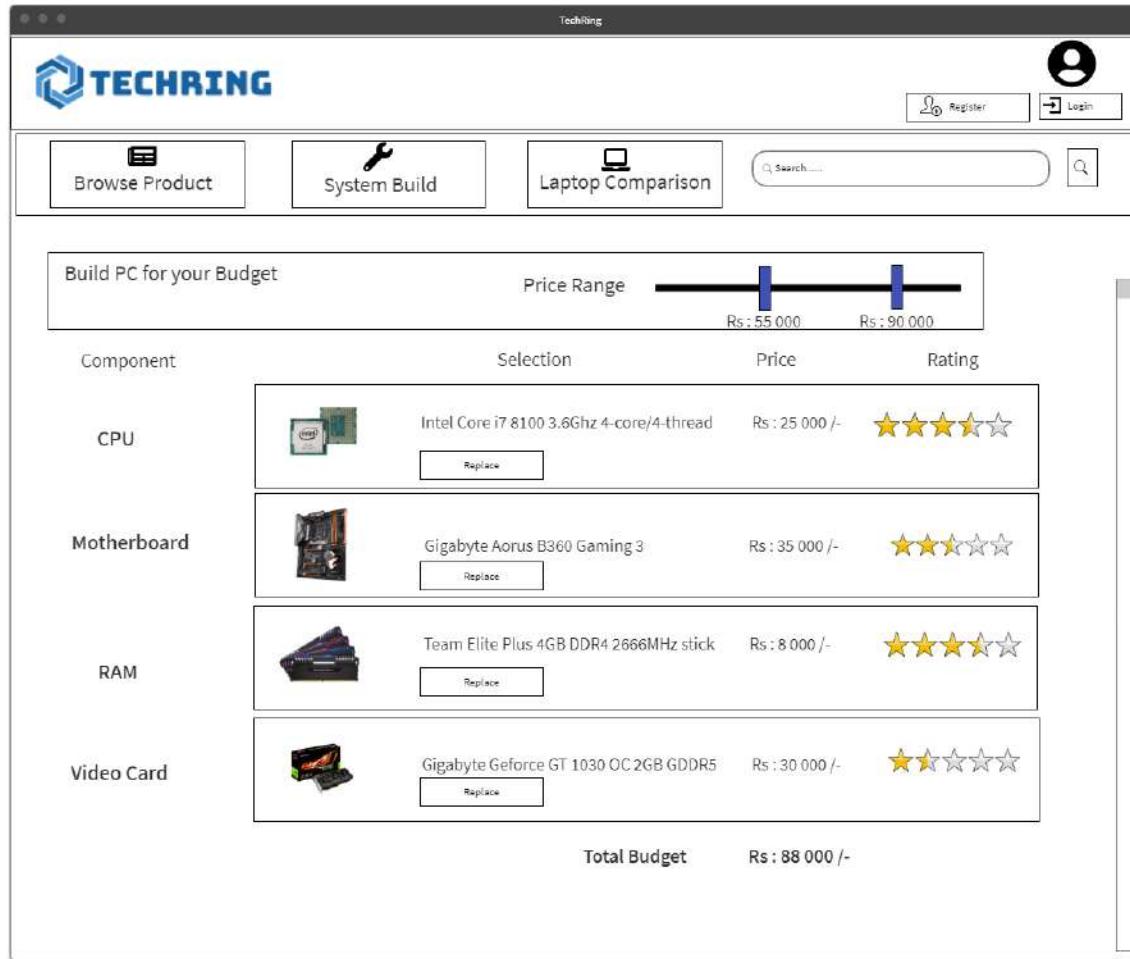


Figure 3. 9- User Interface: Display compatible product list for user budget

When user select build the PC for budget user can select the price range and then user get the complete PC part list that are compatible. If we want to replace any part we can change with any which are compatible with other parts.

The screenshot displays the TechRing software interface. At the top, there is a navigation bar with the TechRing logo, user account options (Register, Login), and search functionality. Below the navigation bar, there are three main menu buttons: "Browse Product", "System Build", and "Laptop Comparison".

The central part of the screen shows a product image of an Asus ROG Strix GeForce GTX 1080 graphics card. To the right of the image, detailed product specifications are listed in a table:

Brand name	ASUS
Item Weight	1.5 Kg
Product Dimensions	29.8 x 5.3 x 13.4 cm
Item model number	90YV0AM1-M0NMO0
Series	ROG-STRIX-GTX1080TI-11G-GAMING
Color	Black
Graphics Coprocessor	Nvidia
Graphics Chipset Brand	nVidia
Graphics Card Description	Nvidia GeForce 1080ti
Graphics RAM Type	GDDR5
Graphics Card Ram Size	11100 MB
Graphics Card Interface	PCI E
Number of HDMI Ports	2
Wattage	600 watts
Supported Software	Ja

Below the product image, there is a "Rating" section with a 5-star rating icon. Further down, there is a "Comments Rating" section with a 5-star rating icon.

At the bottom of the screen, there is a comparison table for vendors:

Vendor	REO	NANOTEK COMPUTER SOLUTIONS	amazon
Price	10 500.00/- Best Price	11 500.00/-	54.04\$ = Rs: 9 500.00/-

Finally, there is a "Comments" section where users can leave reviews. Two comments are visible:

- luchian1: Would recommend.
- origin_gale: It does the job well and cheap. A simple BIOS setting had me at the full 3000mhz.

Figure 3. 10- User Interface: Display Item details

After selecting one PC part we can compare the prices from different vendors. Our platform will suggest the best price by considering different aspects. User can view the user comments on each product. Analyzed comments rating will be displayed under rating section. Also best price for that product will be highlighted and marked.

3.2 Performance requirements

Server should contain following requirements after “TechRing” deployed. Application should be run on the server to connect clients without any distraction.

- Server should be able to response quickly to client
- Application need minimum 1 GB RAM and 20 GB hard disk space to run efficiently
- The server should handle the traffic without failing
- Server should be able to response user 24x7 to maintain reliability of the system

3.3 Design constraints

Responsiveness - Responsiveness is a critical feature of a website. Some people use the website on a computer or on a laptop. Some people use it on a mobile phone. Sizes of the screens are different from each other. Therefore, it is necessary to create the same website for different sizes of screens. ‘TechRing’ will have the ability to run on a computer as well as on a mobile phone without any confusion of the web content. When the size of the screen changes, the proposed website will change according that.

3.4 Software system attributes

3.4.1 Reliability

Reliability is measured based on the capability of a system or software’s ability provide the services to the users without a failure for specified period of time. One of the major factor that affect the reliability of a system is the complexity of the system. The system developers and designers should use the appropriate model carefully. Because the best model will not be the ideal model for the situation.

The proposed platform will be developed with capability to deliver a reliable and efficient service to the end users. Algorithms used in “TechRing” will generate highly accurate results to the users. As the latest technology is used these results will be produced with in less time.

Since data handling will be done by the server there will be less crashing probability. Yet failures might occur due to server issue or connection failures.

“TechRing” will be capable of supporting any device small, medium or large. Thus, user can access our site with the device they are using.

3.4.2 Availability

Availability of a system should have the focus on simplicity and user's purpose. “Uptime” of the platform is the main focus under availability. In this situation “TechRing” is hosted on AWS that is ensure the availability of the system and it balance the load and the traffic by the inbuilt load balancer. So that availability of the system will increase because of the AWS. As a result, the website will remain operational when and where the user needs it to be available.

3.4.3 Security

Security of the platform is the ability of the platform to withstand the unauthorized access and harmful digital threats. The system needs to be built with the appropriate security levels to ensure user's data is secure.

System has different level of user roles they have different accesses to the system those should be maintain properly otherwise some users can access to the confidential data in our system. There is a login function and when a user logs in to the system, a token is generated, and it is used to identify each and every person. Therefore, the system is protected from unauthorized access.

Security mechanisms that is to be implemented will be,

- Intrusion security
- Data encryption

As mentioned, the platform development should consider the levels of security initiated considering the sensitivity of the data we collect, and user level access allowed. The database should have a high-level structure which could prevent a system crash or a data loss.

3.4.4 Maintainability

System should be developed with the capability of adapting to changes, rectify the bugs which should be done in the preventive maintenances and support future changes. The system will be developed supporting high maintainability since many improvements are will be added in to the new system in the future.

One major risk the “TechRing” faces is the changes of web content of targeted websites. “TechRing” gets most of the data by web scraping. When a targeted website changes the content of its site, scraped data can be false. To prevent from that, ‘TechRing’ will have modifications and be able to adapt according to the situation if it happened.

3.5 Other requirements

Performance – Performance is an indication of the responsiveness of the website to execute any action within a given time interval. Everyone likes to get responses quickly as possible without any problem in order to save their time. Some functions of the proposed website connect with online data and analysis of those data will be done at real time. Therefore, performance of the website would be a critical point in the website. In order to increase the performance, latest technologies are used to create the website.

4 Supporting information

4.1 Appendices

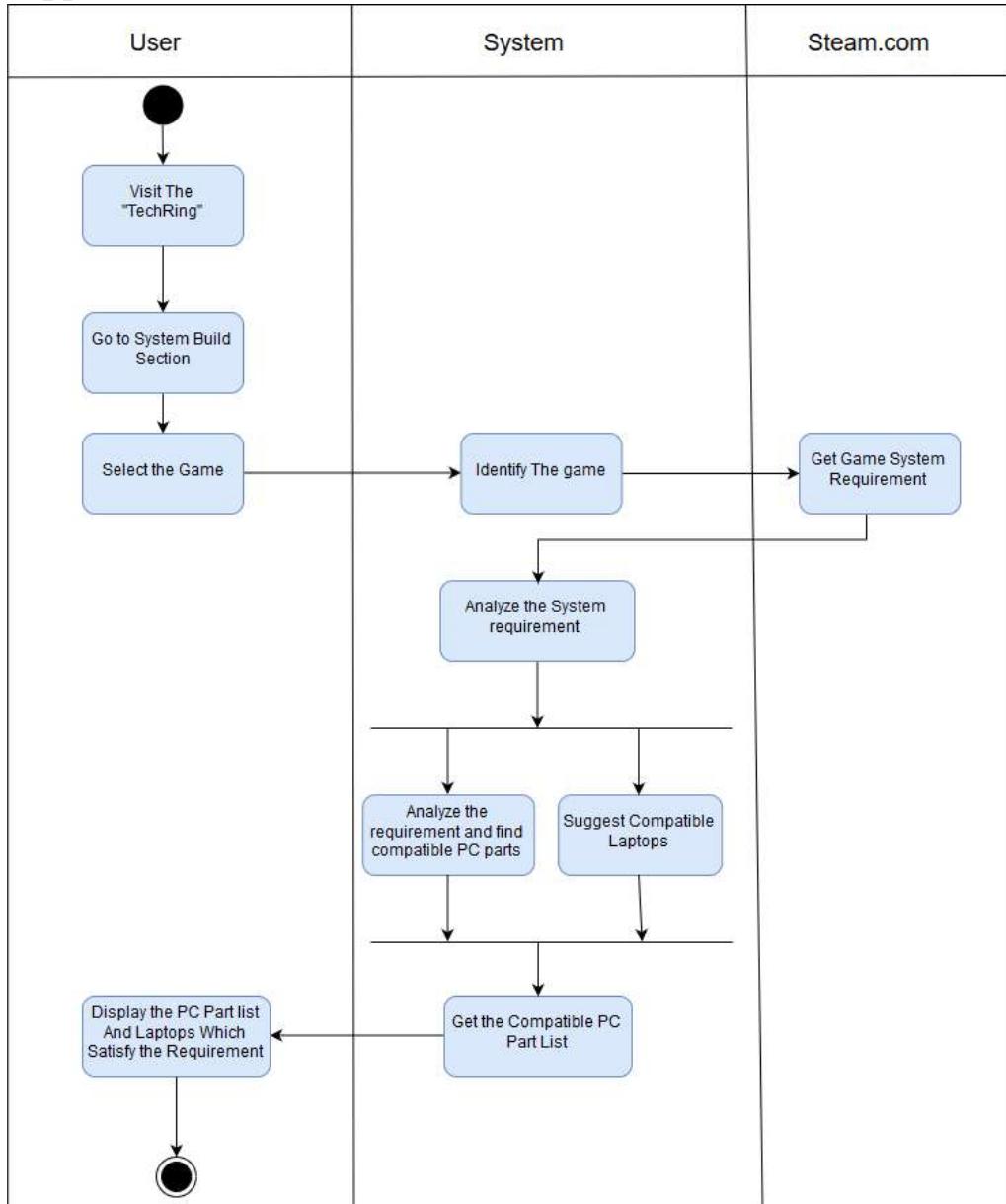


Figure 4. 1 : Activity Diagram: Get compatible PC parts for user requirement

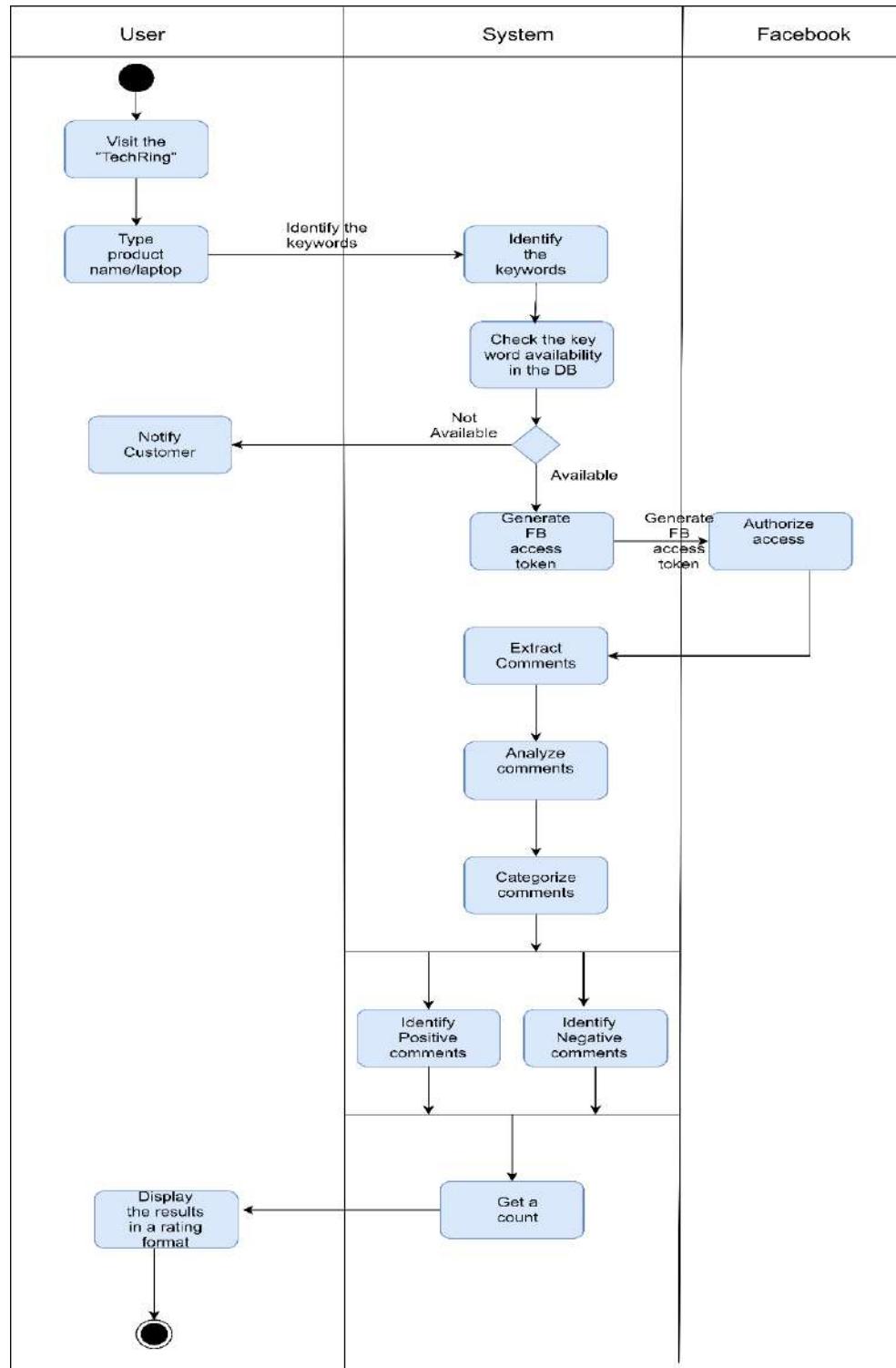


Figure 4. 2 : Activity Diagram: Comment Analysis

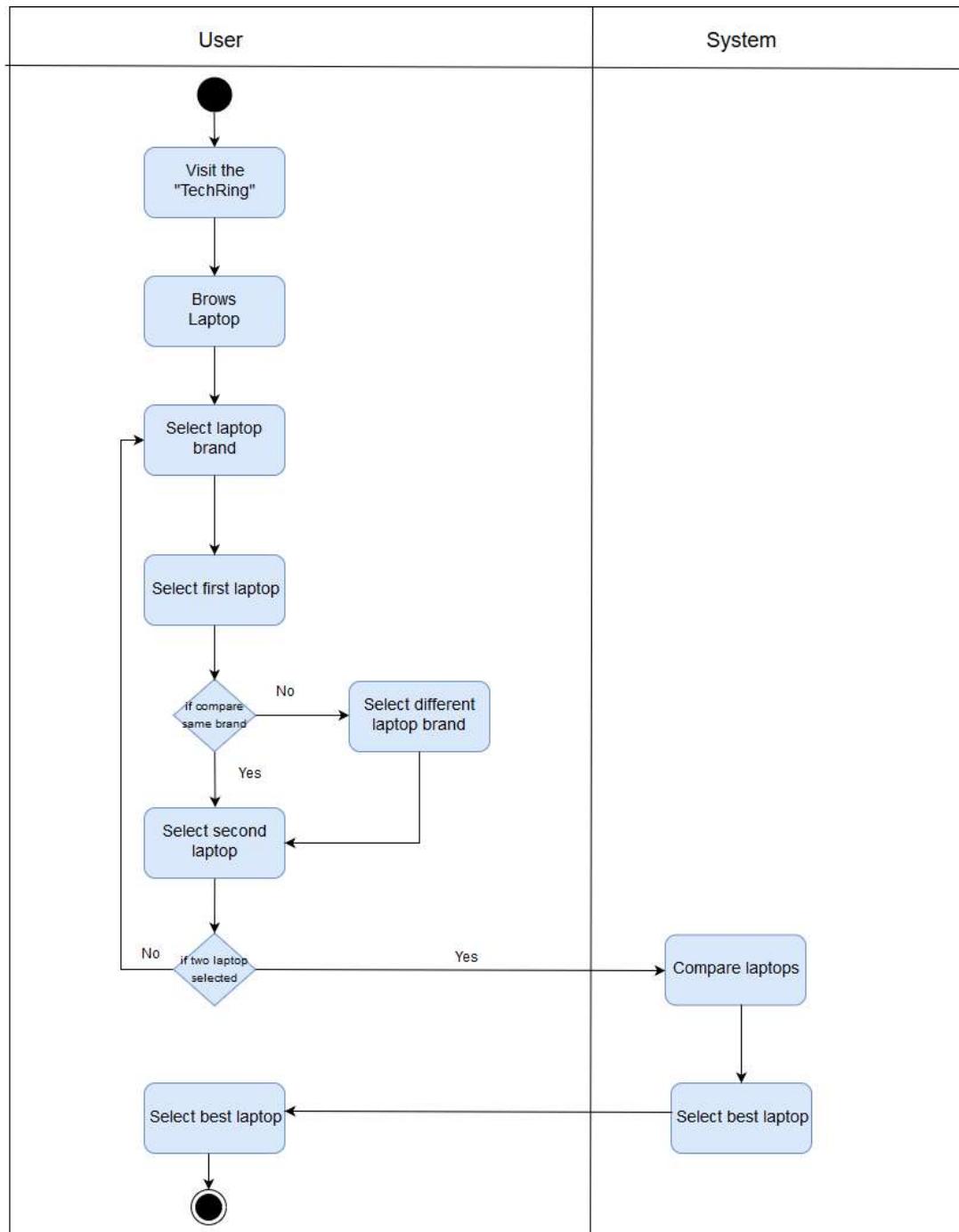


Figure 4. 3 : Activity Diagram: Laptop Comparison

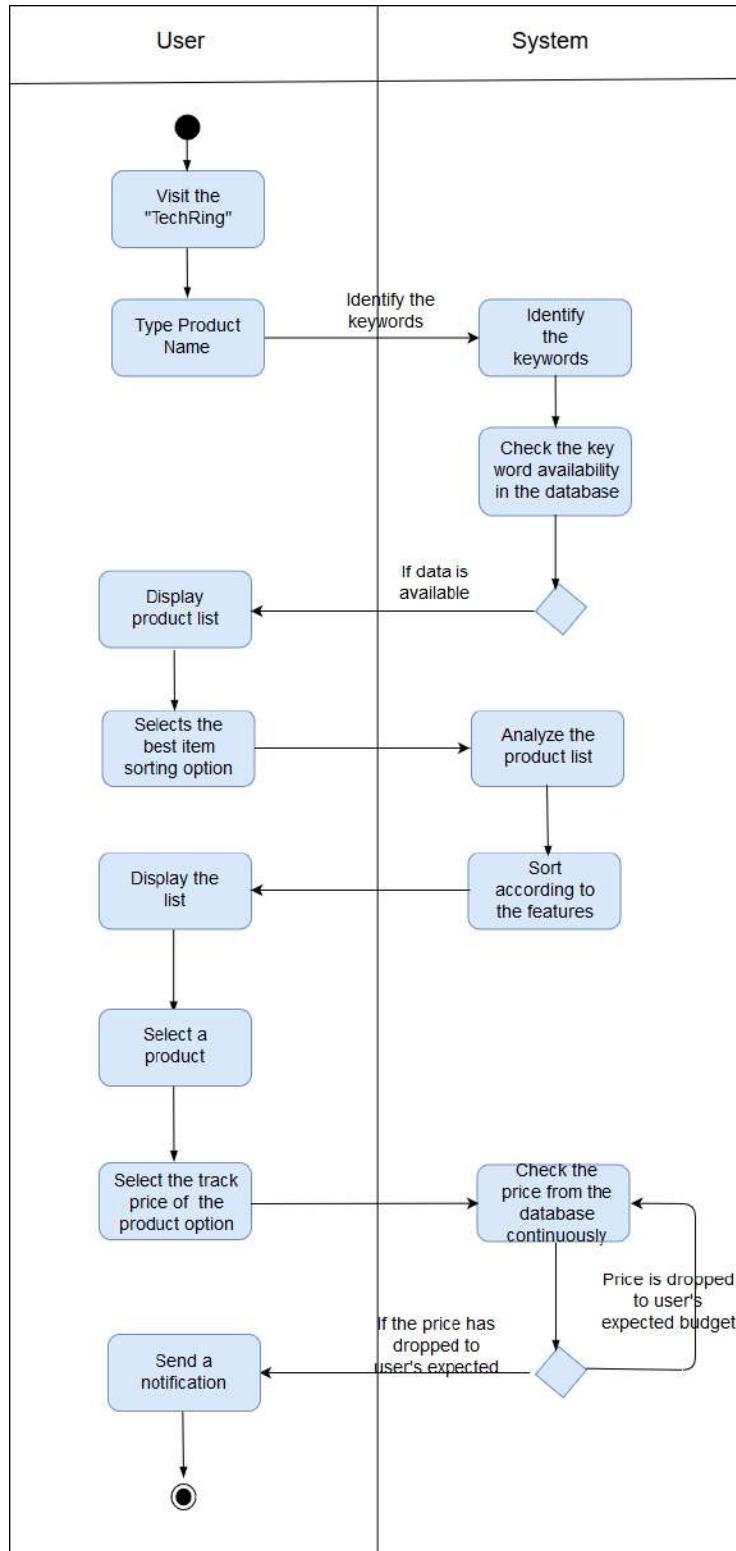


Figure 4. 4 : Activity Diagram: Search and sort product list

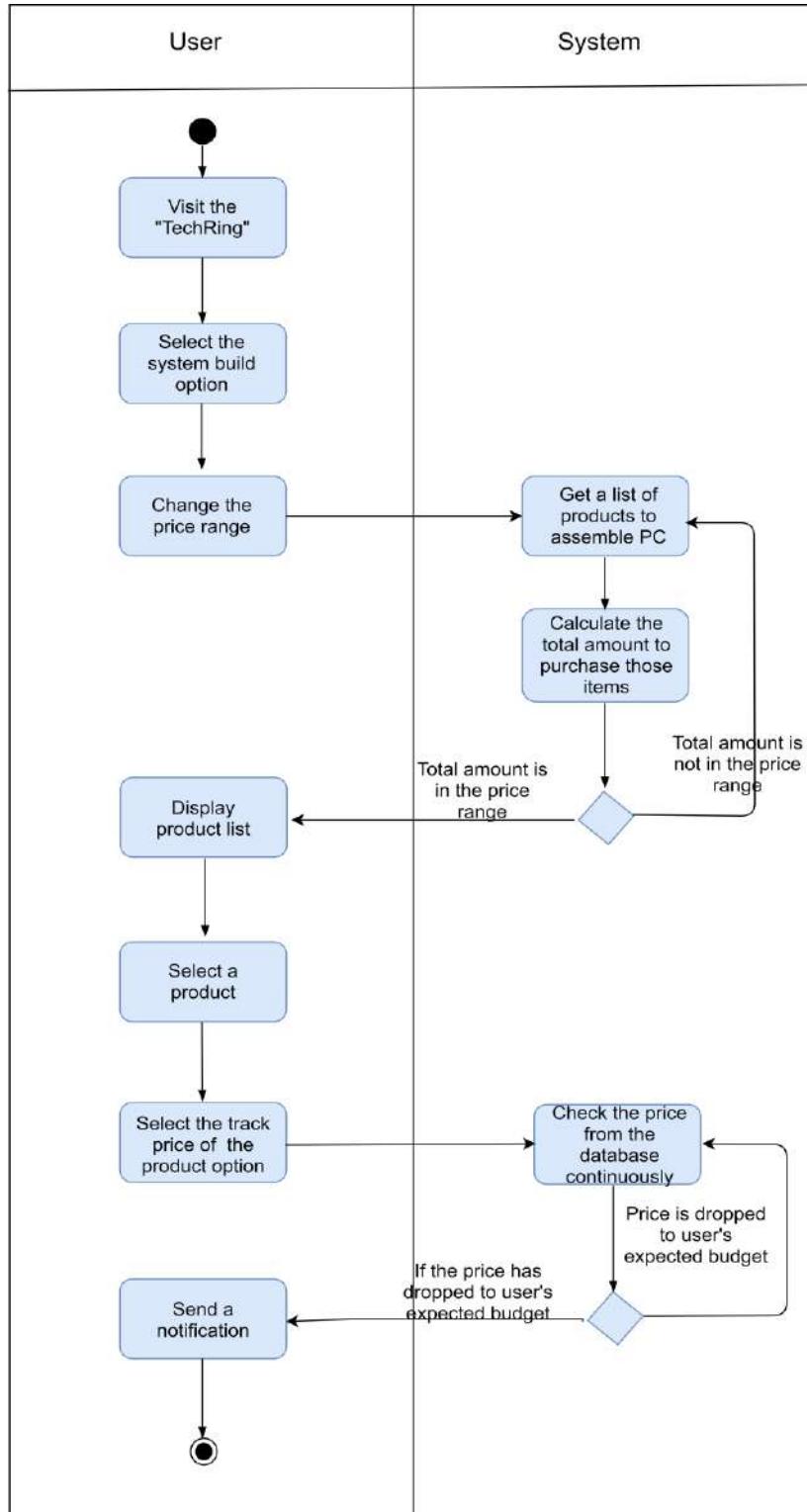


Figure 4. 5 : Activity Diagram: Get product list for user budget

5 References

- [1] F. N. Leo Rizky Julian, "THE USE OF WEB SCRAPING IN COMPUTER PARTS AND ASSEMBLY PRICE COMPARISON," 2015.
- [2] S.-T. Tan, "Multimedia Based PC Assembly Learning Tool," 1996.
- [3] N. D. Udi Boker, "Comparing Computational Power," 2015.
- [4] W. Hou, X. Li, Y. Jin and J. Wu, "A Study of Intelligent Decision-Making System Based on Neural Networks and Expert System," 2013.
- [5] P. J. B. a. R. C. Jain, "Three-dimensional object," vol. 1, 1985.
- [6] R. T. Chin and C. R. Dyer, "Model-based recognition," vol. 18, 1986.
- [7] a. R. B. F. Solina, "Recovery of parametric models from range images : the case of superquadrics with global deformation", Vols. vol:1, vol 2, 1990.
- [8] K. N. Kirithika B, "Comparison of Intel processor with AMD processor with Green Computing," 2013.
- [9] C. Kocas, "Online price competition within and between Heterogeneous Retailer Groups," 2004.
- [10] R. H. Jianxia Chen, "A price comparison system based on Lucene," April 2013.
- [11] A. Zalozhnev, "The ICT Products Prices and Quantities".
- [12] A. Salinca, "Business reviews classification using sentiment analysis.," 2016.
- [13] S. R. S. J. Zeenia Singla, "Statistical and Sentiment Analysis of consumer product reviews," 2017.
- [14] B. L. Minqing Hu, "Mining and Summarizing Customer reviews.".
- [15] A. L. Robert Ireland, "Application of data analytics for product design: Sentiment Analysis of online product reviews," 2018.
- [16] Y. N. A. O. I. O. BabolaT. Issac, "Assembling a Desktop Computer System with Built Uninterrupted Power Supply.," 2017.

- [17] Y. 2. LinghuiLiu1, "ApplicationofAgileMethodintheEnterprise WebsiteBackstageManagementSystem," 2012.
- [18] A. J. M. Kamaljeet Kaur, "Applying Agile Methodologies in Industry Projects: Benefits and Challenges," 2015.
- [19] J. D. A. a. O. B. Shvetha Soundararajan, "A Methodology for Assessing Agile Software Development Methods," 2012.
- [20] [Online]. Available: <http://jaspervanderhoek.com/wp/methodology/agile/pursuing-a-fully-agile-software-lifecycle/> [image].