E-commerce with assistant chatBot

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TABLE OF CONTENT

1. THE DESCRIPTION OF WORK

Concept

The project envisions the creation of an E-commerce platform with a Text-Based Assistant to streamline and simplify the online shopping experience. The core concept is to depart from traditional interfaces and introduce a user-friendly approach where customers can interact with the platform through natural language prompts. The Text-Based Assistant will serve as a responsive companion, allowing users to effortlessly navigate, make informed decisions, and manage their shopping activities with ease. The overarching goal is to enhance user satisfaction and engagement in the ever-evolving landscape of online retail.

Objectives

User-Friendly Shopping: Create an interface that facilitates effortless navigation through product listings, shopping carts, and order tracking, enhancing overall user satisfaction.

Efficient Interaction: Implement a Text-Based Assistant allowing users to perform actions through simple prompts, such as clearing the cart, adding products, or checking past orders, streamlining the shopping process.

Enhanced User Experience: Focus on providing users with a seamless, enjoyable shopping experience by reducing the complexity and frustration commonly associated with traditional e-commerce interfaces.

2. PROJECT PLAN

The strategy of Work Plan

First of all, To create an E-commerce system supported by AI, we have to understand the structure and process of traditional E-commerce. That shows us the interface and functional needs of e-commerce, so we can analyze e-commerce systems easily. After analysis, we discuss the advantages and disadvantages of the usage of e-commerce functions and consider how user interactions should be in e-commerce by using artificial intelligence (AI). That consideration will first allow us to define the scope of functions in e-commerce. After defining which functions should be in e-commerce, we have to define the design tool or method to create the desired e-commerce system. That design tool or method allows an understanding of how to merge traditional e-commerce and AI to create more user-friendly interaction by using text-based and speech recognition, not interface. We use the chatbot tool that might be supported by AI named Botpress. That tool will give us a static prototype and an idea about the algorithm of our new system. After making a static prototype with that tool, we tried to apply the same but dynamic approach by using the programming language. Also, we use the same AI prompts that are used in Botpress because they are tested with Chatgpt-3.5. Python language has strong frameworks to use AI but each AI also has an API and we might use only AI API to achieve that challenge. Our system has a back-end layer communicating with AI to decide which action should be taken and a front-end layer interacting with the user to send a user request to the backend. We try to apply our strategy in that way. That plan and approach is an estimation of our challenge and something might go wrong.

Participant id	**Name**
1	**Onur**
2	**Emre**
3	**Özgürhan**

Table 2.1: Work package list

Work package No[1]	Work package title	Type of activity[2]	Lead participant No[3]	Lead participant short name	Person-months[4]	Start month[5]	End month[6]
WP1	The Analysis of the available E-Commerce systems	ANALYS	1,2,3	Emre, Özgürhan, Onur	2	1	1
WP2	Defining Scope of Actions and Functions of E-Commerce Supported by AI	SUPP	2	Emre	2	1	1
WP3	Research of design tool or method and draw process Creating Static Prototype of E-Commerce Supported by AI	SUPP	2	Emre	3	2	3
WP4	Designing System and System Architecture	OTHER	1	Onur	4	3	5
WP5	Back-end Development	DEV	1	Onur	5	5	8
WP6	Front-end Design and Development	DEV	3	Özgürhan	5	5	8
WP7	Integration and Testing	DEV	3,2,1	Özgürhan, Emre, Onur	2	6	8
				TOTAL	24		

1

2

3

4

5

Table 2.2: Work package description

Table 2.2.0 Gantt Chart

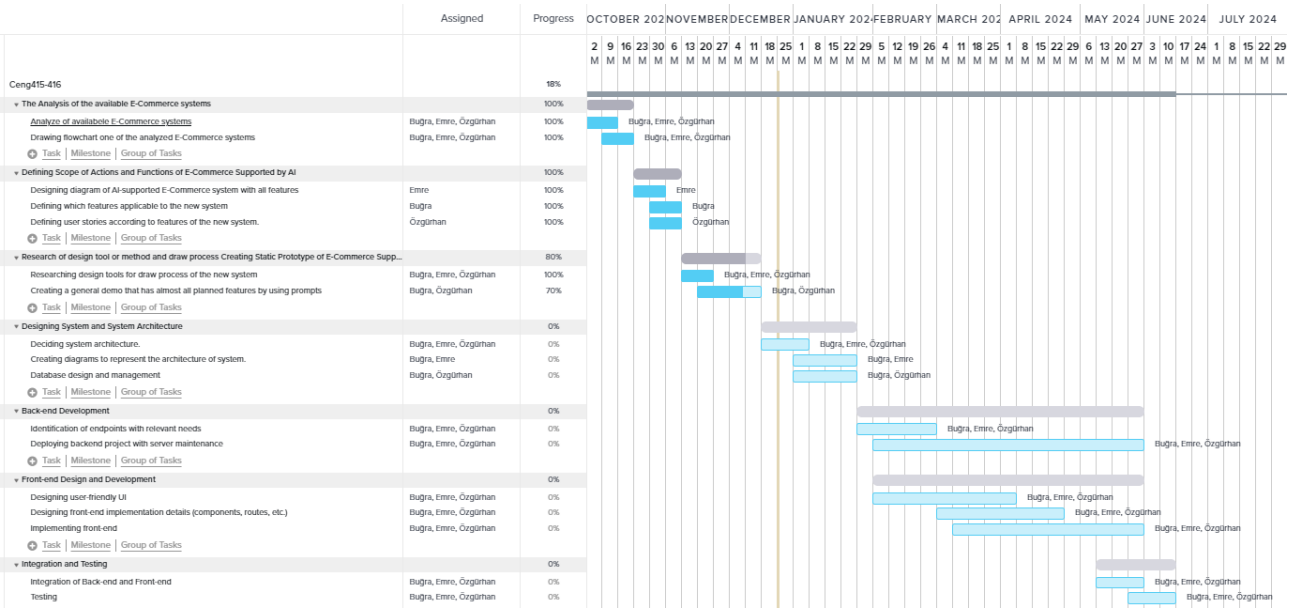


Table 2.2.1: The Analysis of the available E-commerce systems

Objectives

- Identify and document the strengths and weaknesses of the current e-commerce systems.

Description of work

- Gather user feedback on existing interfaces to uncover pain points.
- Create an AS-IS diagram for one of the current systems.

Work Product

- This visual representation will map out the current state of the chosen e-commerce system, including its components, processes, and data flows.

Validation/verification

- Leverage the diagram as a baseline for documenting future system changes.

Table 2.2.2: Defining Scope of Actions and Functions of E-commerce Supported by AI

Objectives

- Design an overall diagram.
- Analyse which features can be advantages or disadvantages.
- Define user stories of AI-supported e-commerce systems.
- Extract features of the new system.

Description of work

- Designing diagram of AI-supported e-commerce system that contains all features.
- Defining which features are applicable to the new system.
- Defining user stories according to features of the new system.

Work Product

- Overall diagram of the AI-supported e-commerce system.
- User stories and features.

Validation/verification

- Creating an experiment that has a few planned features to make by using Chatgpt.

Table 2.2.3: Research of design tool to draw process of E-commerce Supported by AI

Objectives

- Researching technologies and tools to build our product.

Description of work

- To determine possible tools and methods to show system flow.
- To choose the best one for our project and design the system flow.

Work Product

- Trying to create a demo that has a few planned features by using flowise.ai
- Trying to create a demo that has a few planned features by using botpress.

Validation/verification

- Creating a simple chat application that has a feature that text-based request is made for a product by using ChatGPT.
- Creating a more frequently testable chat application.

Table 2.2.4: Creating Static Prototype of E-Commerce Supported by AI

Objectives

- Investigate and evaluate various AI tools and frameworks suitable for building the chatbot. The focus will be on a more detailed demo application to see that strategy is suitable for the general domain .

Description of work

- Investigate small demos that have some specific features.
- Analysing whether algorithms are rational and whether they can be integrated or not.
- Testing the integration of apps with small features one by one to see the result.

Work Product
● Creating a general demo that has almost all planned features by using prompts

Validation/verification
● Requesting and searching a product with brand and features by typing in chat ● Purchasing a product by typing in chat

Table 2.2.5: Designing System and System Architecture

Objectives
● Design the overall system architecture, ensuring scalability, reliability, and maintainability. Define how different components of the chatbot will interact with the e-commerce platform and other services.

Description of work
● Deciding system architecture. ● Creating diagrams to represent the architecture of the system.

Work Product

- It is aimed to create the structure of the project according to the system architecture to be decided.

Validation/verification

- Finding the similar products or software and what type of architectures are used in them.

Table 2.2.6: Backend Implementation

Objectives

- Definition of endpoints
- Deployment of the backend project
- Management of the database

Description of work

- Identification of endpoints with relevant needs
- Deploying backend project with server maintenance
- Establishing a secure connection
- Database design and management

- Validation establish

Work Product

- A Java Spring Boot project with, which uses ElasticSearch database. To check endpoints used Postman.

Validation/verification

- routing to the right endpoints according to the data coming from the user.

Table 2.2.7:Front-end Design and Development

Objectives

- UI design
- Frontend implementation
- Create a draft

Description of work

- Designing the front-end according to creating the backend endpoints.
- Designing user-friendly UI
- Designing front-end implementation details (components, routes, etc.)
- Implementing front-end

Work Product

- Create a web application using react, a javascript library. Make it to be communicated with the backend. Getting authorization/token information for login.

Validation/verification

- User-friendly interface
- Fulfil of backend requirements

Table 2.2.8: Integration and Testing

Objectives

- To integrate front-end and back-end and optimize the system with tests.

Description of work

- Integrating products developed in the previous work package.
- Testing the system to ensure it is functioning effectively

Work Product

- Final product of project

Validation/verification

- Defined endpoints work
- Method integration
- Endpoint integration

Table 2.3 Summary of staff effort

Participant no./short name	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total person months
Onur	1	1	1	1	4	2	1	1	12
Emre	1	1	1	1	4	2	1	1	12
Özgürhan	1	1	1	1	4	2	1	1	12
Total	3	3	3	3	12	6	3	3	36

3.1 Feasibility

3.1.1 Financial Feasibility

The proposed solution is an artificial assistant-supported web application. The main issues that require financial resources are the technologies that will be used to develop and implement the project.

The main technologies to be used in this application are Java Spring Boot Framework, ReactJS, HTML, CSS, Bootstrap, and also the use of database technology elastic search. All of these technologies are open source and available for free.

Hosting services will be used to distribute the website. Since the bandwidth, storage, memory, and processing power required for the first version of the project are not high, free hosting service will be used for the first version of the project. After the first release, a paid hosting service may be required depending on the number of daily visitors, average page views per visit, requests sent by visitors per transaction with the artificial assistant, and changes in page size or memory requirements in subsequent applications.

Summarily, based on the issues discussed and explained above, it can be said that this project is financially feasible.

3.1.2 Legal Feasibility

Web-based media laws, permits, and copyright issues will not be shared by 3rd party. These topics will be taken into account before, during, and after the development of the project. All tools,software, and services to be used for this project will be completely legal. Profile information will be visible only to the admin and themself. The user will be informed before registering(KVKK).

3.1.3 Schedule Feasibility

The developer team will meet at least twice a week until the project is complete. A gathering will be held with our advisor and industry advisor once a week until the project is complete.

The following topics will be discussed at this meeting:

- The progress of the project
- Future works
- Suggestions
- Requests will be discussed.

The end of the meeting topics will be recorded and shared with our advisor.

3.2.1 Use Case - User Login

Use Case ID:	UC-1		
Use Case Name:	Login		
Created By:	Buğra Onur Genç	Last Updated By:	
Date Created:	18.10.2023	Date Last Updated:	

Actor:	Customer
Description:	This use case describes a user logging into the system.
Preconditions:	1-The user must have a verified account in the system. 2-The user must log in with a valid email and password.
Postconditions:	When the user logs in successfully, the system is redirected to the home page.
Priority:	High
Frequency of Use:	High
Normal Course of Events:	1-The user starts the application. 2-The user prompts the "Sign In" option. 3-The user fills in the email and password fields. 4-The user prompts the "Sign In". 5-The system verifies the user's information and allows them to log in. 6-The user logs in successfully and is redirected to the home page.
Alternative Courses:	In step 5, if the system cannot verify the user's information, the system displays an error message and tells the user to try again.
Exceptions:	If the user leaves his email or password blank, the system shows an error message and does not allow him to log in. If the user does not use the @ sign when entering his e-mail address, it will display an error message and will not allow him to log in to the system.
Includes:	-
Special Requirements:	Encryption should be used to ensure the security of the user's password.
Assumptions:	Users are assumed to have unique emails. It is assumed that users will keep their passwords secret.
Notes and Issues:	-

3.2.2.Use Case-User Register

Use Case ID:	UC-2		
Use Case Name:	Register		
Created By:	Buğra Onur Genç	Last Updated By:	
Date Created:	18.10.2023	Date Last Updated:	

Actor:	Customer
Description:	This use case describes new users signing up to the system using email accounts.
Preconditions:	-
Postconditions:	When the user logs in successfully, the system is redirected to the home page.
Priority:	High
Frequency of Use:	Low
Normal Course of Events:	1-The user starts the application. 2-The user prompt the "Sign Up". 3-The user fills in the necessary information (name, surname, email address, password,phone). 4-The user prompt the "Sign Up". 5-The system verifies the entered data and registers the user in the system. 6-The user successfully becomes a member and is automatically logged into the system.
Alternative Courses:	-
Exceptions:	If the user leaves the required information missing (name, surname, email address, password,phone), the system displays an error message and does not allow the membership process. If there is an email address already registered in the system, the system will return an error message that this email address is already in use. If the user does not include the @ sign in the email address, the system sends an error message.
Includes:	-
Special Requirements:	Encryption should be used to secure the user's password. It is assumed that users' email addresses must be unique.
Assumptions:	It is assumed that users have access rights to the e-mail addresses they log in to. It is assumed that users must verify their email during the membership process.

Notes and Issues:	It is used to register users who want to use the system.

3.2.3.Use Case-User Search for Product

Use Case ID:	UC-3		
Use Case Name:	Search for product with natural language input.		
Created By:	Emre Yurdagül	Last Updated By:	
Date Created:	18.12.2023	Date Last Updated:	

Actor:	Customer
Description:	This use case describe displaying product according to user input
Preconditions:	The customer must be on Homepage.
Postconditions:	-
Priority:	Medium
Frequency of Use:	High
Normal Course of Events:	1-The customer accesses the e-commerce system. 2-The customer is on the AI assistant 3-The customer prompts for searching product. 4-The system detects intent as searching product and lists products related to given prompt.
Alternative Courses:	AC-1: If the user does not specify anything about the product. Ask a question again about what kind of product you want to buy
Exceptions:	
Includes:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

3.2.4.Use Case-User Changing filter while listing products

Use Case ID:	UC-4		
Use Case Name:	Search for more specified product with changing filters.		
Created By:	Emre Yurdagül	Last Updated By:	
Date Created:	18.12.2023	Date Last Updated:	

Actor:	Customer
Description:	This use case describe managing filters of product search
Preconditions:	The customer must be searched something.
Postconditions:	-
Priority:	Medium
Frequency of Use:	High
Normal Course of Events:	1- The customer seeing products. 2- The customer enters specific details about requested product. 3- System analyze and shows filtered products.
Alternative Courses:	
Exceptions:	
Includes:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

3.2.5.Use Case-User Buying specific product.

Use Case ID:	UC-5		
Use Case Name:	Buy specific product		
Created By:	Emre Yurdagül	Last Updated By:	
Date Created:	18.12.2023	Date Last Updated:	

Actor:	Customer
Description:	This use case describe managing filters of product search
Preconditions:	The customer must be searched something.
Postconditions:	-
Priority:	Medium
Frequency of Use:	High
Normal Course of Events:	1- The customer seeing products. 2- The customer enters the product that they want. 3- System analyze and add product to the cart.
Alternative Courses:	AC-1: If the user requests a product that our system does not have then the error message will be shown.
Exceptions:	
Includes:	
Special Requirements:	

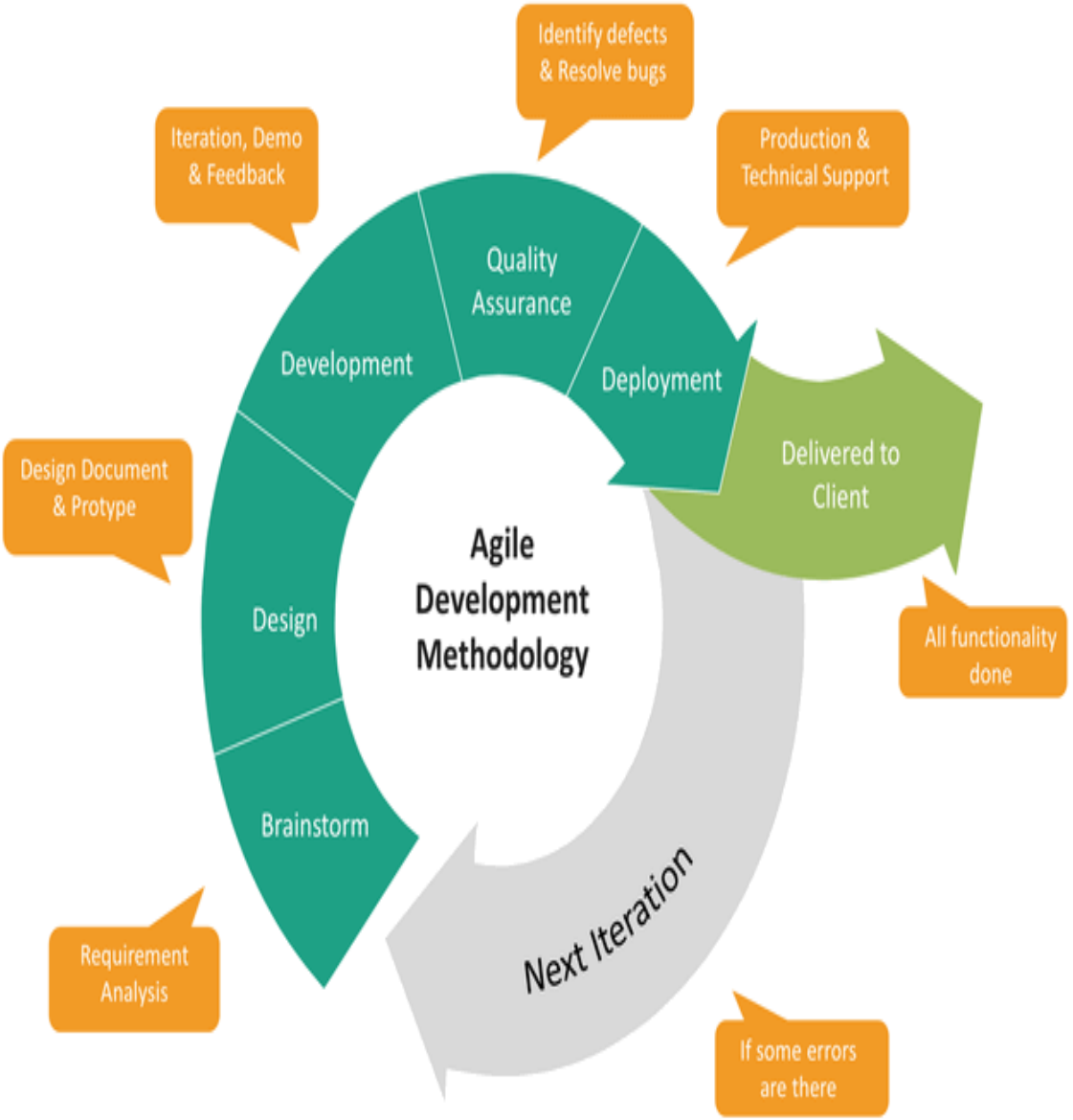
Assumptions:	
Notes and Issues:	

3.3-User Stories

3.3.1-As a user :

- I want to register by creating a first name, last name, phone, email, and password so that I can have a personal account in the system via text-based assistant.
- I want to log in with my email and password so that the system can authenticate me safely and I can grant access to the features the system provides via text-based-assistant.
- I want to tell the Text-Based Assistant to add an item to my shopping cart, so I can continue shopping without navigating to another page.
- I want to request the Text-Based Assistant to filter search results by category, price, and other attributes, so I can more easily find what I need.
- I want to sort products by relevance, rating, or price via text commands to the Text-Based Assistant, so I can see products that are more relevant to my needs first.
- I want the option to give feedback on the Text-Based Assistant's performance, so it can be improved for a better user experience.
- I want the Text-Based Assistant to remember my payment preferences for future transactions, so I don’t have to re-enter them.

3.4 Process Model


Identify defects & Resolve bugs
Iteration, Demo & Feedback
Production & Technical Support
Quality Assurance
Development
Deployment
Delivered to Client
Design Document & Protype
Agile Development Methodology
Design
All functionality done
Brainstorm
Next Iteration
Requirement Analysis
If some errors are there

4. PLANNED SOLUTION/PRODUCT

A key feature of our project is that it includes an artificial assistant to personalize and facilitate users' shopping experience. This artificial assistant understands users' voice commands using natural language processing (NLP) and voice recognition technologies react to users' commands and guide users. In addition, Elasticsearch will be used in the project to ensure that users' requests are responded to quickly and effectively.[8]

Front-end Technologies:

- HTML
- Bootstrap
- React[7]
- Javascript

Back-end Technologies:

- Java - Spring Boot [5]
- Python - Langchain, Flask[6]

The choice for the backend coding technology was the Spring framework of Java.

Database Technologies:

- Elasticsearch

Prototype and Design Technologies:

- Botpress

AI Technologies:

- Chatgpt
- Hugging Face

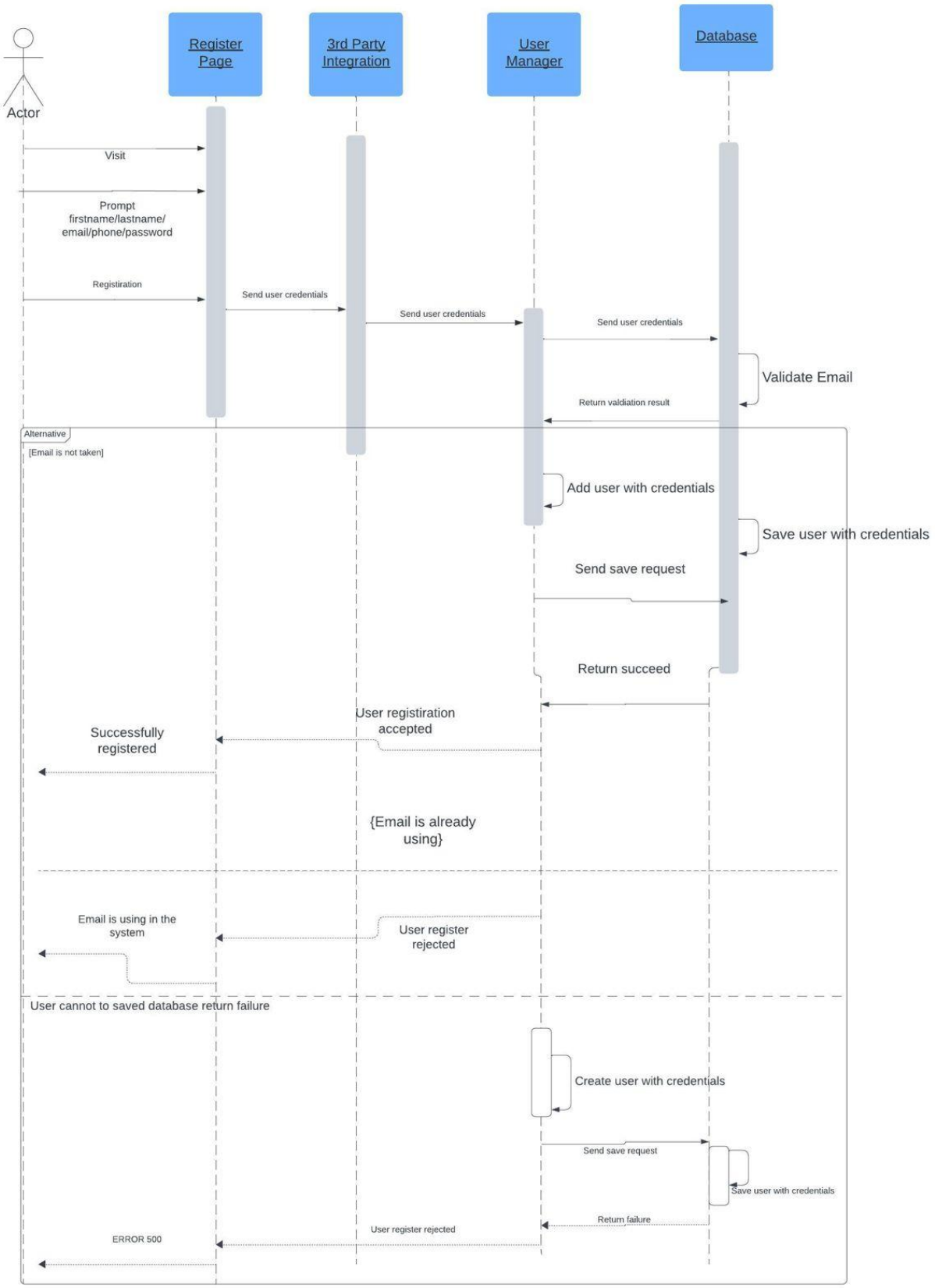
Why these technologies?

Each front-end technology that we use serves a specific purpose. HTML is used for creating the structure and content of web pages, Bootstrap and CSS provide pre-designed styles and responsive layouts, React facilitates the development of reusable UI components, and JavaScript adds interactivity and dynamic behavior to web pages. Together, these technologies enable developers to create visually appealing, responsive, and interactive web applications.

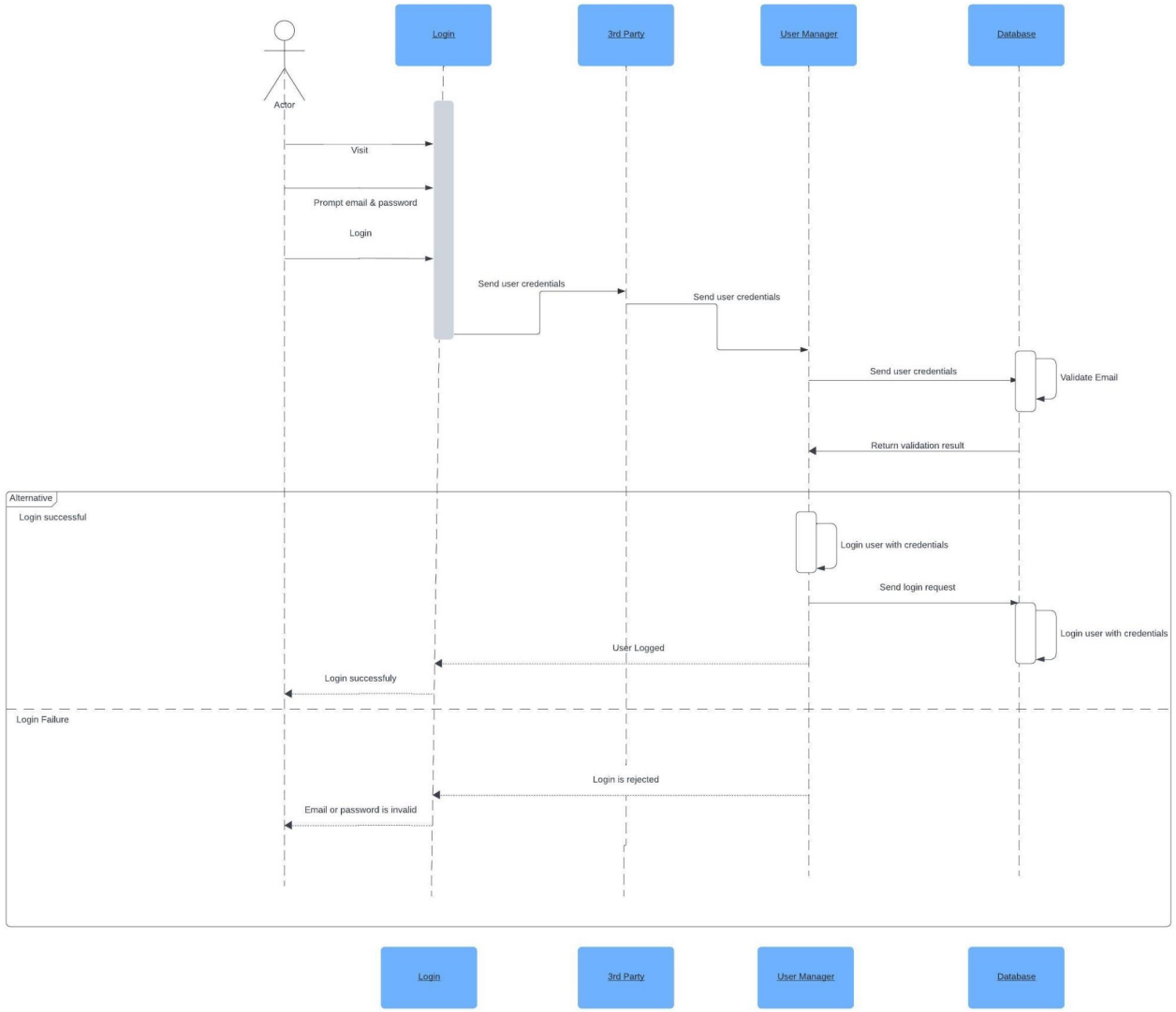
The use of Elasticsearch provides a robust solution for data management and search-related tasks. Elasticsearch excels in performing fast and efficient searches on large datasets. Java with Spring Boot provides a robust and scalable framework for building the back-end of our web application, handling tasks such as request handling, business logic, and integration with other components. Together, these technologies enable us to create a powerful and reliable back-end infrastructure for our project.

The purpose of the usage of AI technology is to delegate the decision mechanism and to extract necessary information from a sentence. AI cannot solve a problem at once but If we divide problems into subproblems and request to solve these subproblems then we can control the process of e-commerce so, we use AI in e-commerce easily.

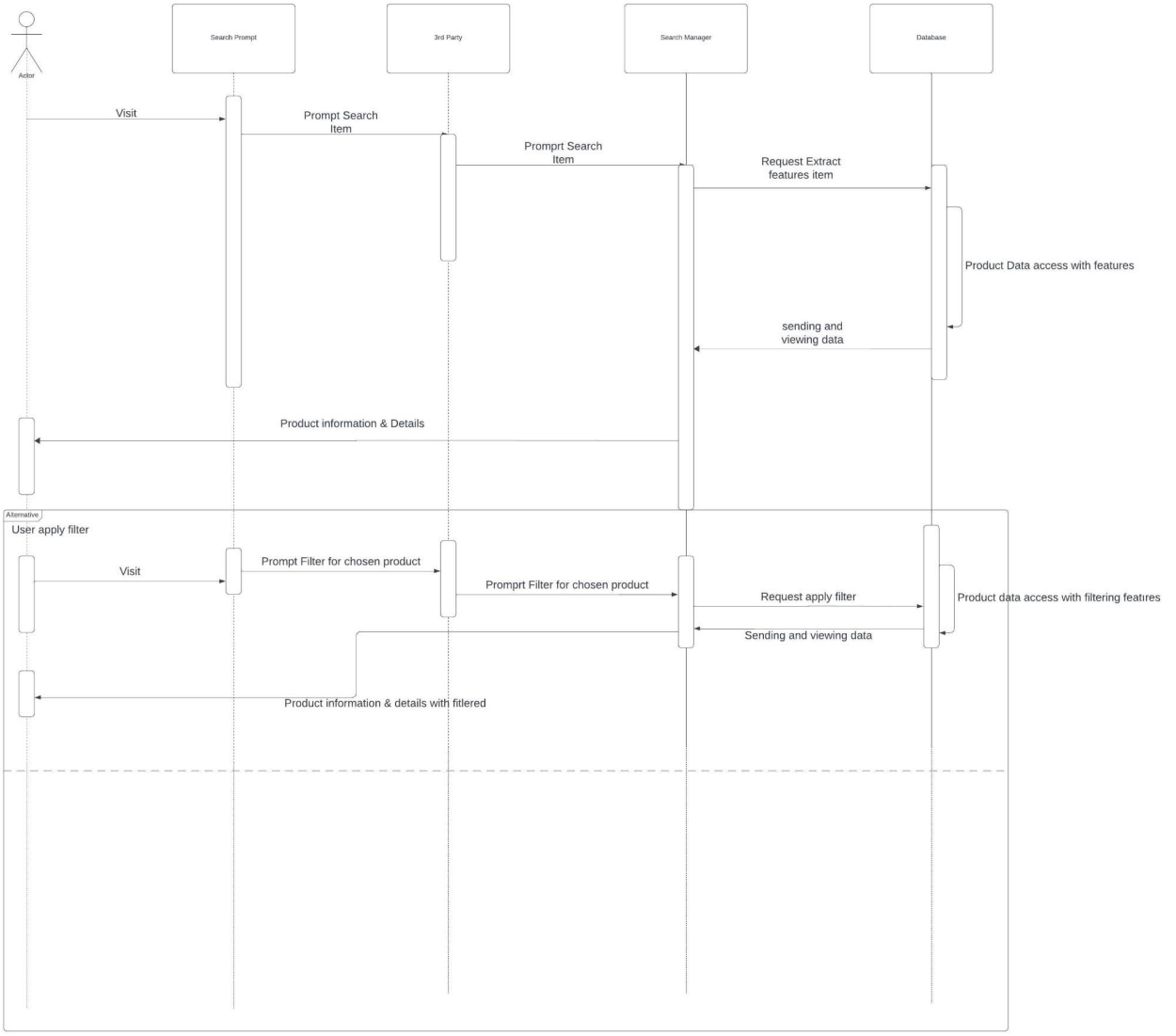
4.1.1 - Register Sequence Diagram


Actor
Register Page
3rd Party Integration
User Manager
Database
Visit
Prompt firstname/lastname/ email/phone/password
Registiration
Send user credentials
Send user credentials
Send user credentials
Validate Email
Return valdiation result
Alternative
[Email is not taken]
Add user with credentials
Save user with credentials
Send save request
Return succeed
User registiration accepted
Successfully registered
{Email is already using}
Email is using in the system
User register rejected
User cannot to saved database return failure
Create user with credentials
Send save request
Save user with credentials
Return failure
User register rejected
ERROR 500

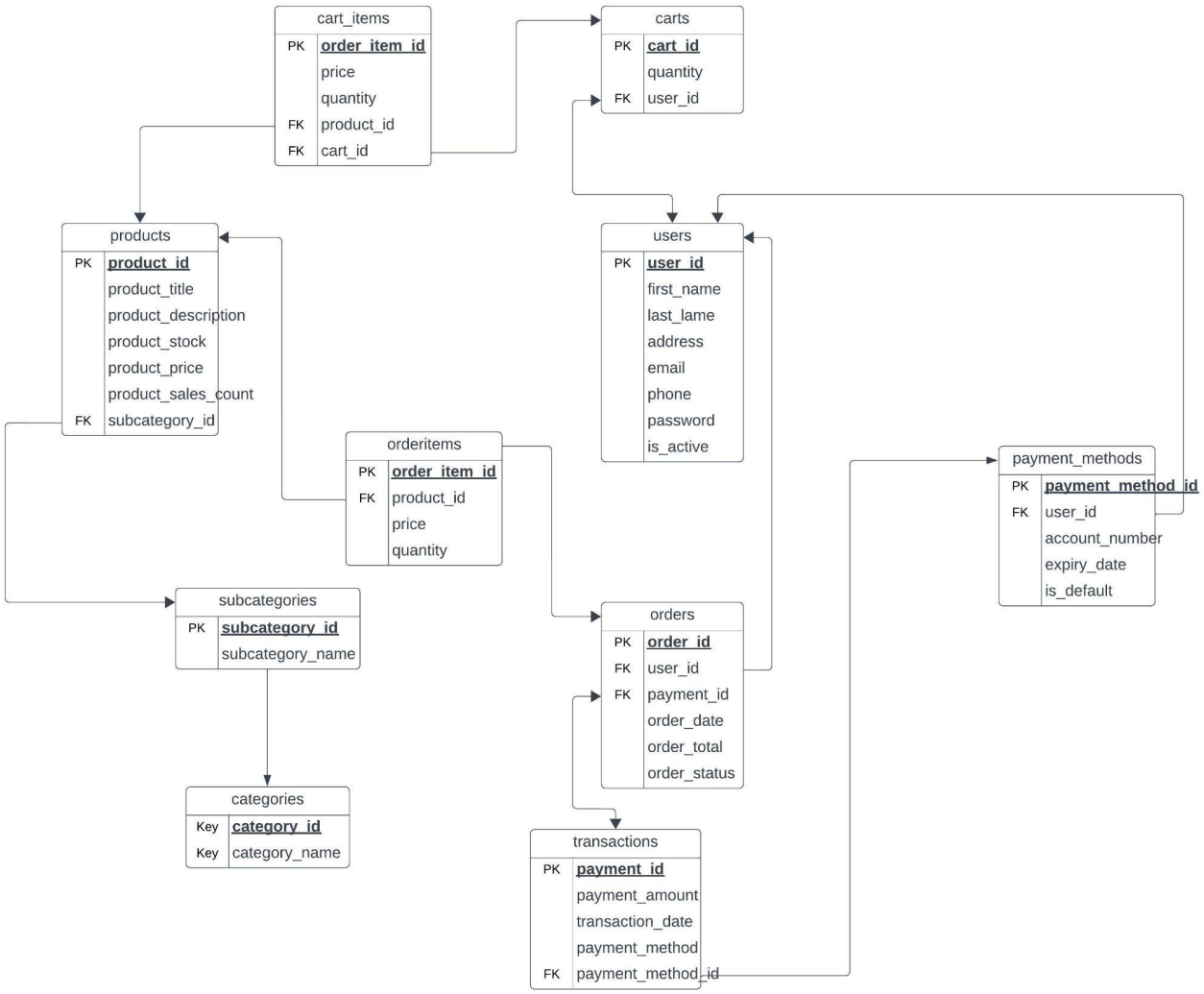
4.1.2 - Login Sequence Diagram



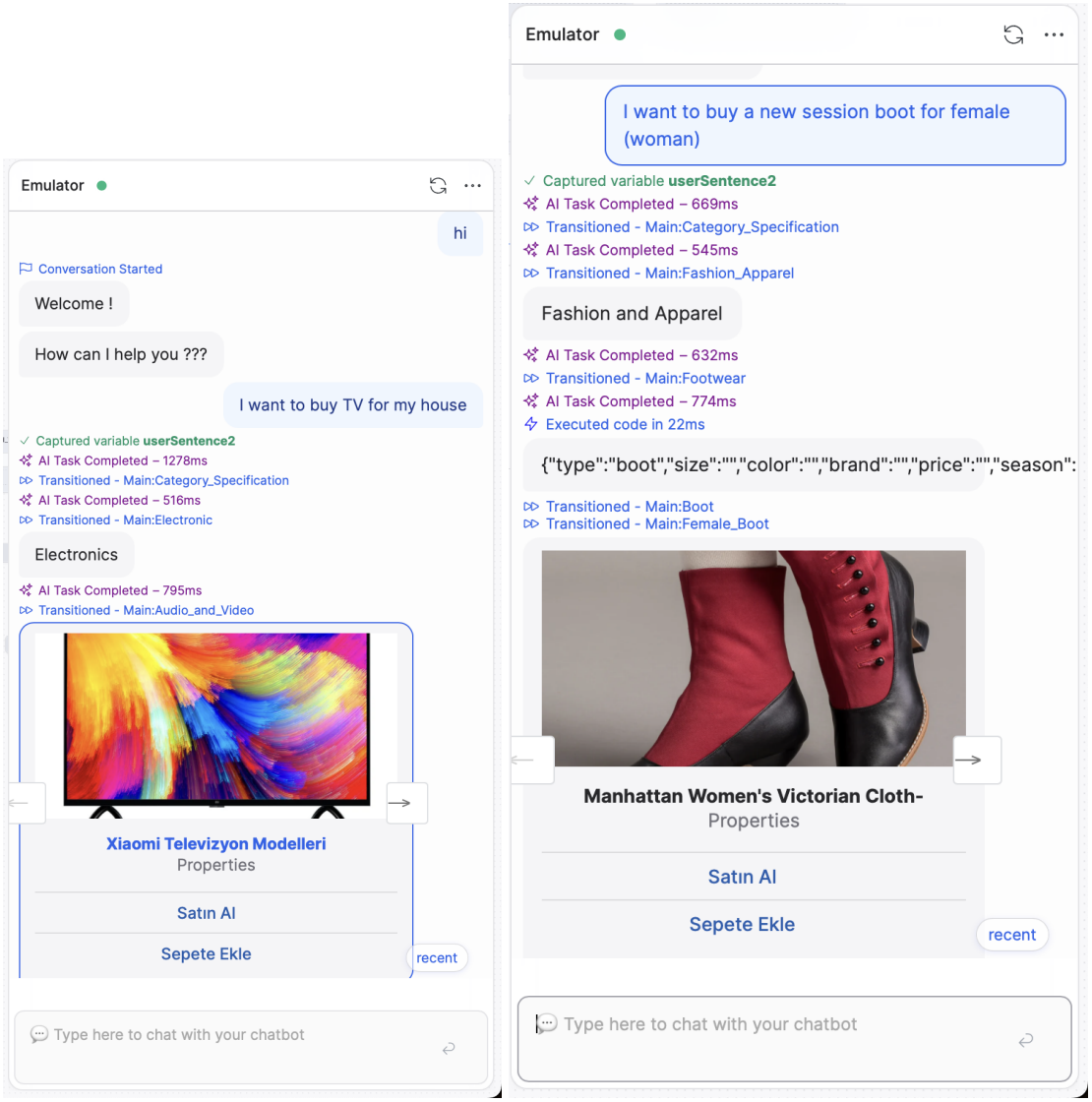
4.1.3 - Search Product Sequence Diagram

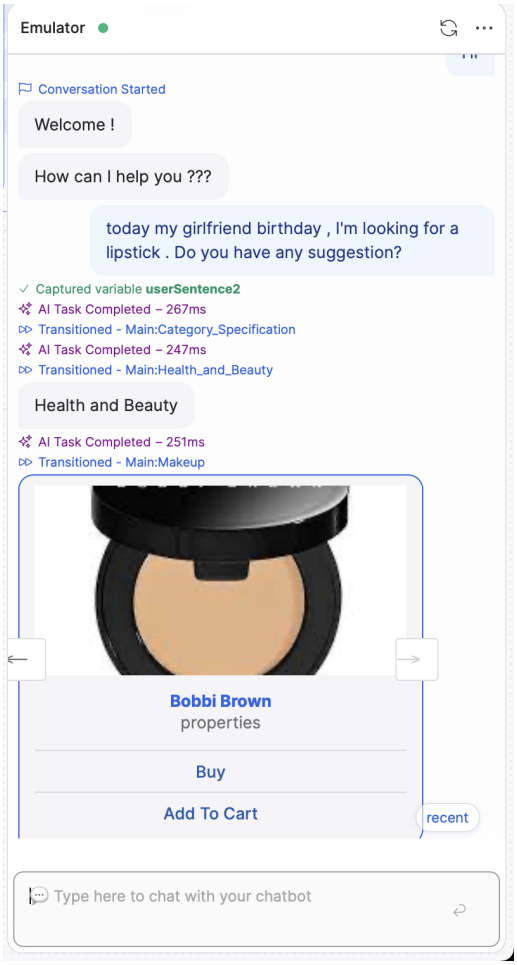


4.2.1 - ER DIAGRAM



4.3.1 - INTERFACE DESCRIPTIONS




Emulator
Conversation Started
Welcome !
How can I help you ???
today my girlfriend birthday , I'm looking for a lipstick . Do you have any suggestion?
Captured variable userSentence2
AI Task Completed – 267ms
Transitioned - Main:Category_Specification
AI Task Completed – 247ms
Transitioned - Main:Health_and_Beauty
Health and Beauty
AI Task Completed – 251ms
Transitioned - Main:Makeup
Bobbi Brown
properties
Buy
Add To Cart
recent
Type here to chat with your chatbot

5. RELATED WORK/SIMILAR SOLUTIONS

1-https://www.trendyol.com/[9]
2-https://www.gittigidiyor.com/[10]

Differences
In the platform we will develop, unlike other e-commerce platforms such as Trendyol and Gittigidiyor, users will be offered the opportunity to shop with an artificial assistant as a shopping experience. Instead of clicking on something for filtering options, they will be able to find the products they are looking for more easily and add them to their carts, thanks to the assistant. In addition, Trendyol and Gittigidiyor are also a While there are many sellers, we will be ahead of many sellers on the platform we will develop. Additionally, users will be able to benefit from the artificial assistant when registering or logging into the system. In this way, users who will use the platform we will develop will have a different shopping experience.

Similarities
Similar to the secure payment system currently used in Trendyol and Gittigidiyor, users will be able to make their payments securely on the platform we will develop. It will also have a user-friendly interface and users will be able to use the platform comfortably on mobile as well as on the web.

6. IMPACT

Improving Accessibility and Usability: By making it simpler for users to navigate effortlessly through product listings, shopping carts, order tracking, product reviews, product ratings, etc., the system will appeal to a wider age audience, including those less familiar with conventional e-commerce transactions, thereby expanding its market reach.

Increasing Interactivity: By focusing on simplifying and enhancing the user interface, the platform aims to reduce the complexity that customers can experience with traditional e-commerce systems, such as the frustration of not finding what they are looking for or being confronted with the wrong product. This can provide a more enjoyable shopping experience, encouraging repeat visits and long-term customer loyalty.

Economic Impact: The adoption of this technology is predicted to have a significant economic impact, as it will enhance efficiency and improve the overall user experience. This, in turn, is likely to result in increased sales and stronger customer retention rates, ultimately leading to the success of businesses implementing this technology.

Technological Advancement: By integrating natural language processing, the Project contributes to the advancement of artificial intelligence in e-commerce and potentially defines a new user experience for customer interactions in online retail environments.

7. REFERENCES

[1]. "Guide For Applicants specific to Call FP7-REGPOT-2012-2013-1", http://ec.europa.eu/research/participants/portal/download?docId=31901

[2]. "Writing Formal Reports", http://ece.uprm.edu/~hunt/inel5326/ReporteFinal.pdf.

[3]. "ACM Policy and Procedures on Plagiarism", http://www.acm.org/publications/policies/plagiarism_policy?searchterm=plagiarism.

[4]. "Writing Your Journal Article in Twelve Weeks: A Guide to Academic Publishing Success", 1st. Ed., Wendy Laura Belcher, ISBN-13: 978-1412957014, 2016.

[5]. What is the Spring Boot ? https://spring.io/projects/spring-boot

[6]. https://python.langchain.com/docs/get_started/introduction

[7]. https://react.dev/learn

[8]. https://www.elastic.co/guide/index.html

[9]. Trendyol - -https://www.trendyol.com/

[10]. Gittigidiyor - https://www.gittigidiyor.com/