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

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Table of Contents

List of Figures

List of Tables

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 (Eg: Videos editing purposes) and different software requirements.

Specific objective is to build the complete personal computer by using different parts for customer requirement. To get the list of product we need to identify the requirement clearly and get the requirement specification from the web scraping. Initially develop the "TechRing" to build complete personal computer for game system requirement. After get the full game system requirement our platform will analyze the requirement and suggest the compatible parts which satisfy user's requirement.

1.2.1 Objective

Analyze the system requirement of the game and according to hat requirement our platform will suggest the best compatible parts for satisfy user required game.

1.2.2 Other objectives

- To provide solutions customized according to computer games (For both laptops and PC parts).
- 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.
- Customer can find the PC part and the requirement in same place no need to search through internet.

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
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 SRS document.

Main Goals.

1. 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.
2. To reduce the time to find compatible PC parts for requirement and assemblers can ensure the assembling PC have enough capability to run particular PC game.
3. Provide reliable service for gaming community, experts and non-experts of PC assemblers to guide the assembling process.

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.

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 wilsl 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.

Assembling a PC is a task with high complexity [2]. Our platform will suggest the compatible PC parts which satisfy the user requirement. So customers can easily find the parts which they want to buy for their need. To get the customer requirement our platform will get the gaming system requirement from Steam.com which is most popular gaming platform to gamers. After get the requirement "TechRing" will analyze the requirement and find the compatible PC parts using build sequence. Build sequence is the process to build the complete PC from the compatible components.

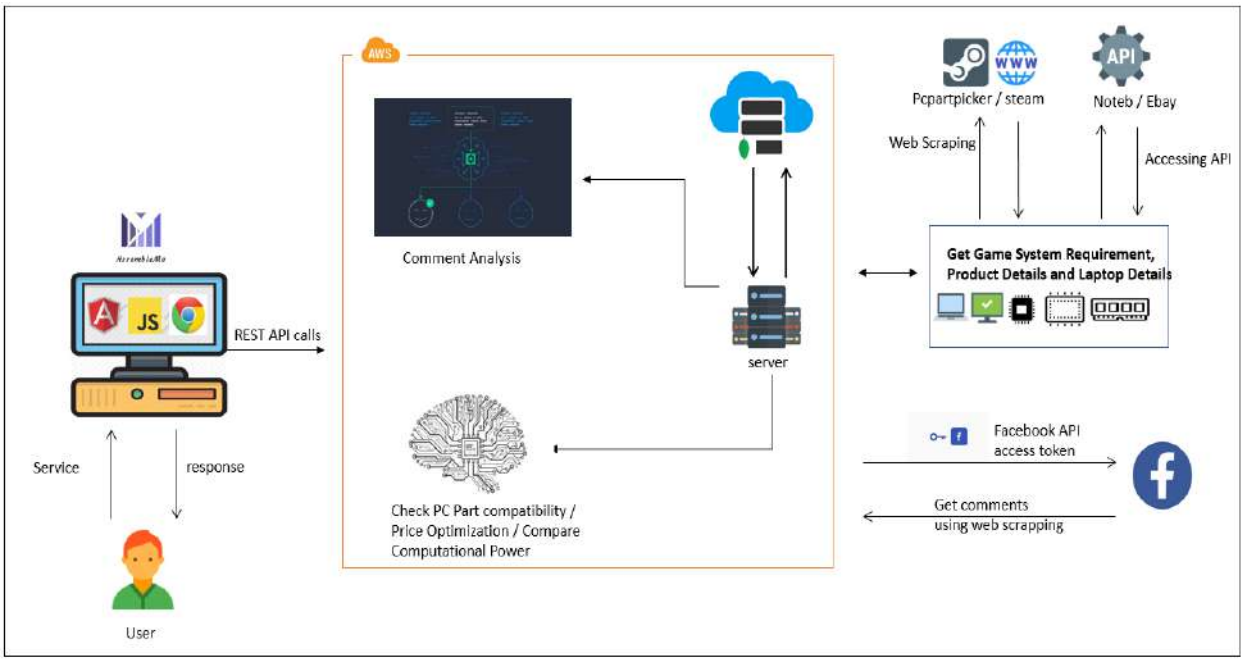

Figure 1. 1 - High Level Architecture Diagram

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.

To build the complete PC we have to analyze the requirement and suggest parts by the build sequence. First build sequence will identify the processor to satisfy the requirement. After we get the compatible processor sequence will extract the processor socket and suggest compatible motherboard. Then we can find the other parts that match to the mother board from the build sequence. After select the mother board sequence and expert system will suggest the RAM that need to be satisfy the game system requirement. Finally our sequence will suggest the video card for the system. After finished the build sequence we can get the final product which has the product list of compatible PC parts.

Build Sequence tasks

- Analyze the game system requirement
- Suggest the CPU
- Get compatible motherboard with comparing CPU socket
- Find the RAM which are compatible and satisfy the game system requirement
- Suggest the video card for the build

When suggest the compatible PC parts we have to check weather that part will ensure the user requirement to select part use expert system to identify whether the selected part can achieve the user requirement.

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
- 2 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 app need 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 gamming 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

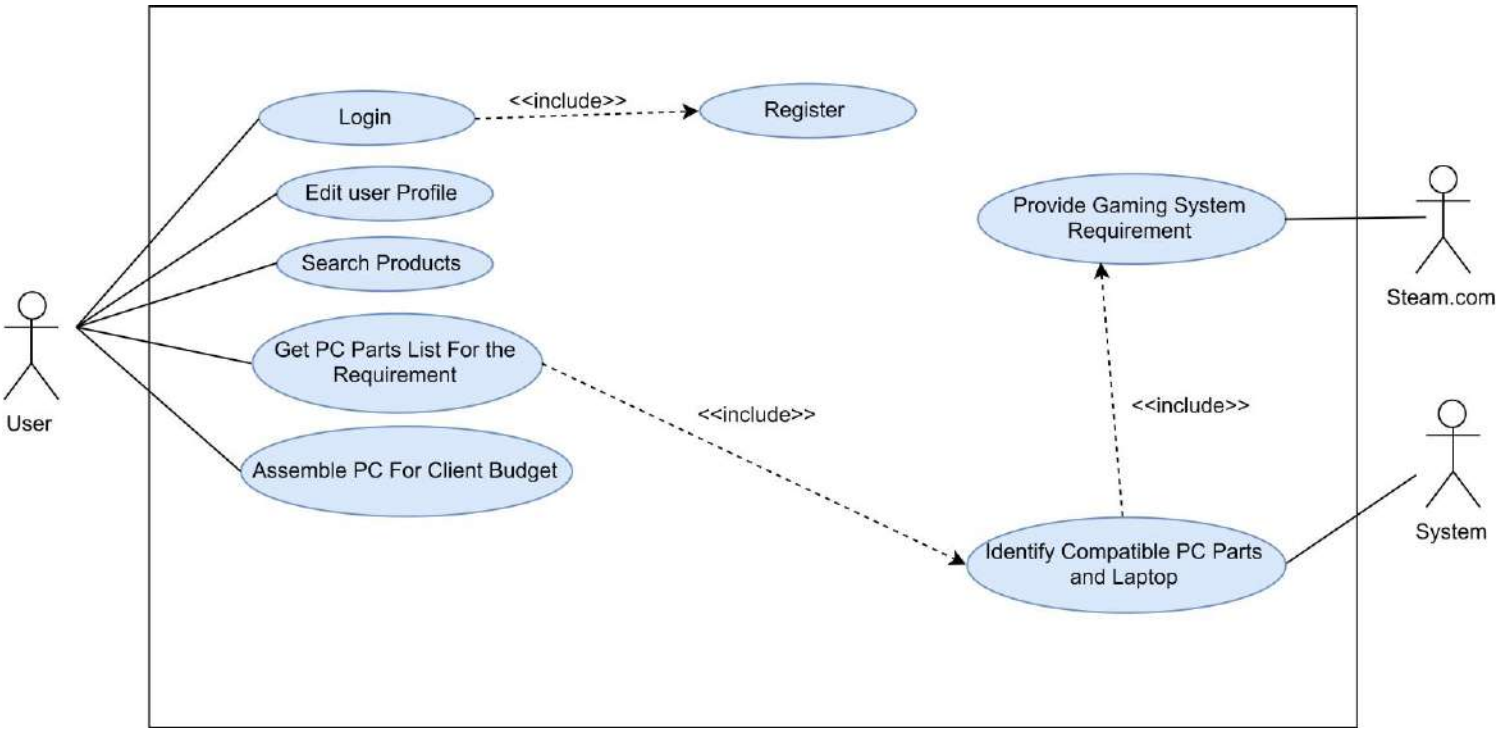

Figure 2. 1 - Use Case Diagram

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	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

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	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 Requirment

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	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 Get Game system requirement

Use case Name	Get game system requirement
Description	Get the compatible system requirement to match compatible parts
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	1. User visit the "TechRing" platform 2. Visit to build PC for requirement 3. Enter the game name 4. Get requirement by web scraping Steam.com 5. Show the complete system Requirement
Extensions	4.a 1. If user provide invalid name system prompts error message

Table 2. 5 - Use Case Scenario: Get System Requirement

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 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.

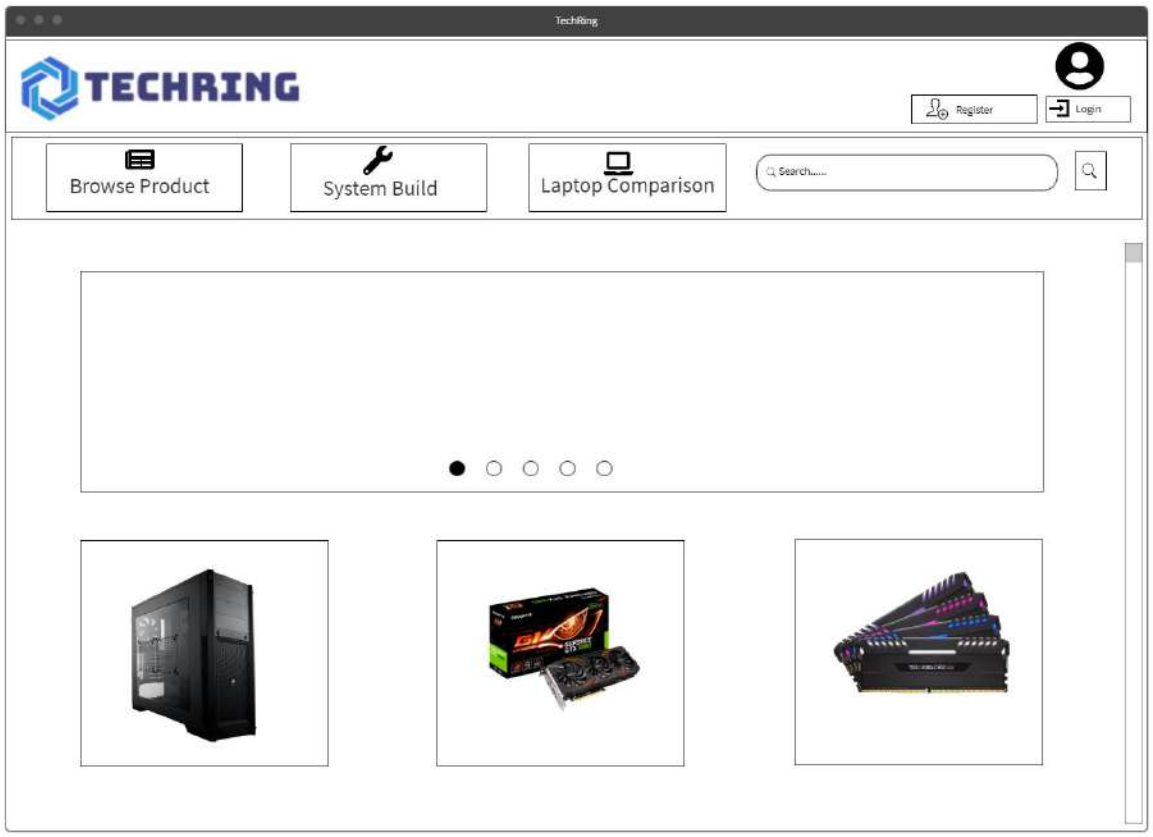

Figure 3. 1 - User Interface: Home page

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.

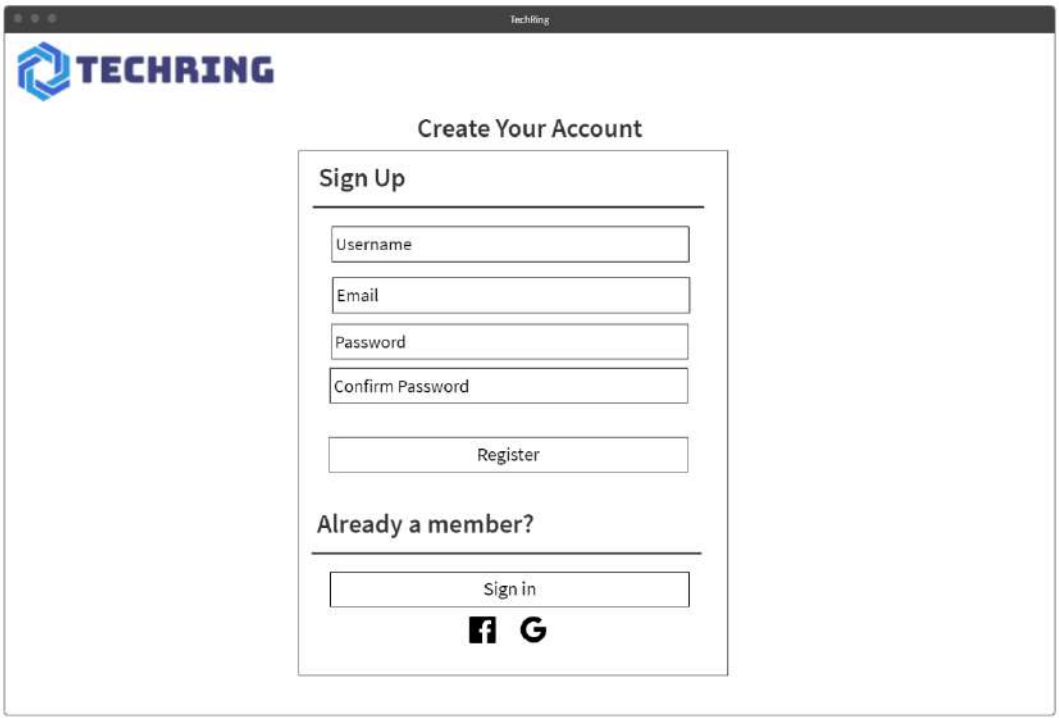

Figure 3. 2- User Interface: Sign Up

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.

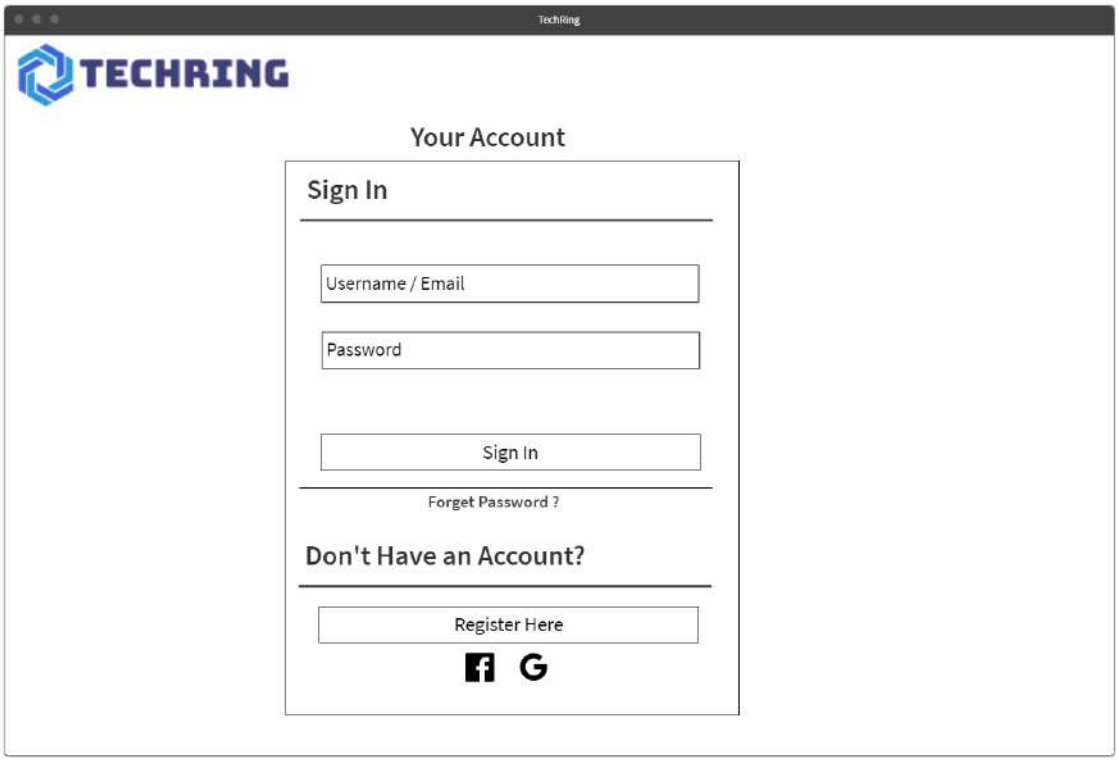

Figure 3. 3- User Interface: Sign In

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.

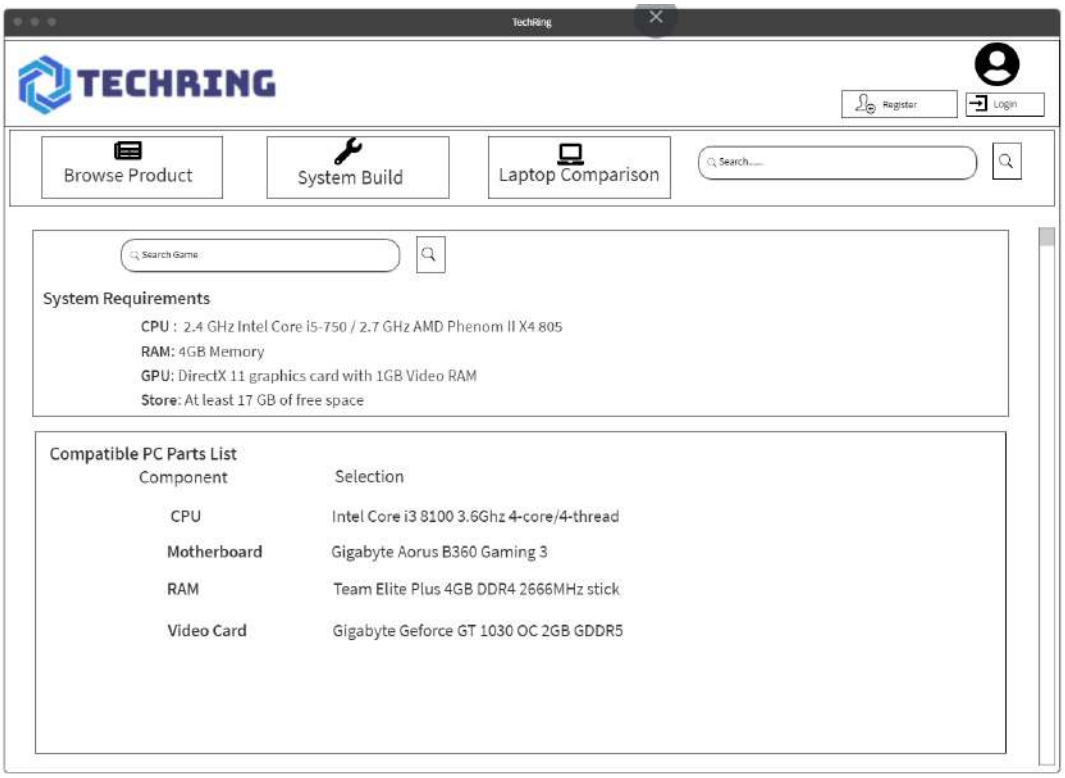

Figure 3. 4- User Interface: System Build for game system requirement

The Figure 3.4 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 PC parts to build the PC.

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

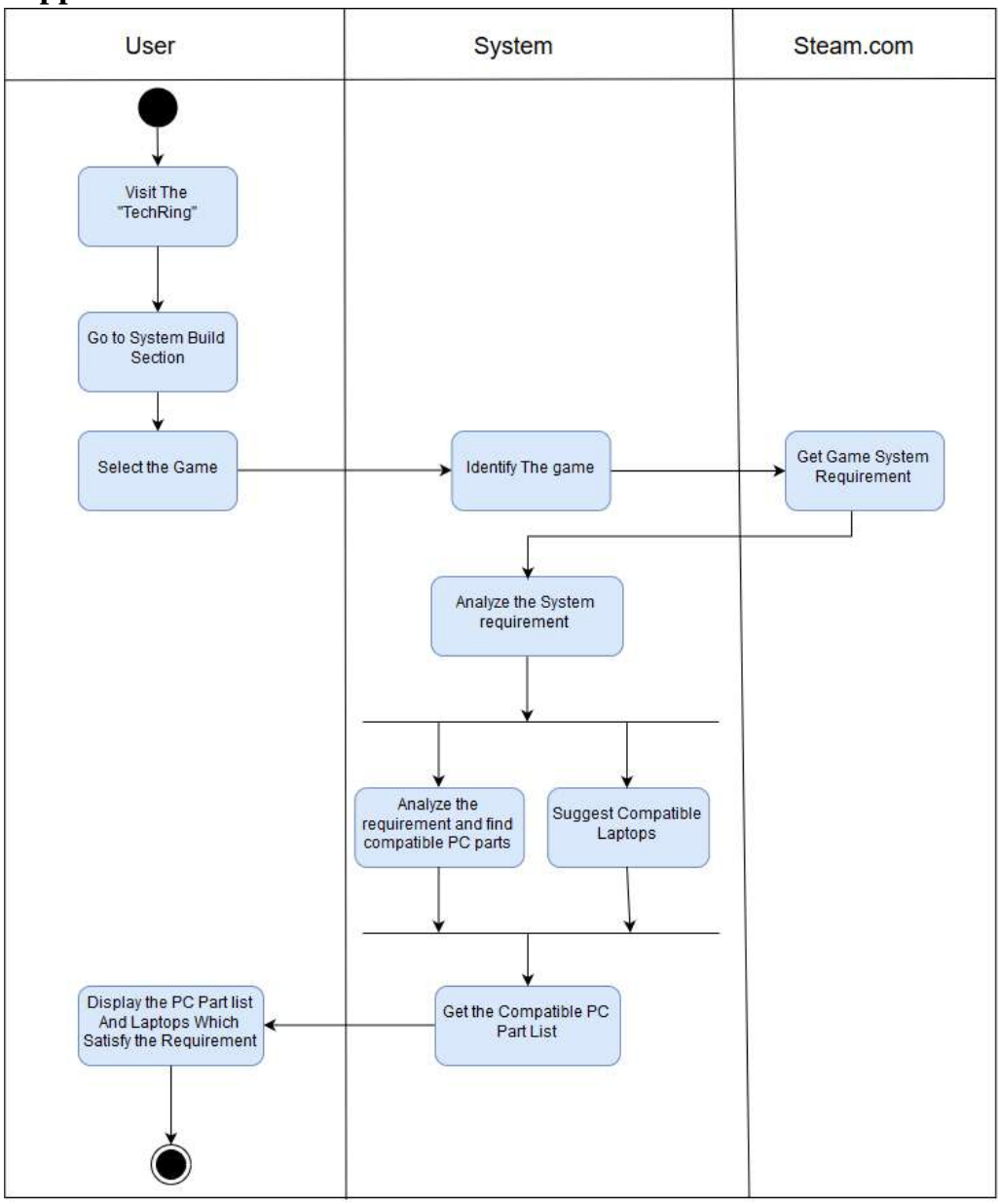

Figure 4. 1 : Activity Diagram: Get compatible PC parts for user requirement

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