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برنامج هندسة البرمجيات

PC Recommender System

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June 2020

Acknowledgement

A spatial Thanks go to Dr. Rasha Ismail for all the great efforts she has done with us along the year. For all the guidance and resources, she provided us during working with her.

Our project could not have been accomplished without the continuous support of T.A. Naglaa Fathy. So, Thank you from all of our hearts.

Abstract

In a world that most of its population are differently depending on personal computers (PC) in almost every field even the most unexpected ones. As everything is now running by a computer, many people need to purchase one. But the process of buying a PC is not that easy nowadays. Since there are many different PC parts and each part has a lot of options (e.g. there are approximately twenty companies produce RAM, each company produces from two to four different series of RAM. That is how wide it is).

PC Recommender System is developed to solve this problem and eases the PC purchasing process for users. The system targets three main types of users: one with a little knowledge of computer parts, one with a fair knowledge, and the last one with advanced knowledge of computers. It asks each user some questions about the uses a user usually needs. Then, the system processes the user's answers using some algorithms and techniques. Finally, the system simply builds the best PC depending on each user's specific personal needs and recommends that PC parts and the benchmarks of this collection of pieces.

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Chapter 1

Introduction

The introduction chapter introduces the major area that is related to the project. It begins with discussing the necessity of the project existing. After that, the chapter talks about the problem the project solves. Then the steps were taken to achieve solving the problem. Finally, it shows the organization of the document and what to expect from each chapter.

1.1 Motivation

Presently, computers are widely used in every field even the most unexpected fields. People of all ages and all backgrounds depend on computers at least once or twice a day. Some people use computers to study, others use computers to work, and also computers are great devices for entertainment as people watch movies, read books and articles, and play video games. The variety of computer's uses and benefits created a need for people to own a personal computer.

Personal computers are not purchased as a one whole device but as separated parts and then these parts are combined together in a case. Each combination has its own features and uses. And there are huge number of combinations can be made by the great variety of computer products. Not all people are computer experts, so they do not know what parts to purchase that fulfill their personal needs.

The rule of “The more expensive, the better” does not actually work in that field. As there are many high-priced computer parts that are great for some tasks but

are not so great for other tasks. The decision of buying the most expensive processor to have the best performance in all tasks is not very accurate.

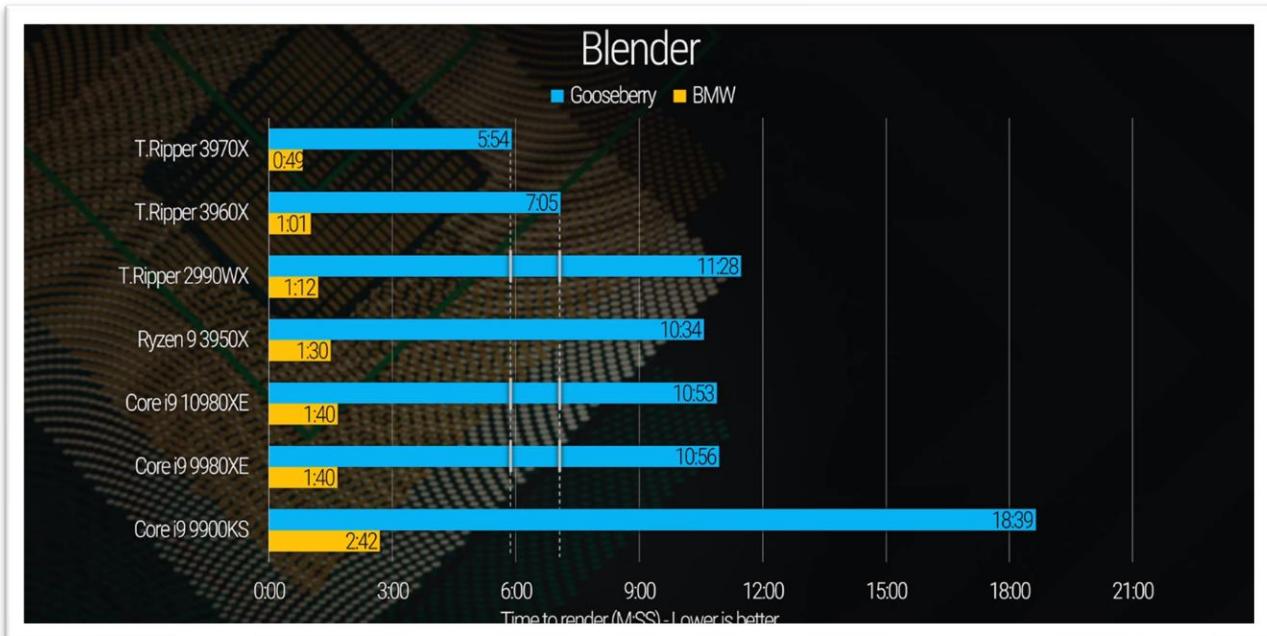


Fig. 1.1 Benchmarks of different processors

In the previous diagram, it shows the total time taken by different processors to render the Gooseberry animation using Blender. Here the **T.Ripper 3970X** takes less time than any other processor. On the other hand, the **Core i9 9900KS** takes the longest time to render. While the two previously mentioned processors worth the same amount of money (nearly 2,000 \$), they do not perform the same. Surprisingly, the **Ryzen 9 3950X** worth less than 700\$ and it takes less time than the 2,000\$ processor. And that proves the point of view discussed before. Sometimes in some specific tasks “the cheaper, the better” works perfectly.

1.2 Problem Definition

Lately, the number of different computer parts rapidly increased. Which created a serious problem and caused people confusion. The main problem is that people do not know what the most suitable parts are to buy to fulfill their needs.

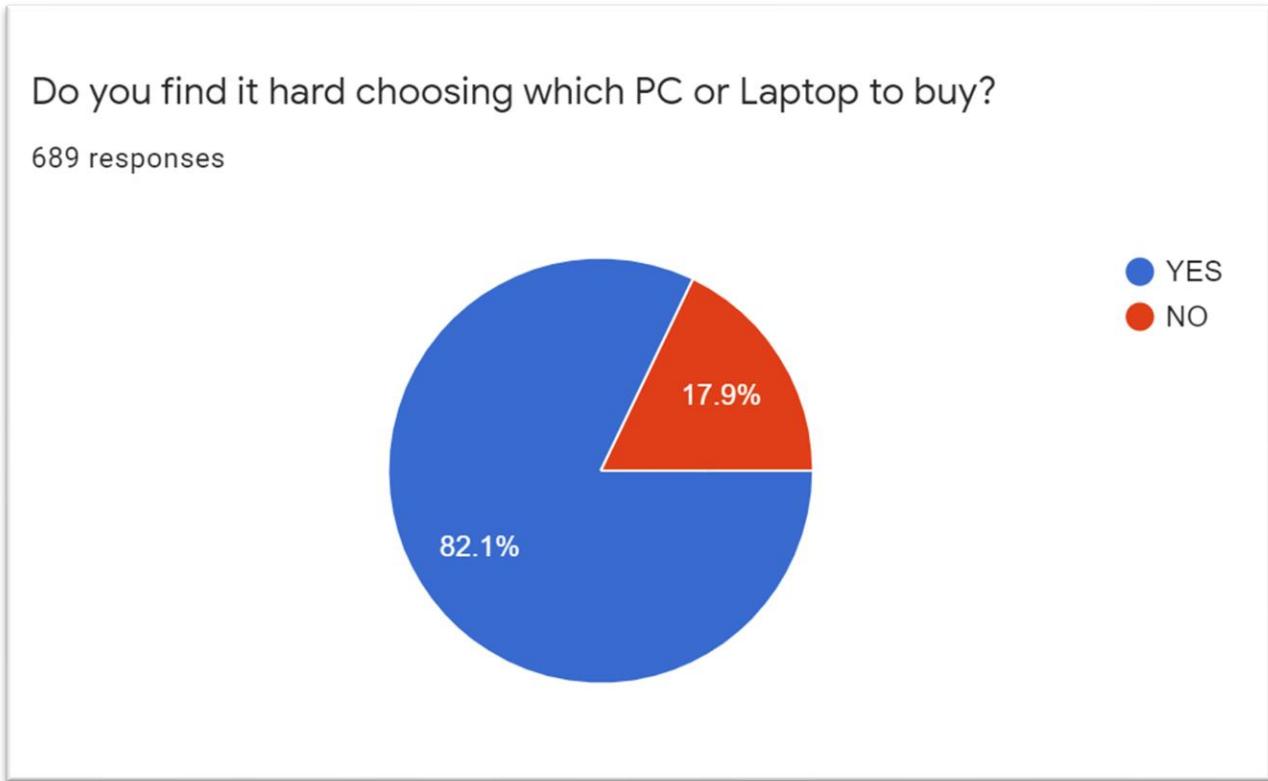


Fig. 1.2 Survey (people not knowing what to buy)

A survey has been done to ask the people whether or not did they find it hard to choose a suitable computer to buy. People responses state that 82.1% of them have a problem with figuring out the right product to purchase.

Alongside people's confusion, other problems are being noticed which are forthcoming discussed in detail:

- Wasting Money

People waste a lot of money buying the wrong parts for their personal computers. As it is mentioned before in the document, the rule “The more expensive, the better” does not always work when it comes to purchase a personal computer. Sometimes, a customer pays more money for buying the wrong product while the right, more suitable product might costs less money.



Fig. 1.3 Survey (people ignorantly wasting money)

A survey has been done to ask the people whether or not did they buy a product and found out it is not what they actually need. People responses state that 78.5% of them have wasted money buying the wrong product.

- Wasting Time

Even if a customer wants to avoid the wasting money problem, that customer will face another problem instead. It is of course wasting time searching for what's right for what that customer needs. A customer might ask a friend who

has more knowledge in the purchasing computers. But what about those other customers who do not have expert friends in the computers field? Also, one person might search the internet for the right product. Unfortunately, the internet does not have a specific place that offers such consultations.

- Scamming

Some people usually take the easy way and go for electronics store or a mall. They inform the storekeeper what they need and let the storekeeper to choose the computer parts for them. But the problem here is that not all the storekeepers are trustworthy. Some storekeepers might scam the customers and sell them an over-priced item that they do not need. Other storekeepers prefer one brand over another so they might recommend the customer an item because it is produced from their preferred brand. Also, some storekeepers lack proper knowledge. So, they might recommend a customer a wrong product ignorantly.

1.3 Objective

Our aim is to develop a **PC Recommender System** (Website) using REACT for the front-end and Mongo database for the back-end. The system will be available on the internet for all the people to use.

The system will ask the user some questions about a user's preferences and needs. Using these answers, the system will recommend the most suitable computer parts for the user. It will be user friendly to suit people who:

- Have a little knowledge of computer parts.
- Have a fair knowledge.
- Have an advanced knowledge of computers.

Creating a **Community** for users to help them communicate with each other by posting reviews about their experience of using any computer part and comment on other posts.

Having a **News** page that will contain the upcoming Computer Parts that are going to be available in the market anytime in the future. News will be posted by Admins only.

1.4 Document Organization

In this document, chapters go as follows:

Chapter 2: Background

This chapter gives an overview of the scientific background behind the project. All the concepts, algorithms, data gathering, data mining and recommender systems filtering techniques are discussed in detail. Also, description of the field, related works and similar systems.

Chapter 3: Analysis and Design

This chapter covers the outcomes of analysis and design phase. It also discusses the functional and non-functional requirements of the system. Moreover, it has the system architecture, the diagrams that were designed in the analysis phase and design of the database.

Chapter 4: Implementation

This chapter explains the system's functions, technologies, algorithms used within the project and a detailed description for the implantation of all functions.

Chapter 5: User Manual

User manual guides the user on how to use and operate every different function in the system.

Chapter 6: Conclusions and future Works

This chapter includes a conclusion of the project, a summary of what have been done and the future work that are planned to be done in the coming future.

Chapter 2

Background

In this chapter, the field and scientific background of the project, related work and similar systems are discussed in detail.

2.1. Recommender System

Recommender systems are information filtering systems that, in some ways, solve the problem of information overload by filtering the essential information fragment out of a large amount of dynamically generated information according to each user's preferences and interests. They help the user to find and select the correct items in different online websites like:

- Online shopping websites, by recommending the right products.
- Entertainment websites, by recommending the most preferred type of videos, movies or video games.
- Scientific websites, by recommending the most relevant books and articles.
- Social media, by recommending friends a user might know or pages a user might like following them.
- News websites, by recommending the topics the user is interested in.

Recommender systems are uniquely personalized information filtering systems that produce outputs of certain items that might be of interest to a certain user. It is not always necessarily that an item is equally useful to all users.

2.1.1. Phases of Recommender System

1. Information Collection Phase: In this phase, the relevant information of the users are being collected to create a user model for the recommendation tasks depending on user's behaviors, preferences and interests. A recommender system cannot work precisely until the user model is well constructed. The more information each user model has, the more accurate recommendations are produced.

Recommender systems depend on different types of input, such as:

- **Explicit Feedback:** This is the most reliable way to provide accurate data, as it does not involve extracting preferences from actions. But it also requires more effort from the user.
- **Implicit Feedback:** This does not require any effort from the user, as the implicit feedback method infers automatically with the user's actions such as: the time spent on each website, history of purchasing, navigation history and button clicks. It is not less accurate than the Explicit Feedback, but it reduces the burden on users as it does not need their direct interfering.

- **Hybrid Feedback:** This is a combination between the two previous mentioned feedback systems (Explicit Feedback and Implicit Feedback).

2. Learning Phase: In this phase, the feedback that were gathered in the previous phase are being filtered and exploited by a learning algorithm.

3. Recommendation Phase: In this phase, the system finally recommends what kind of items the user might prefer or find them more suitable for him.

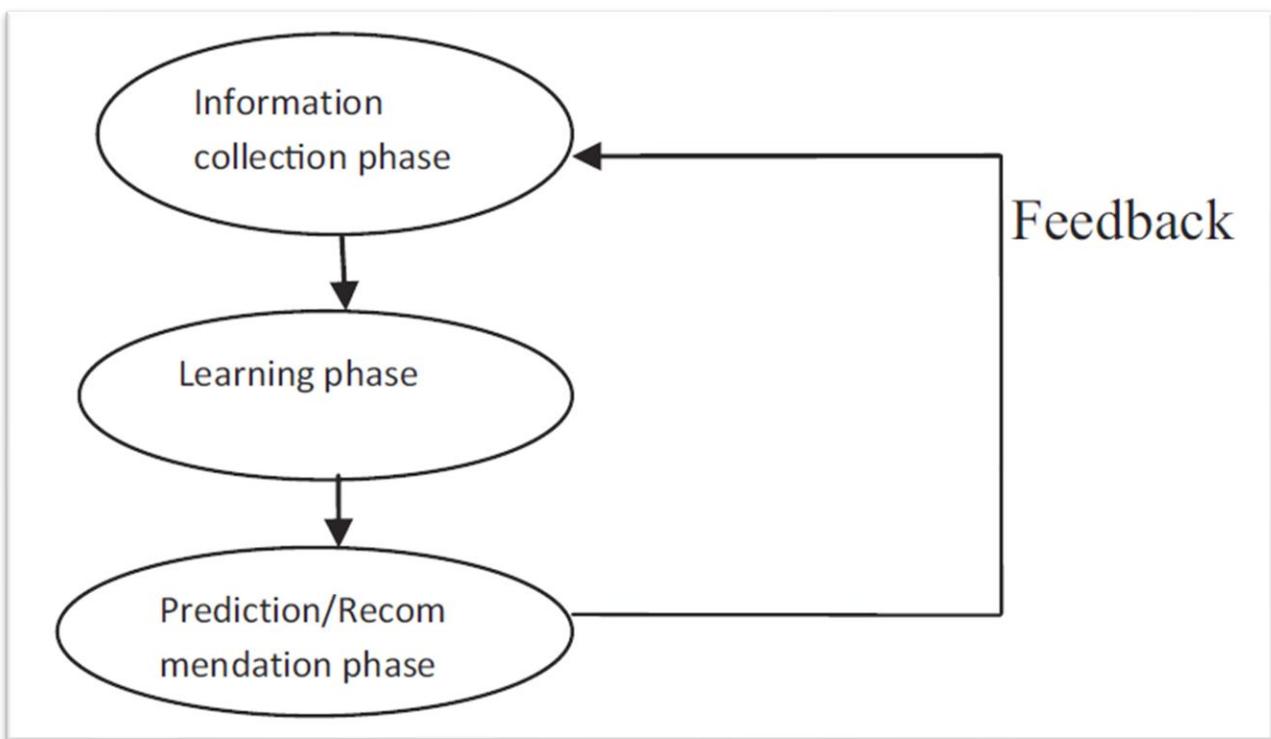


Fig. 2.1 Recommendation Phases

2.1.2. Recommendation Filtering Techniques

There are different recommendation techniques and each technique has its own features and uses. So, it is very important to choose the most accurate recommendation technique for the current scenario. In figure 2.2 (Fig. 2.2 Recommendation Techniques) shows the anatomy of different recommendation filtering techniques.

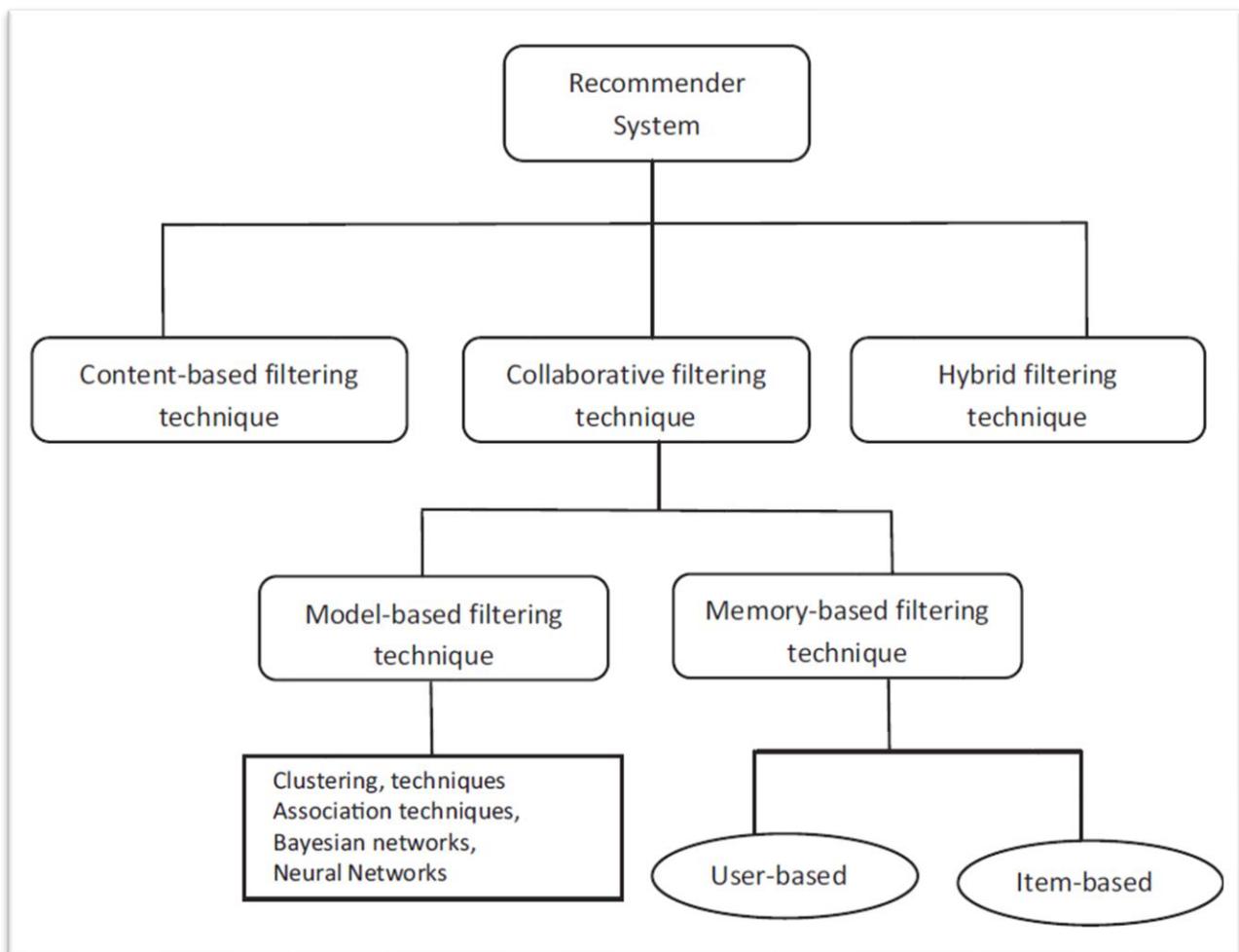


Fig. 2.2 Recommendation Filtering Techniques

- 1. Content-Based Filtering:** Content-based technique is a domain-dependent algorithm and it emphasizes more on the analysis of the attributes of items in order to generate predictions. It is the most successful technique when it comes to recommending documents like news, web pages and publications.
- 2. Collaborative Filtering:** Collaborative filtering is a domain-independent prediction technique for content that cannot easily and adequately be described by metadata such as movies and music. Collaborative filtering technique works by building a database (user-item matrix) of preferences for items by users. It then matches users with relevant interest and preferences by calculating similarities between their profiles to make recommendations.

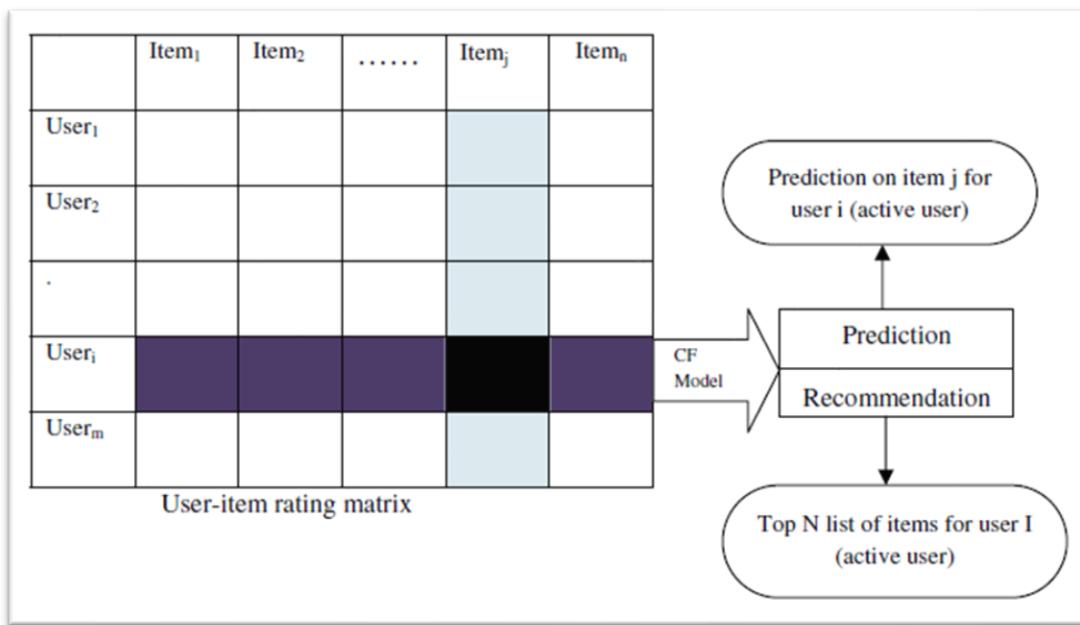


Fig. 2.3 Collaborative Filtering Technique

3. Hybrid Filtering: Hybrid filtering technique combines different recommendation techniques in order to gain better system optimization to avoid some limitations and problems of pure recommendation systems. The idea behind hybrid techniques is that a combination of algorithms will provide more accurate and effective recommendations than a single algorithm as the disadvantages of one algorithm can be overcome by another algorithm.

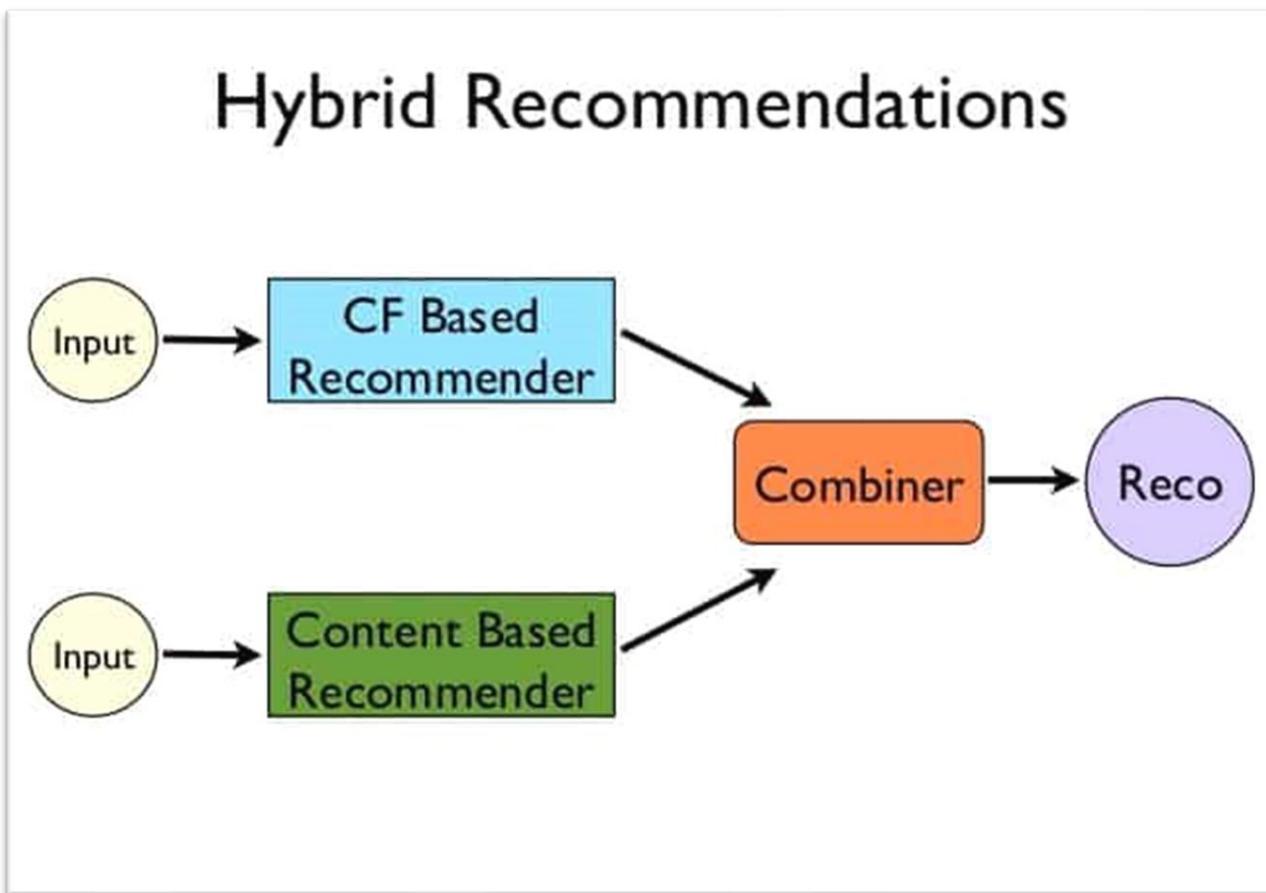


Fig. 2.4 Hybrid Filtering Technique

2.1.3. Similar Systems That are Using Recommender System

1. MyFridgeFood

It is a system that recommends different recipes according to what ingredients do the user have inside the user's fridge.

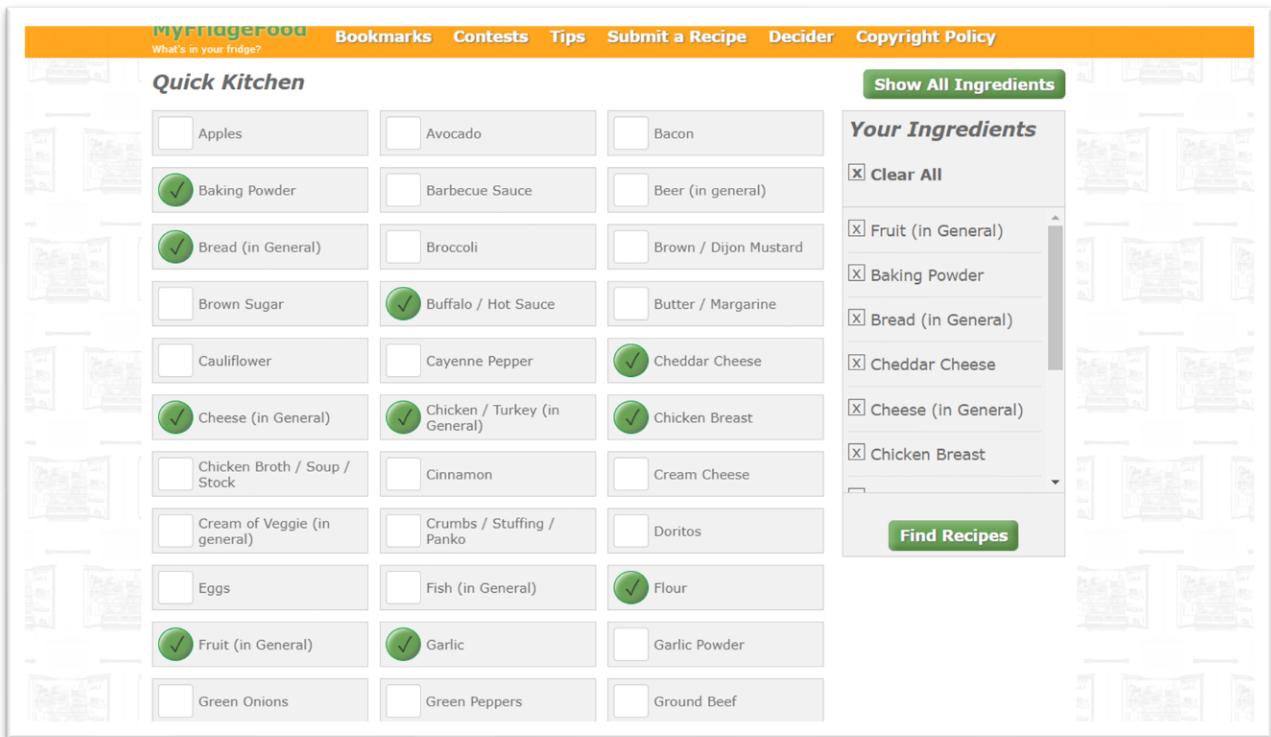


Fig. 2.5 MyFridgeFood Website



Cheddar Biscuits

Just like the Lob

Category: Salads and Sides

Cooking Time: 20 minutes

Calories: 223

Fat: 13

Carbs: 21

Protein: 7

No Missing Ingredients

[Log In To Bookmark!](#)



Basic Grilled Cheese

Some people don't even know how to make a classic

Category: Sandwiches / Burgers

Cooking Time: 10 minutes

Calories: 137

Fat: 10

Carbs: 5

Protein: 8

No Missing Ingredients

[Log In To Bookmark!](#)



Wheat Wraps

Low in Carbs for bread
18

Category: Snacks
Cooking Time: 50



Grilled Cheese Rolls

Great Twist...or Roll :)

Category: Sandwiches / Burgers

Cooking Time: 10 minutes

Calories: 137

Fat: 10

Carbs: 5

Protein: 8

No Missing Ingredients

[Log In To Bookmark!](#)



Crispy Cheese Bites

You need a frying pan...



Buffalo Chicken Grilled Cheese

Fig. 2.6 MyFridgeFood (Results Page)

2. SuperCook

This is a very similar system as MyFridgeFood. As it also recommends recipes to users depending on the food, they already have.

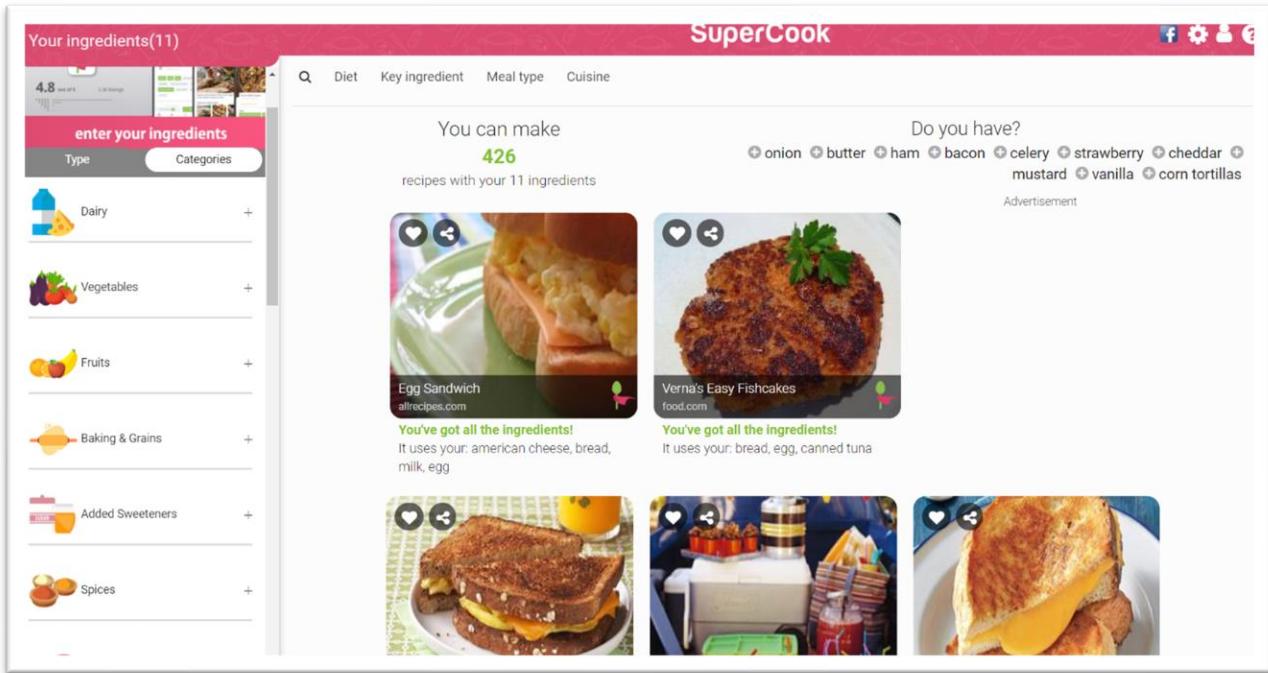


Fig. 2.7 SuperCook Website

2.2. Data Mining

Data Mining, otherwise known as Knowledge Discovery from Data (KDD), is the process of digging through data to discover hidden patterns and relations within datasets and predict future trends. It is an interdisciplinary subject as it is based upon three scientific concepts: statistics, artificial intelligence and machine learning.

2.2.1 Clustering

Clustering is very similar to classification but involves grouping chunks of data together based on their similarities. For example, you might choose to cluster different demographics of your audience into different packets based on how much disposable income they have, or how often they tend to shop at your store.

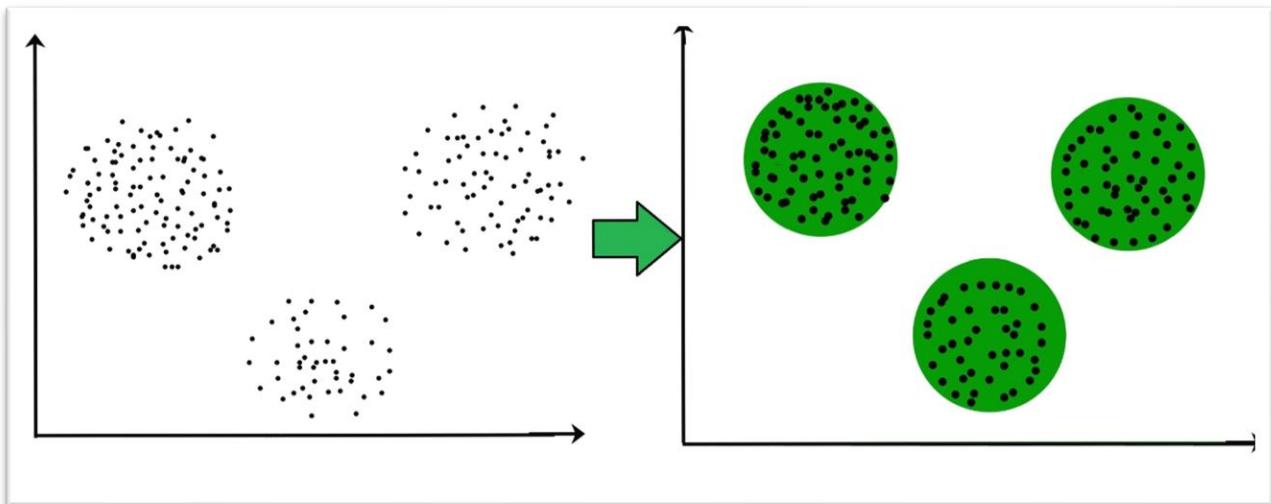


Fig. 2.8 Clustering

Chapter 3

Analysis and Design

This chapter will provide us with the outcomes of analysis and design phases. It also discusses the functional and nonfunctional requirements; it also provide us with system architectures and UMLs.

3.1 System Overview

3.1.1 System Architecture

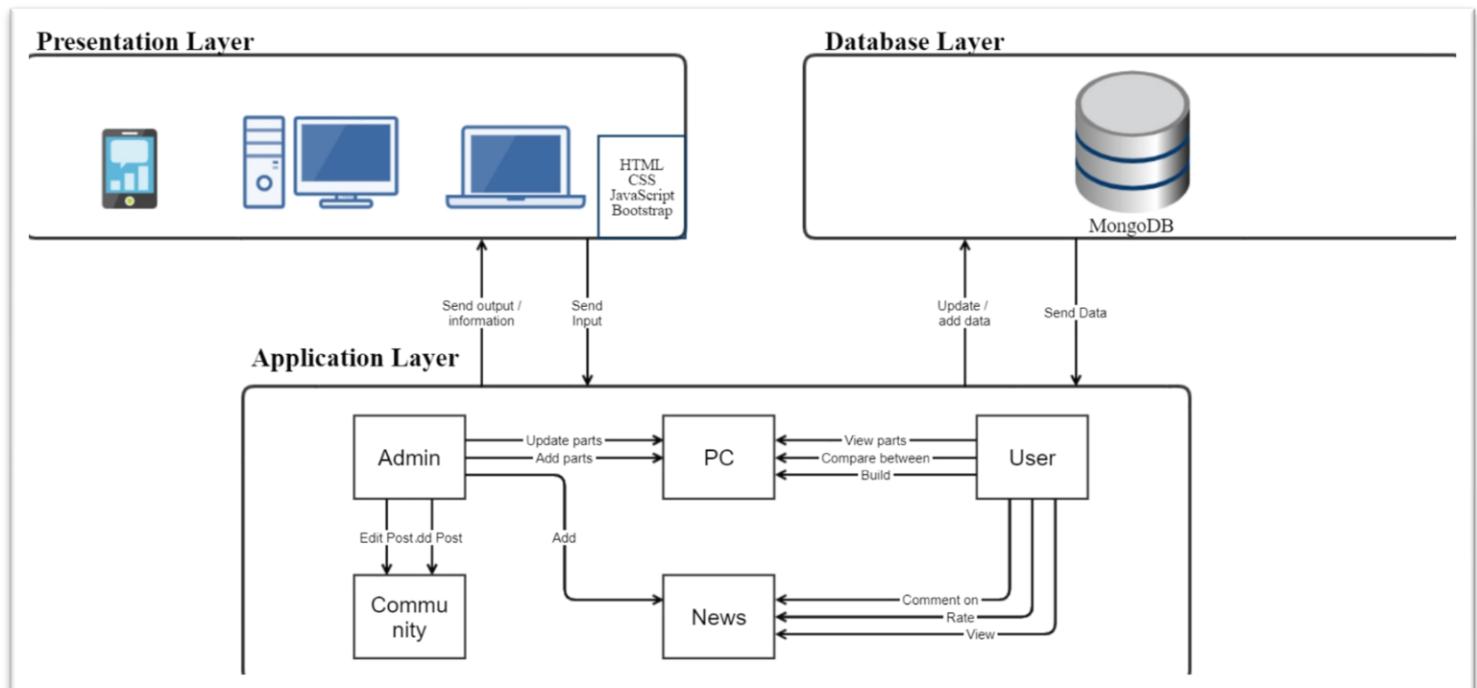


Fig. 3.1 System Architecture

Scenario

- ❖ First the user log in or register to the system and write what he wants to do.
- ❖ Then depend on the information we get from the user and collecting information about his failed and needs.
- ❖ After that depends on the information, we get the system will present the best product for him/her.

3.1.2: Functional Requirements

- ❖ **On the frontend side:**
 - User Build his own PC.
 - User want best PC.
 - Comment to posts.
- ❖ **On the backend side.**
 - Check the availability of components and can work with each other or not.
 - Recommend best PC.
 - Post any new components.

3.1.3 Nonfunctional Requirements

Security:

- The system shall ensure that only authorized users can access the user data.
The system shall distinguish between authorized and non-authorized users.

- Passwords shall never be viewable at the point of entry or at any other time.

Efficiency:

- The response between the user and the system will have the minimum time so the user can get his order faster.

Usability:

- The website shall be easy to use by adult members (age 18 to 80) of the public who may only have one hand free.
- People with no training and no fluent understanding of English shall be able to use the system.
- The user can interact with the system easily.

3.1.4 System Users

A. Intended Users:

- The system will be available for all people who want to buy new PC and cannot choose best one.
- People who works in computer science filed and do not know the best pc can do best performance.
- Users who cannot find best place to get their needs

B. User Characteristics

There are three types of user experience in PC:

- Have no knowledge.
- Have Knowledge but cannot decide.
- Have knowledge and can decide.

3.2 System Analysis & Design

3.2.1 Use Case Diagram

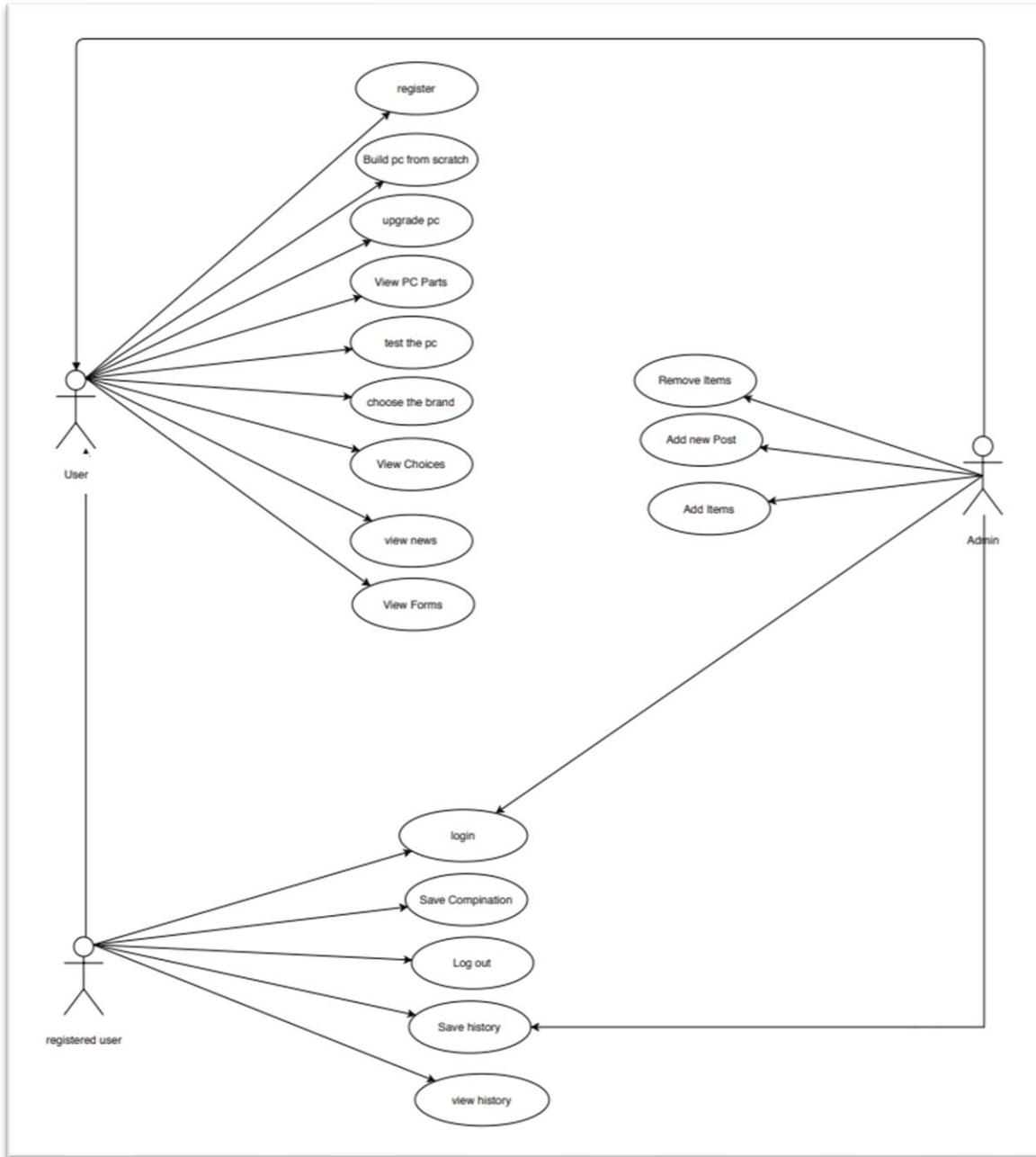


Fig. 3.2 Use Case Diagram

3.2.2 Class Diagram

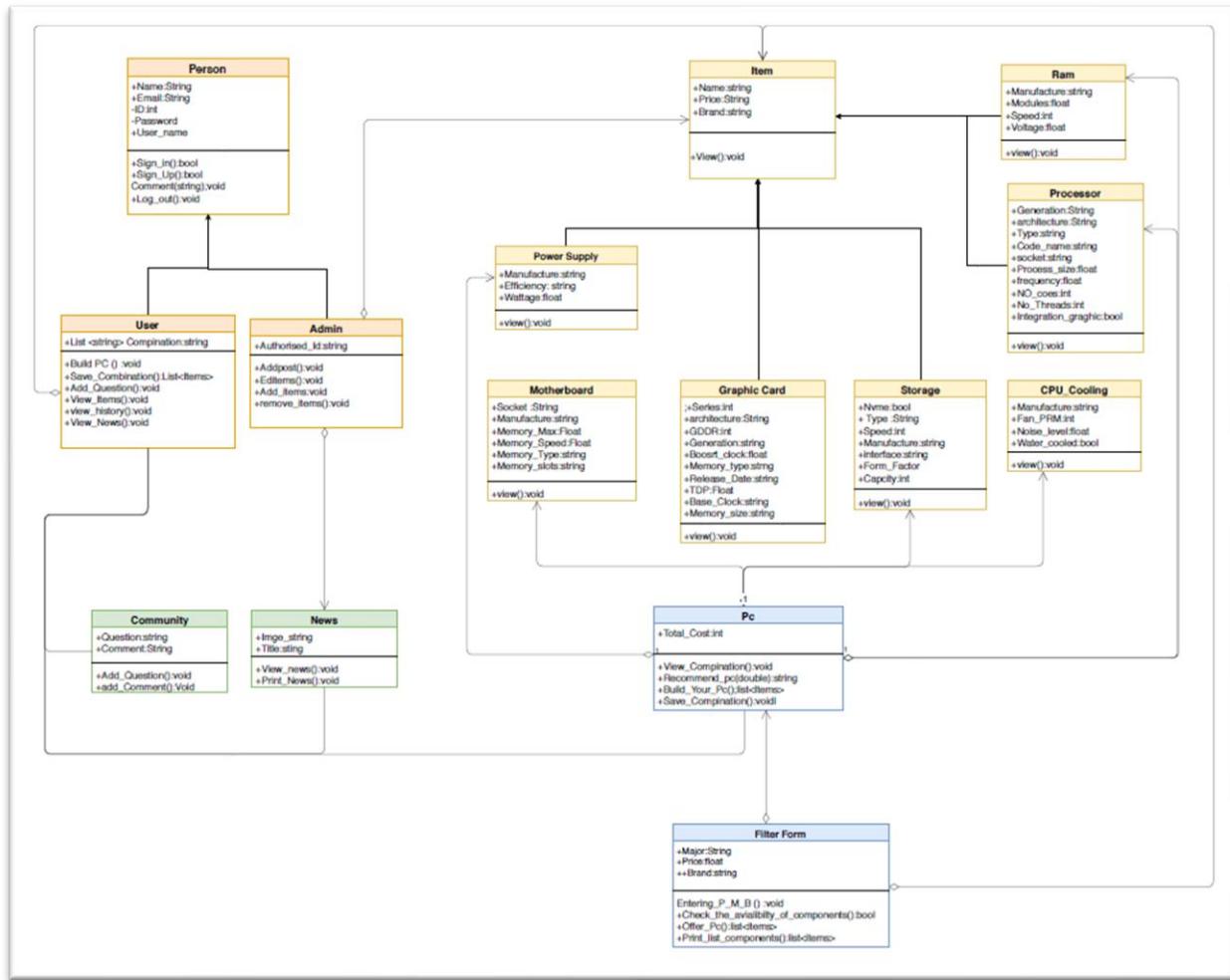


Fig. 3.3 Class Diagrams

- Person: class parent class has the main functionality and variables.
- User: child class inherit from person it has all fun and features about user and communicate with (Community Class & Laptop Class & Pc class).
- Admin: child class inherit from person it has all fun and features that the admin can do and the admin has a (News Class) because he is reasonable to do all features in the (News Class) and post all news.

- PC: it has all components classes and every component in the Pc has its own class all of the inherit from (Part Class).

3.2.3 Sequence Diagrams

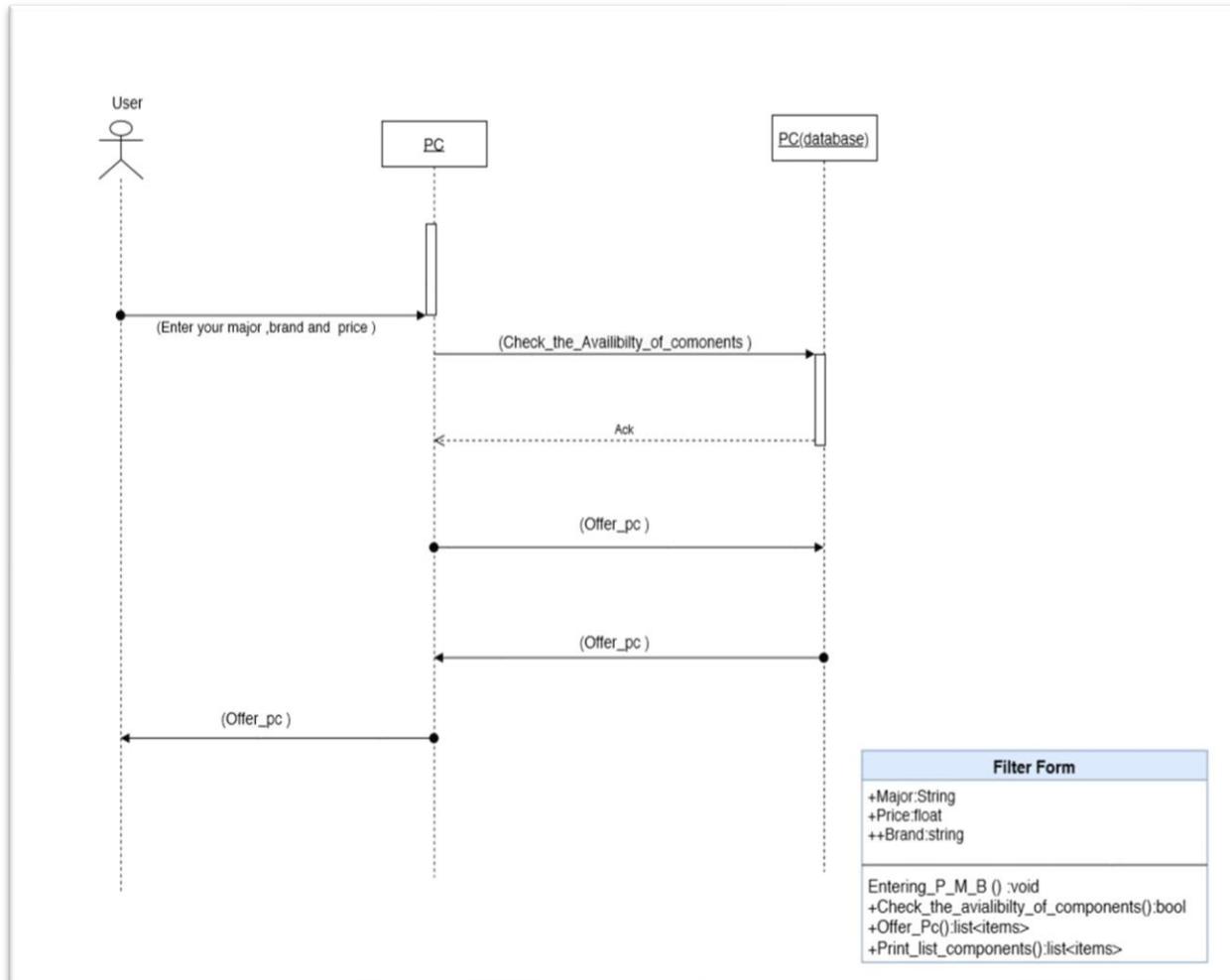


Fig. 3.4 Sequence Diagrams 1

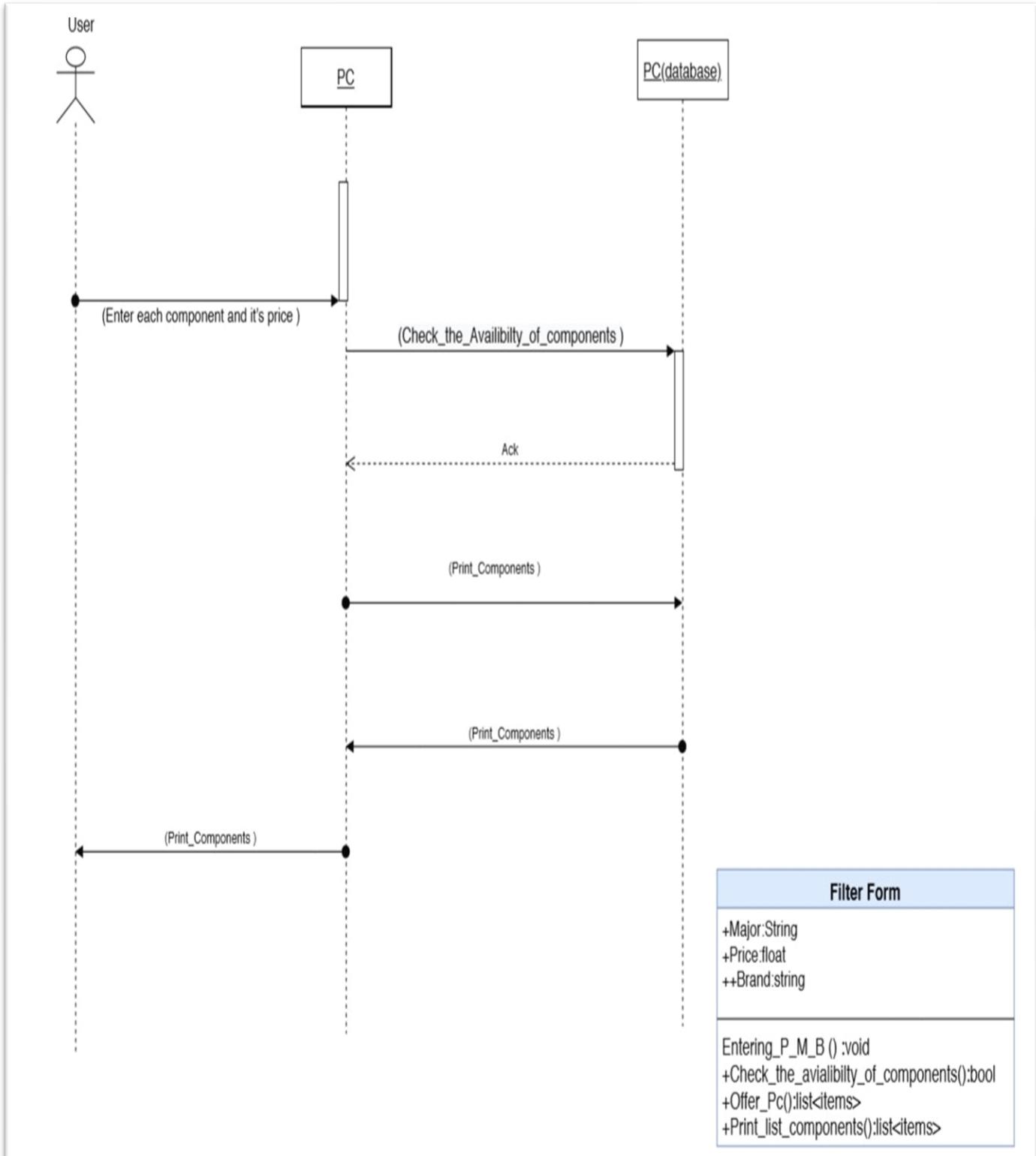


Fig. 3.5 Sequence Diagram

Chapter 4

Implementation

All the functions, new techniques, and algorithms that are used in the system is being discussed in detail in this chapter.

4.1. Authentication

4.1.1. Register / Sign-up

- There are two kinds of users who can sign up in the website:
 - Admin: an admin should have additional authentication steps.
 - User: a user can sign up by just entering the user's Name, Email, Username and Password.
- After the Admin presses the Submit button, a record will be created in the database containing the user's Name, Email,, and all his data.
- Giving the Admin the access to add new item to the Categories, adding News or posts, and editing posts.
- When a User submits his info, a record will be created in the database having all his data.
- Also, a User History record will be created for the user for the future saved combinations.
- If the sign up process is successful, the user will be moved to the main page.
- If not, then a warning message will appear to the user, telling the user what is missing in the failing process.

4.1.2. Login

- Any user can use the system without having a registered account or being logged in the system. But they will lack some functionalities in the system.
- The login process requires the user to enter Username and Password.
- Then, these data will be sent to the database looking for a match.
- If no match is found, a warning message will appear to the user alerting him that either the Username or the Password are wrong.
- If a match is successfully found, then the user data will be sent back to the front-end.
- A History tap will be added to the home page main taps.
- The History tap contains all the saved combinations the user saved before.

4.2. Admin's Functionalities

- Adding a new item to the categories. The admin adds all the item's info and sets its type, brand, price and link that item with a purchasing link.
- If an item became banned from the market and is not being produced again, an admin can remove that item from the database so it is not neither recommended or viewed to users.
- Post news, Admin can post articles and they will be appeared in the News tap for the users to read them.
- Ban users. If an admin noticed improper behavior from any user, that admin has the ability to ban that user.
- Moreover, removing user's posts or comments.

4.3. User's Functionalities

4.3.1. Build

There are three types of Build functions:

1. Beginner: This is a function that recommends a PC combination for the user after the user does some required steps:
 - First, the user will be asked to decide the budget that he wishes to get his PC at.
 - Then, chooses the user's major (Computer Science, Engineering,, etc.). If a user does not have a major, a user can choose No.
 - Choose the user's work (Game Developer, Video Editor, ..., etc.). Also, can choose No.
 - Decides whether a user will be playing video games or not.
 - After the user presses Submit, the choices a user made are being processed the recommending algorithms to finally recommend the proper PC combination.
 - The user can save the PC combination in the History by clicking on Save Combination.
2. Intermediate: This function has all the Beginner steps but added to them the following:
 - The user is asked to choose the preferred CPU brand (Intel – AMD) and the preferred Storage type (SSD – HDD).

- The same recommending algorithms will be processing the user's preferences but will exclude the non-preferred CPU brand and non-preferred Storage brand.
 - The user can then save the PC combination in the History by clicking on Save Combination.
3. Pro: In this Build function, the user is expected to have enough computer knowledge.
- The user chooses each part on his own.
 - By clicking on the dropdown menu beside each part, a function call will be sent to the database to return all the items in this part type. For example, if the user clicked on the processors dropdown menu, all the processors that are stored in the database will be viewed in the menu.
 - After the user chooses all the parts and clicks the Submit button.
 - The chosen parts will be viewed in an organized list with its name, price and a link so that if a user wants to purchase that item from an online shopping website.
 - Also, the PC combination's total price will be viewed at the bottom of the list.
 - The user can save the PC combination in the History by clicking on Save Combination.

4.3.1.1 Mechanism and Algorithm used for Build

- Priority set up for each pc component.

Based on pc user and usage, pc component's importance varies from case to another, but there are standers that might generalize all these cases.

Priority set up for components out of (10) based on field experts:

Processor and motherboard: 4 for both component

Graphic card and ram: 5 for both component

Storage: 1

- Equation for pc builds up:

($Pc = \text{processor} + \text{motherboard} + \text{Graphic card} + \text{ram} + \text{storage}$)

This is the simple form for representing a pc.

When applying priority:

($Pc = [a * \text{processor} + (4-a) * \text{motherboard} + b * \text{Graphic card} + (5-b) * \text{ram} + c * \text{storage}] / 10$).

When $a=4$

$B=5$

$C=1$

Which present division has consistency and balance.

With more selection options from user preference and components availability it gives results more accurate and satisfied for users.

4.3.2. Categories

- The user can get into the Categories tap and pick any type of items (e.g. GPU category)
- A call will be sent to the database to return all the GPU stored in the database to be viewed on the GPU Category page.
- The user can choose any item to check all its specs, price and also will be provided with a Link in case the user wants to purchase that item from an online shopping website.

4.3.3. News

The user can view News articles that were posted by admins.

4.3.4. Forum

- The user can post a question in the Forum tap. Then the question will be published and can be viewed by the other different users.
- Users can also comment to other user's questions.

4.3.4. History

- The user can add combinations by clicking on the Save Combination button after building a PC combination.
- All the saved combinations are stored in the history record in the database and are viewed in the History tap.
- Users can remove any saved PC combination.

4.4. Tools and Technologies

4.4.1 Front-End

- HTML , CSS , BOOTSTRAP , JAVASCRIPT

4.4.2 BACK-End

- NODE JS , MONGO DB

Chapter 5

User Manual

In this chapter, all the functions and design of the system is displayed as captured screenshots describing how the website operates.

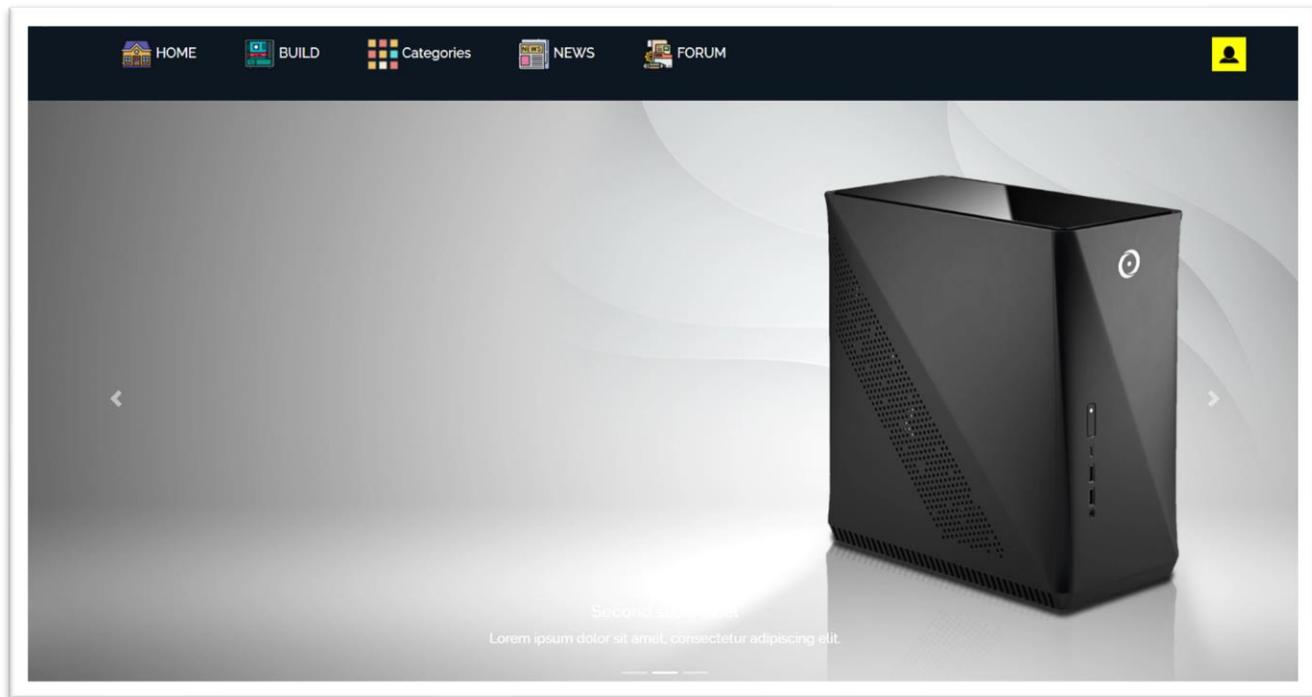


Fig. 5.1 Home Page

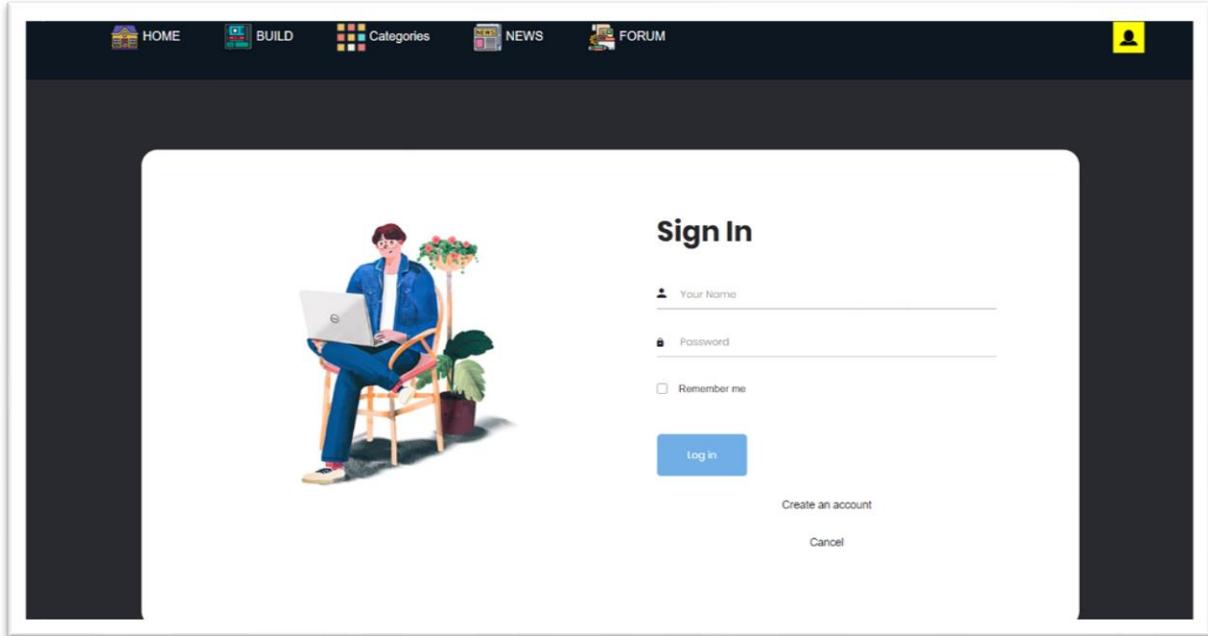


Fig. 5.2 Sign In Page

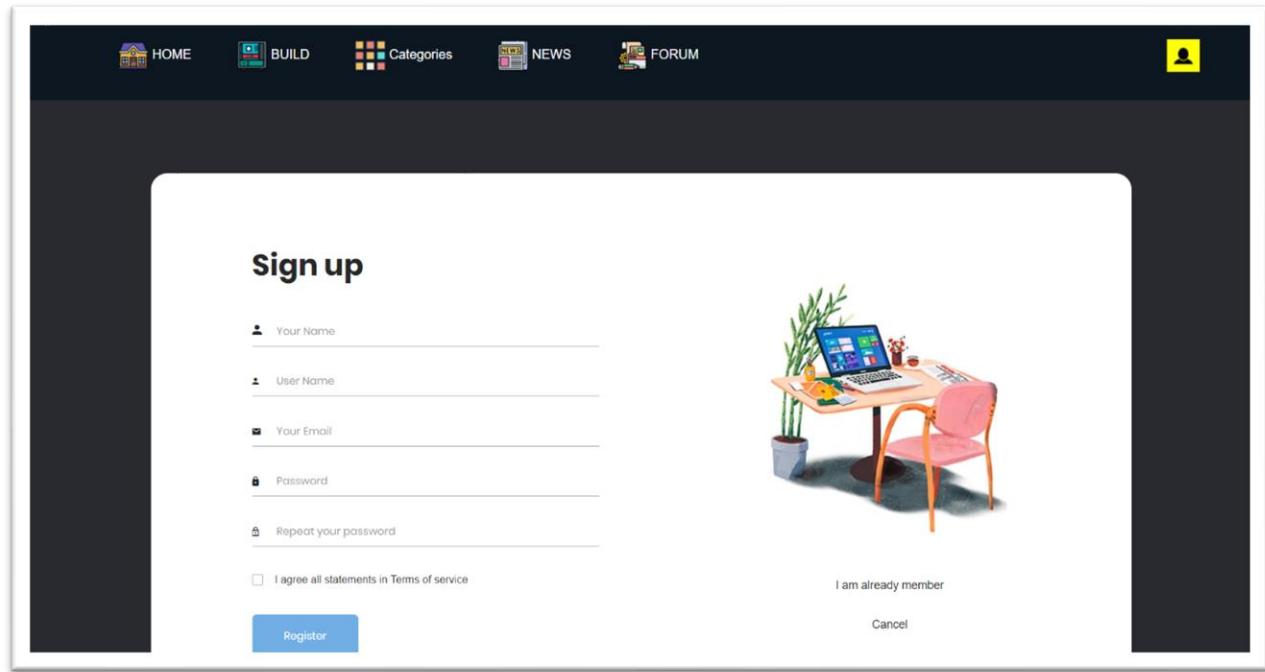


Fig. 5.3 Register Page

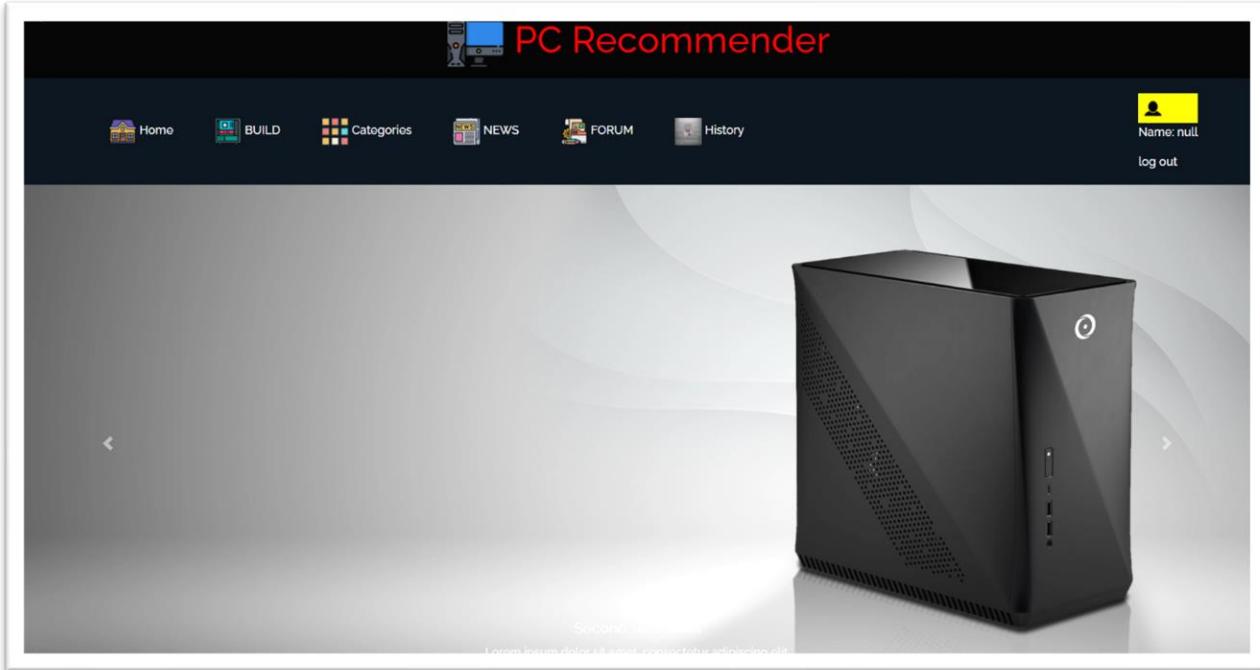


Fig. 5.4 Home Page (Logged User)

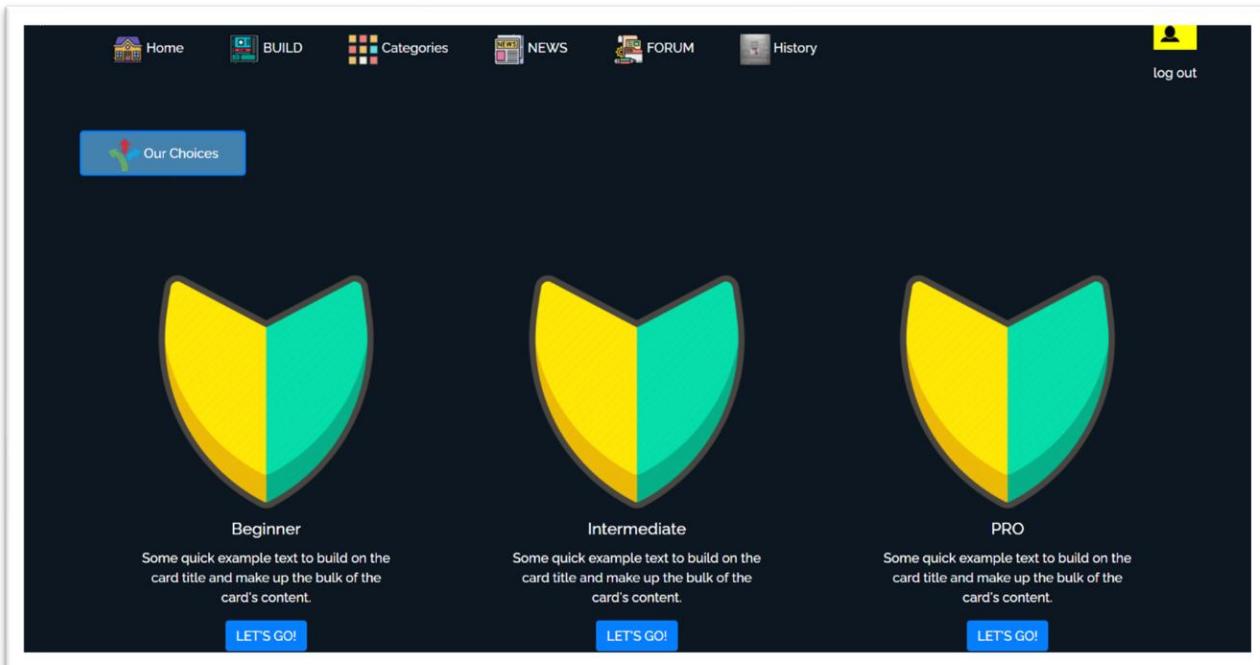


Fig. 5.5 PC Build Page

The screenshot shows a dark-themed user interface for a build page. At the top, there is a navigation bar with links for Home, BUILD, Categories, NEWS, FORUM, History, and a log out button. Below the navigation bar, the text "WHAT'S YOUR BUDGET?" is displayed in red, followed by a dropdown menu set to "500". The next section, "DO YOU HAVE A MAJOR?", also in red, contains five options: Computer Science, Engineering, Science, Graphic Design, and No. The "Graphic Design" option is highlighted with a white background and black border. The final section, "USED FOR WORK?", in red, contains five options: Graphic Designer, Game Developer, Video Editor, Data Scientist, and AI & Machine Learning. The "Graphic Designer" option is highlighted.

Fig. 5.6 Build page (Beginner – 1)

This screenshot shows the continuation of the build process. The "DO YOU HAVE A MAJOR?" section has the "Graphic Design" option selected. The "USED FOR WORK?" section has the "Graphic Designer" option selected. Below these sections, a green button labeled "Software Engineering" is highlighted. The "GAMING!" section at the bottom has two buttons: "NO" and "YES", with the "YES" button highlighted.

Fig. 5.7 Build page (Beginner – 2)

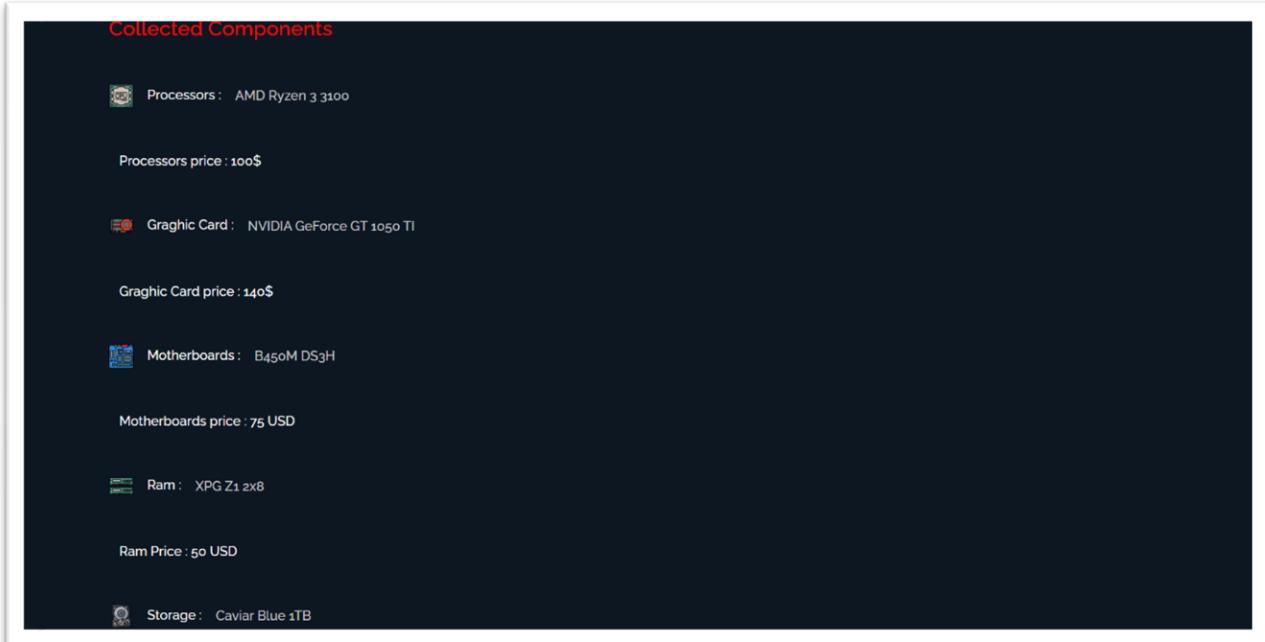


Fig. 5.8 PC Build Page (Beginner – PC Combination – 1)

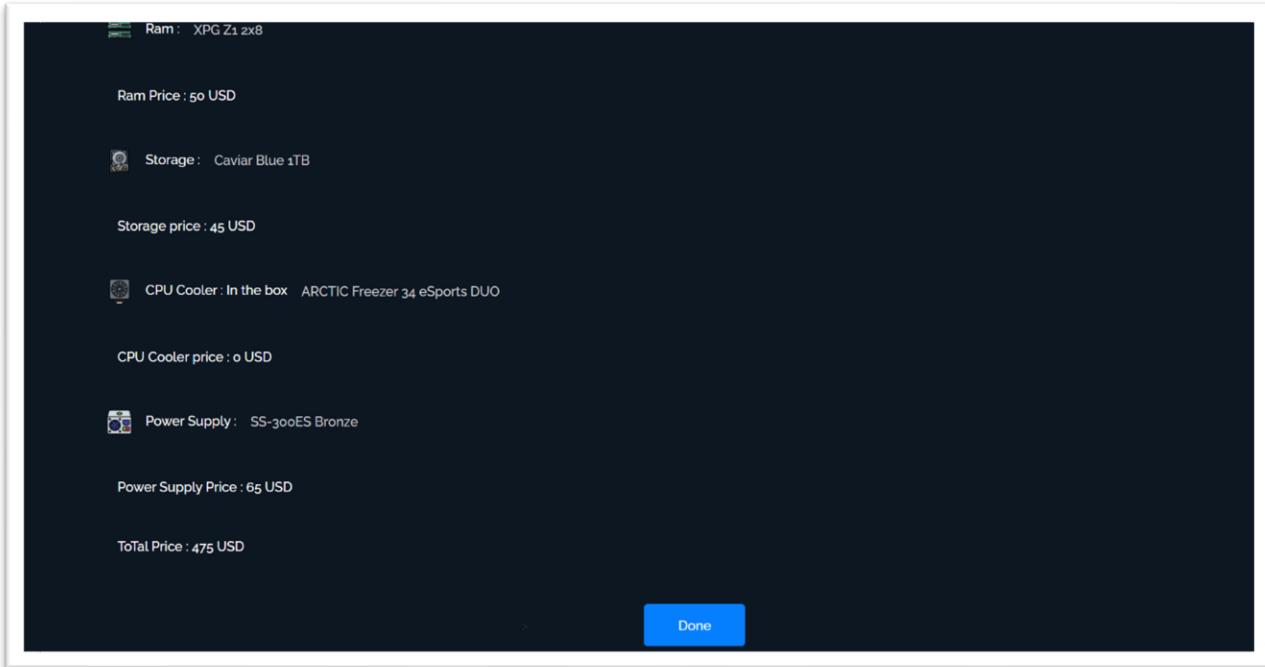


Fig. 5.9 PC Build Page (Beginner – PC Combination – 2)

1000 ▾

WHAT'S YOUR MAJOR?

Computer Science Engineering Science Graphic Design Suicidal

No

USED FOR WORK?

Graphic Designer Game Developer Video Editor Data Scientist AI & Machine Learning

Software Engineering NO

This screenshot shows a user interface for a survey or poll. At the top, there's a dropdown menu set to '1000'. Below it, a red header asks 'WHAT'S YOUR MAJOR?'. Five options are listed in rounded rectangles: 'Computer Science' (highlighted in green), 'Engineering', 'Science', 'Graphic Design', and 'Suicidal'. Below this is a long rectangular input field containing the word 'No'. Another red header asks 'USED FOR WORK?'. Five more options are listed: 'Graphic Designer', 'Game Developer', 'Video Editor' (highlighted in green), 'Data Scientist', and 'AI & Machine Learning'. At the bottom, there are two buttons: 'Software Engineering' and 'NO'.

Fig. 5.10 Build page (Intermediate – 1)

GAMING!

NO YEAH

PREFERRED CPU BRAND

INTEL AMD

PREFERRED STORAGE BRAND

HDD SSHD

submit

This screenshot shows a continuation of the survey. It starts with a red header 'GAMING!' followed by two buttons: 'NO' (highlighted in green) and 'YEAH'. Below that is a section for 'PREFERRED CPU BRAND' with 'INTEL' (highlighted in green) and 'AMD' as options. Then, for 'PREFERRED STORAGE BRAND', it shows 'HDD' and 'SSHD' (highlighted in green). At the bottom is a blue 'submit' button.

Fig. 5.11 Build page (Intermediate – 2)

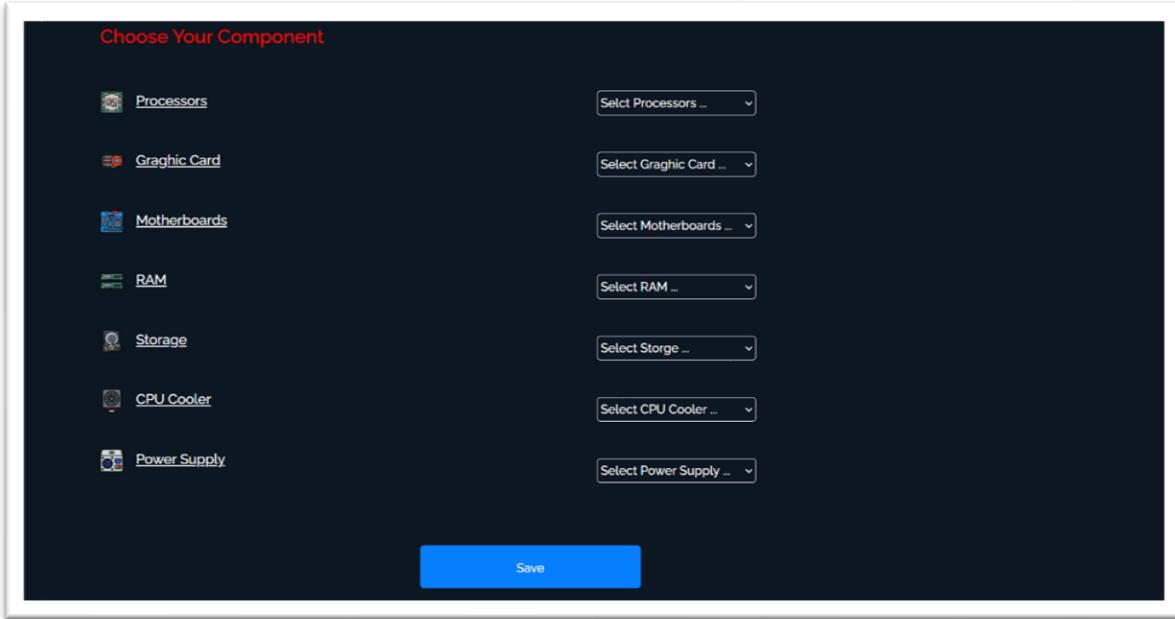


Fig. 5.12 Build page (Pro.)

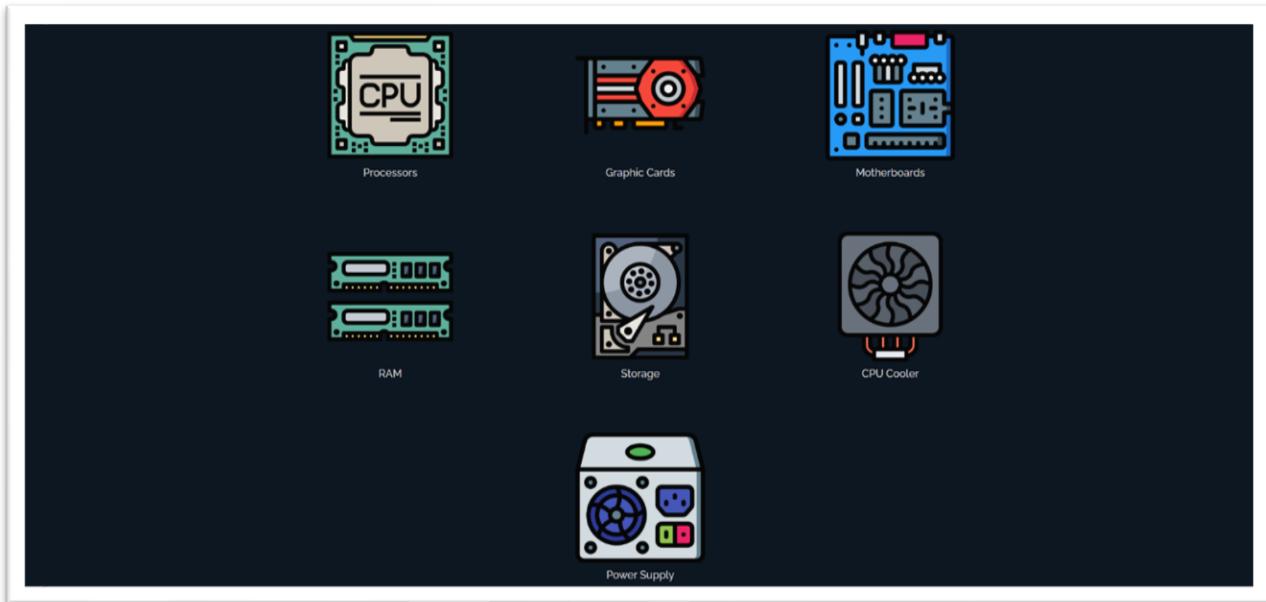


Fig. 5.13 Categories page

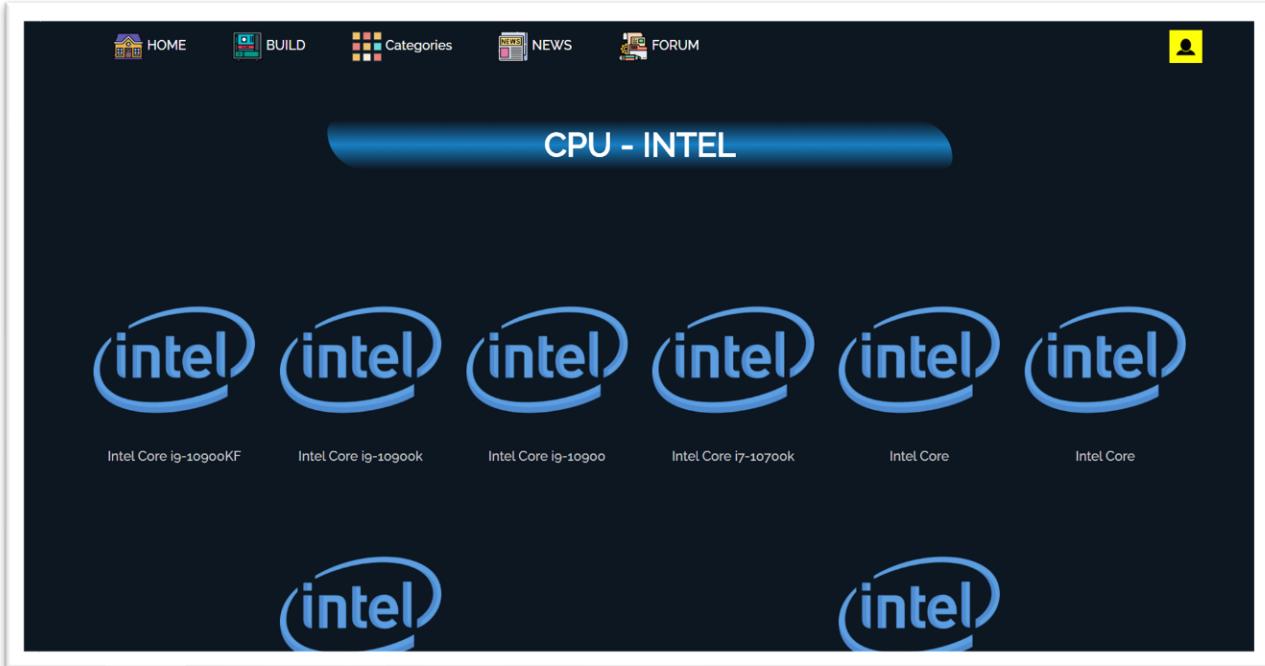


Fig. 5.14 Categories page (Processors – Intel)

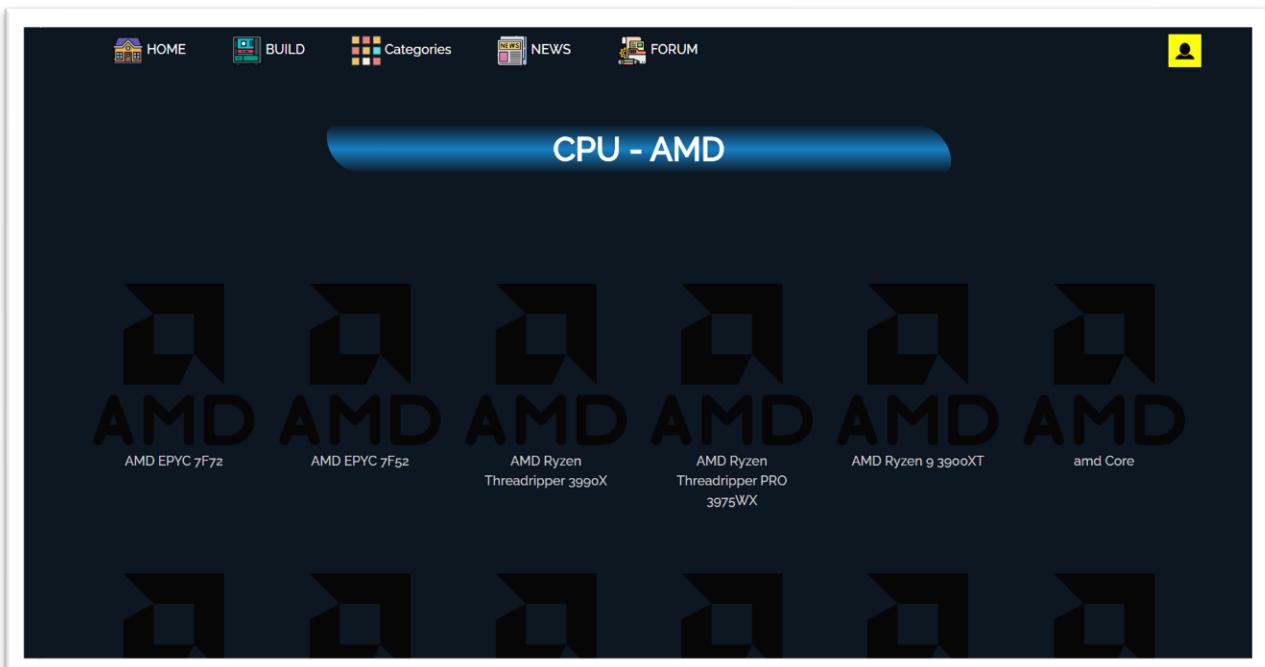


Fig. 5.15 Categories page (Processors – AMD)

Intel Core i9-10900KF		
Generation	Code Name	Socket
10th	Comet Lake	1200
Process Size	Foundry	TJMax
14 nm	Intel	100°C
Frequency	Turbo Loc	Base Lock
3.7 GHz	up to 5.3 GHz	100 MHz
TDP	NO. Cores	NO. Threads
125 W	10	20
Integrated Graphics	Release Date	Memory Support
N/A	Apr 30th, 2020	DDR4-2933 MHz
Price	Buy	
\$505	Click to BUY	

Fig. 5.16 Categories page (Processors – Intel – Details)

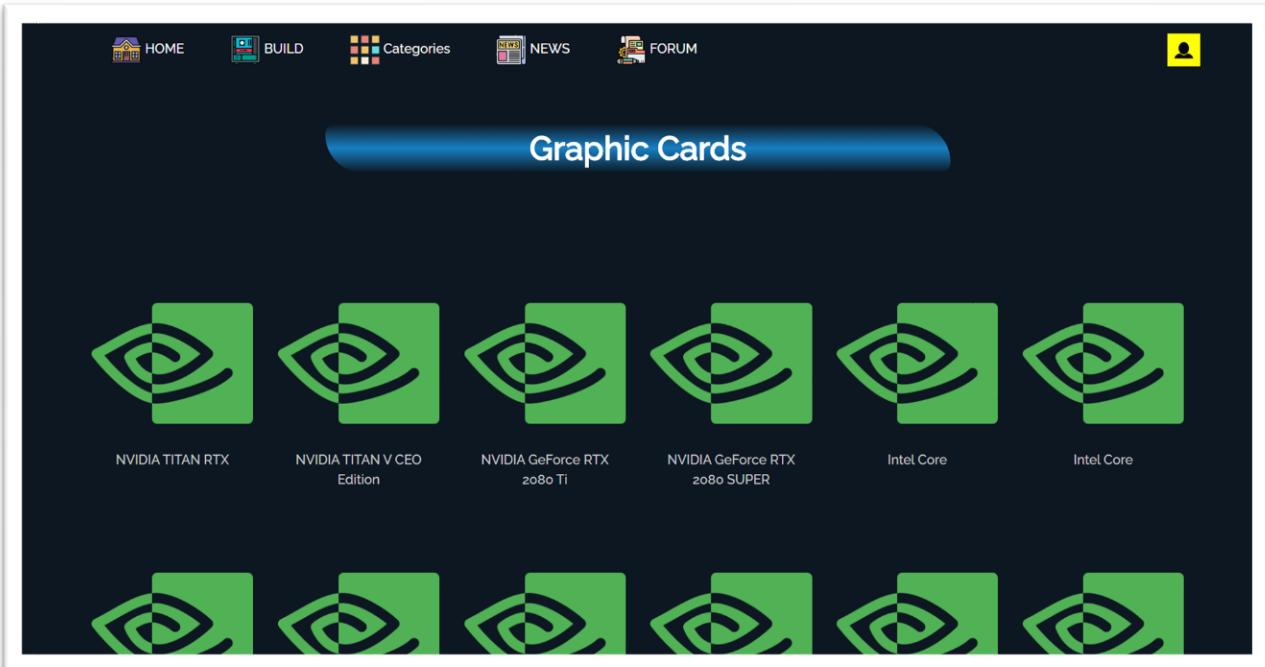


Fig. 5.17 Categories page (Graphics Cards)

The screenshot shows a dark-themed web interface titled "Your History". At the top, there are navigation links: Home, BUILD, Categories, NEWS, FORUM, History, and a log out button. Below the title, a section titled "Collected Components" lists four items:

- Processors**: Type: [empty], Price: [empty]
- Graphic Card**: Type: [empty], Price: [empty]
- Motherboards**: Type: [empty], Price: [empty]
- Ram**: Type: [empty], Price: [empty]

Fig. 5.18 History Page 1

This screenshot continues from Fig. 5.18. It shows the same collected components (Ram, Storage, CPU Cooler, Power Supply) with their respective type and price fields. Below these, there is additional information:

- Total cost:** [empty]
- Buy:** [New Egg](#)

A blue "Done" button is located at the bottom right.

Fig. 5.19 History Page 2



Fig. 5.20 News Page

Intel's next-gen gaming chips will take a huge architectural risk to rival AMD's Ryzen

Intel confirms that Alder Lake, coming 2021, will feature a hybrid computing architecture

CPU Core Roadmap					
COVES	SUNNY COVE	WILLOW COVE	GOLDEN COVE		
HYBRID	LAKE FIELD	Alder Lake	PERFORMANCE HYBRID		
MONTES	THE MONT		GRACE MONT		
			2019	Today	2021
			Architecture Day 2020		

Intel Alder Lake will be a hybrid architecture, Intel confirms. The next-generation client processor architecture, expected to arrive in the second half of 2021 for both mobile and desktop, will be a combination of two CPU architectures: Golden Cove and Gracemont. The aim is to provide an efficient answer for both high performance and high core-count processing for games and productivity tasks. In short, this is Intel's answer to high core-count AMD Ryzen chips.

Alder Lake has been rumoured to take a hybrid approach for some time, although confirmation has only come during Intel's latest Architecture Day 2020.

Fig. 5.21 News Article Page

Fig. 5.22 Forums (Register Page)

Fig. 5.23 Forums (Login Page)

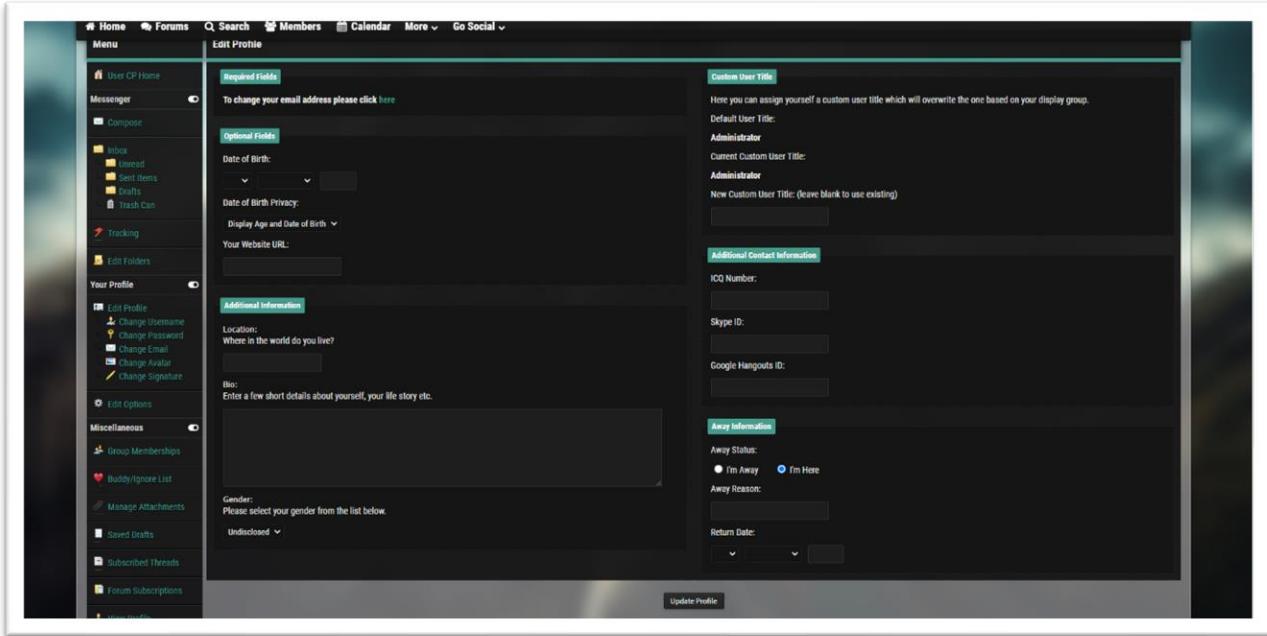


Fig. 5.24 Forums (Edit Profile Page)

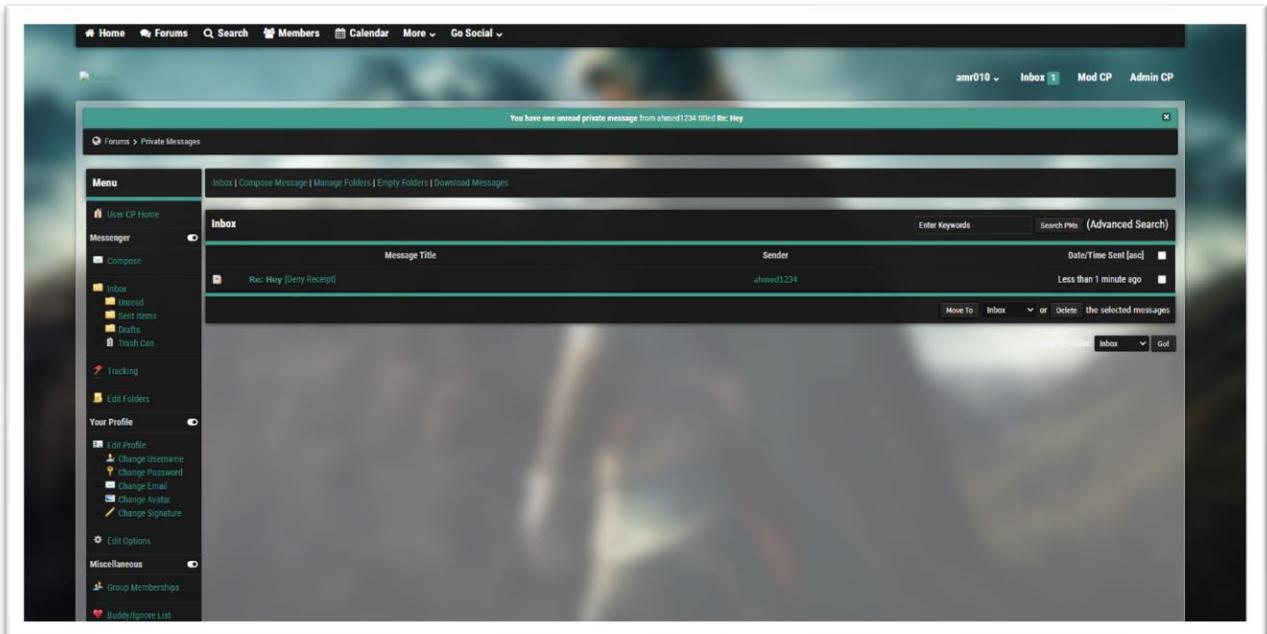


Fig. 5.25 Forums (Message Inbox Page)

Member List

Avatar	Username	Joined [desc]	Last Visit	Post Count	Thread Count	Referrals
	amr010 Administrator ★★★★★	07-29-2020, 10:36 AM	Less than 1 minute ago	2	1	0
	ahmed Junior Member ★★	07-29-2020, 11:21 AM	07-29-2020, 11:22 AM	1	1	0
	ahmed1234 Junior Member ★★	08-11-2020, 06:49 PM	6 minutes ago	1	0	0

Search Member List

Username: Website: Sort by: ascending order descending order

Contains: Sort by: Registration date

Forum software by © MyBB > Theme © Andrew 2020

Default Go

Go Social Navigation Extra Menu About us

Fig. 5.26 Forums (Member List Page)

My Category

My Forum 4 Replies 2 Topics new thread 08-11-2020, 06:52 PM by ahmed1234

Board Statistics

1 user active in the past 15 minutes (1 member, 0 of whom are invisible, and 0 guests). - See who's online
amr010

4 Replies 2 Topics 3 Members Latest User: ahmed1234 Most Online was 1

Forum software by © MyBB > Theme © Andrew 2020

Default Go

Go Social Navigation Extra Menu About us

Generated in 65 ms (61.97% PHP / 38.03% MySQL)
SQL Queries: 11 / Server Load: Unknown / Memory Usage: 2 MB
[\[Advanced Details\]](#)

Fig. 5.27 Forums (Categories Page)

Fig. 5.28 Forums (Posts List Page)

Fig. 5.29 Forums (Post with Comments)

Chapter 6

Conclusions and Future Work

6.1 Conclusions

Nowadays, personal computers have become an essential device for nearly all people. They play a huge part of people's daily life as mostly everything depends on computers. The importance of personal computers and the need of everyone to purchase his own computer has created a need of guidance.

PC Recommender System offers people the proper guidance they need to effectively choose the right, most suitable computer parts for them. By asking the users for their needs, processing these answers using some filtering techniques and algorithms calculating the user preferences, and finally give the user a PC combination that fulfills that user's needs.

Moreover, users with great knowledge in computer parts can take advantage of the system by building their own personal computer. As all the computer parts that are stored in the database will be viewed for them to choose which to choose. The system will handle the issue of parts that are not compatible together. Then, the total list of parts will be viewed in an organized list with all the details of the PC combination, total price and benchmarks of the PC performance.

6.2 Future Work

One of our future plans is to develop a Chatbot to ease the user experience on the website. So that users will not be required to go through all the detailed steps on the system. Just answering a few friendly questions, the Chatbot will ask and get the same result of the full steps process.

Additionally, supporting the system with an algorithm to search all over many online shopping websites for each item a user might choose, and offers the user the best price of them.

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