FAST BOT

FYP Group

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Abstract

Fast Bot would provide a platform that connects Admission Aspirants, New Admissions, and Existing Students with expert Information on FAST NUCES Chiniot Faisalabad Campus. The main purpose of the application is to solve the admission and hostel queries of the students of FAST NUCES Chiniot Faisalabad Campus without ever needing to contact any staff member. A better knowledge of campus facilities before admission would help students start their academic journey with confidence. Our admin and live chat agent would also be helping them throughout the process of getting admission and securing a hostel seat, providing authentic and timely alerts to the admission aspirants and students. The admin panel will manage the answers given through the chatbot making sure that all the queries of users are solved swiftly.

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1. Introduction

Fast Bot would be an intelligent chatbot which will be able to answer queries. In our project we will be covering hostel and admission queries only. Fastbot would also have a live chat agent and feedback feature. Fastbot will be a source of authentic answers available 24/7 in a user-friendly environment. A web app that is efficient and easier to use.

2. Vision Document

In this section, project vision is discussed in detail.

2.1. Problem Statement

Problem of	1. No Authentic Source of Information 2. Students relying on unverified information on social media 3. Students and families have to visit campus physically or call university staff for information regarding hostel and admissions
Affects	1. It creates unnecessary confusion over admission procedures 2. University staff are burdened with calls during office timing
Impact of which	1. Admission aspirants having vague mind about campus 2. Posting queries on social media apps such as Facebook
Successful solution would be	1. A 24/7 available interactive source of information 2. A live chat agent to explain things further 3. Bridge between admission aspirants and information

Table 1: Problem Statement

2.2. Business Opportunity

Fast Bot would be a web based chatbot to automate all the queries related to admission and hostel facilities. Now a days, everything is attracted towards software technology to make life easier so Fast Bot will facilitate students in an effective way. It will provide an effective way to handle the queries of students and guide them regarding admission and hostel facilities. It would also help the university to attack more admissions and would also in result reduce the workload on the staff. This first of its kind system will have a wide range of questions usually asked by a student or student's parent. This will be a one stop-shop for all the queries related to the campus. Answers shall be simple and easy to understand.

2.3. Objectives

The aim of this project is to contribute to the solution of the problem of direct communication between applicants and the university.

The main objectives of the project are as follows:

- To develop a database where all the relevant information about questions, answers, keywords, logs and feedback will be stored.
- Natural Language Processing (NLP) algorithm in order to retrieve the best possible answer.
- To develop a web interface which aims to give the ability to potential students and their families to submit questions in a chatbot and get authentic solutions.

2.4. Scope

FAST Bot is a web application. The main problem we're currently facing is the information gap between admission applicants and our campus. Fast Bot will connect the students directly with authentic information in an interactive environment. Fast Bot will make admission process and securing hostel seat easier and efficient. Studies have shown that people find it easier and hassle free to talk to a bot. Furthermore, after being deployed at the campus website Fast Bot will be available 24/7 to the students and applicants for any query.

2.5. Constraints

- The system shall not require any hardware development or procurement.
- Internet connectivity issues may result in the system not working properly.
- The system would be able to understand sentences in the English language only, use of any other language would not produce any result.

2.6. Stakeholder and User Descriptions

Stakeholder and User Descriptions are defined in detail below.

2.6.1. Market Demographics

Our target market is FAST NUCES students and admission applicants and to provide a better platform for their queries and to make it easy for university to communicate effectively. Use of android phones and websites is increasing day by day, everything is now shifting from manual system to automated systems. It can be used for different universities but for this project FAST NUCES is targeted.

2.6.2. *Stakeholder Summary*

Name	Description	Responsibilities
FAST Bot Developers	It includes those who are involved in designing and implementing of this project.	1. Design and develop Fast Bot and Deploy it on the website. 2. Proper testing should be applied
End-User	End users include all FAST students and admission applicants.	1. Should have knowledge of using web applications
Supervisors of project	Supervisor will be stakeholders of this product as they are involved in development process of this project with the development team.	1. Gives direction to development team 2. Ensures that the system will be maintainable 3. Ensures that there will be a market demand for the product's features 4. Monitors the project's progress 5. Ensures that project follows the documents generated during project planning and work products are properly delivered

Table 2: Stakeholder Summary

2.6.3. *User Environment*

Any user with internet connection will be able to access the website. End-users must have knowledge of using a web application and other basic information about asking a query. The proper user interface and guidelines must be sufficient to educate the users on how to use the web application without facing any problems. It is a chat bot so it must be deployed on the website.

2.6.4. *Stakeholder Profiles*

The Stakeholder Profiles Attributes of the system are listed in this section.

2.6.4.1. Supervisors of the Project

Representatives	Supervisor: Mr. Asif Ameer Co-supervisor: Mr. Sajid Anwar
Description	They are involved in supervising activities of development process
Type	They are technical stakeholders. They have expertise in domains which are being applied to this project i.e., natural language processing, machine learning, artificial intelligence.
Responsibilities	1. Gives direction to development team 2. Ensures that the system will be maintainable 3. Ensures that there will be a market demand for the product's features 4. Monitors the project's progress 5. Ensures that project is in compliance with the documents generated during project planning and work products are properly delivered 6. They will facilitate development team to complete this project within specified resources.
Success Criteria	The completion of features which are being committed by development team at start of the project.
Involvement	1. Requirement reviewer 2. Senior managers 3. Reviews implementation
Comments/Issues	None

Table 3: Supervisors of the Project

2.6.4.2. Development Team of the Project

Representatives	Mr. Anas Rao Mr. Talal Ahmed Mr. Abdul Saboor
Description	They are involved in designing of the web app.
Type	They are technical stakeholders.
Responsibilities	1. Should design this chat bot considering user's needs 2. Proper testing should be applied to make it as effective as possible 3. Proper dataset is required for better answers
Success Criteria	The completion of features which are being committed by development team at start of the project.
Involvement	1. Designers 2. Testers
Deliverable	1. Documentation 2. Data acquisition 3. System Training
Comments/Issues	None

Table 4: Development Team of the Project

3. System Requirement Specification

In this section, features and requirements of the system are explained.

3.1. System Features

- NLP Powered Chatbot
- Admin Module
- User Module

3.2. Functional Requirements

The functional requirements of the system are listed below.

3.2.1. *Complex Dialogues*

In addition to understanding and interacting within conversations, Fast Bot has Natural Language Processing to analyze the intent of a conversation.

It can identify the intent of a question to provide an accurate answer and suggest options to confirm or resolve the issue.

3.2.2. *Fast onboarding*

Staring a conversation on Fast Bot is extremely easy. Fast Bot can be launched quickly and answer custom query readily.

3.2.3. *Easy Handling*

Fast Bot uses a well-designed user interfaces and experience (UI/UX). It can manage huge amounts of data seamlessly. It can answer queries, connect the user to live chat agent and send alerts to users and has a clear and structured overview of conversations.

3.2.4. *Analytics and Reporting*

Fast Bot is an excellent source of data and customer information. An in-depth Fast Bot analytics and analysis of customer information will give us the information we need to tailor it according to user's expectation. Moreover, this analysis will provide us with the valuable information on the efficiency of Fast Bot.

3.3. Non-Functional Requirements

The functional requirements of the system are listed below.

3.3.1. *Performance Requirements*

- The application would access the server Database within no time when the user access it.
- Very less response time is expected.
- Fast Bot would compute results effectively and quickly,
- The system will connect the user to live chat agent instantly.

3.3.2. *Safety Requirements*

This is a web application to be used by students and applicants. As only one user can use application at a time on the website, so in this case, no safety requirements would be required. There is a separate module for Administration only. We will take standardized input from user. We will prevent our database Injection attacks.

Therefore, our system always will be in a safe state.

3.3.3. *Security Requirements*

As it is a chatbot which will be readily available to anyone who wants to access it. There will be no user authentication. However, the data of private conversations would be in secure hands.

3.3.4. *Software Quality Attributes*

The Software Quality Attributes of the system are listed below.

3.3.4.1. Availability

The application would be available 24 hours a day, 7 days a week.

3.3.4.2. Usability

The System would be easy-to-use and would be appropriate for the target market of applicants and students. The application would include help, within itself, for the user. Users would not require the use of a hardcopy Manual to use the web app.

4. Use Case Diagram

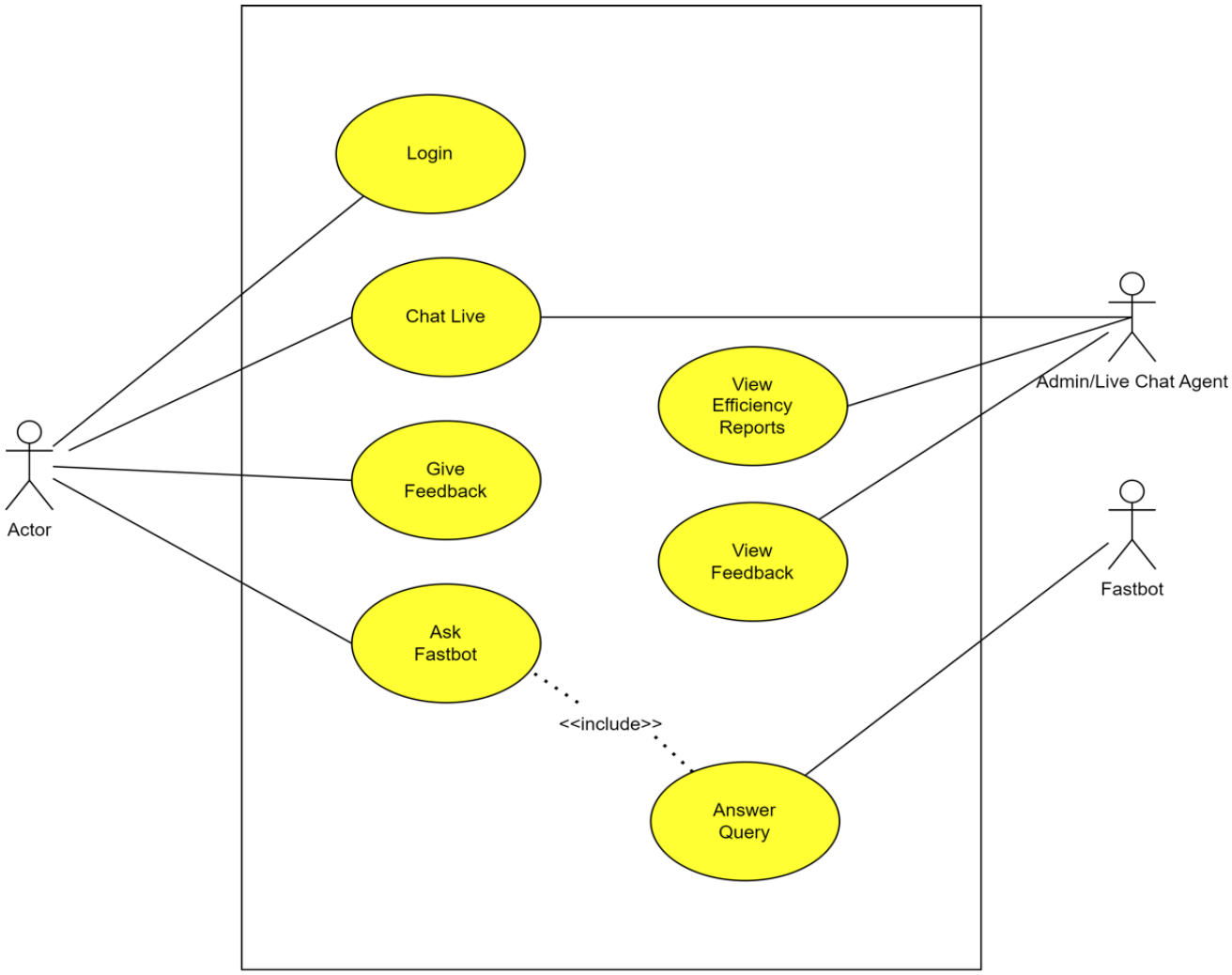

Figure 1: Use Case Diagram

5. Use Cases

5.1. Login

Use case ID	UC-01
Use case Name	Login
Actor	Users, system
Type	Primary
Description	The user would provide his credentials to be logged in to the system. After logging in the user would be able to use the Fast bot.

5.2. Chat Live

Use case ID	UC-02
Use case Name	Chat Live
Actor	Users, Live Chat Agent
Type	Primary
Description	Connects the user to a live chat agent who can answer the complex queries which are out of scope for the chatbot.

5.3. Give Feedback

Use case ID	UC-03
Use case Name	Give Feedback
Actor	Users, system
Type	Primary
Description	The user would be able to give feedback on the answer received by the Chatbot.

5.4. View Feedback

Use case ID	UC-04
Use case Name	View Feedback
Actor	Admin
Type	Primary
Description	Admin will be able to view all the feedbacks from the users.

5.5. Ask Fast bot

Use case ID	UC-05
Use case Name	Ask Fast bot
Actor	User, Fast bot
Type	Primary
Description	The user will be able to ask queries directly to fast bot.

5.6. Answer Query

Use case ID	UC-06
Use case Name	Answer Query
Actor	Fast bot, User
Type	Primary
Description	Fast bot will appropriately answer user queries

5.7 View Reports

Use case ID	UC-07
Use case Name	View Reports
Actor	System, Admin
Type	Primary
Description	Admin will be able to view the efficiency reports generated by the system.

6. Expanded Use Case

6.1. Communication with Fastbot

Use Case Reference	UC-05
Use case Name	Sending/receiving messages
Actor	Users, system
Description	The user would be able to communicate with the chatbot and get their queries answered and resolved.
Trigger	User has selected fastbot for a query.
Pre-Condition	User has logged in.

Post Condition	Conversation has been initiated successfully.
Normal Flow	• Enter the question/ query and the bot will answer it.
Alternative Flow	• User can communicate with live chat agent if Fastbot does not respond
Special Requirement	Availability of Internet
Frequency of Use	High
Assumption	The user knows how to navigate and ask queries from the bot.

6.2. User Feedback to Fast bot's Response

Use Case Reference	UC-03
Use case Name	User Feedback to Fast bot's Response
Actor	Users, System, Admin
Description	The user will give feedback to the bot's response to user query. User can write his/her remarks and experience in the feedback.
Trigger	User opens the feedback tab.
Pre-Condition	Fastbot answers to user's query.
Post Condition	Feedback is submitted successfully.

Normal Flow	After receiving answer, user opens feedback tab.
Alternative Flow	User can contact Live Chat Agent to give feedback.
Special Requirement	Availability of Internet
Frequency of Use	High
Assumption	The NLP model can answer query successfully.

6.3. Live chatting with Chat Agent

Use Case Reference	UC-02
Use case Name	Live chatting
Actor	Users, Chat Agent
Description	Connects the user to a live chat agent who can answer the complex queries which are out of scope for the chatbot.
Trigger	The user selects the option for live chat in case if the bot cannot answer a query
Pre-Condition	The user selects the option for live chat with agent.
Post Condition	User's queries are successfully answered by the university representative through live chat support.

Normal Flow	• The user communicates with live chat agent.
Alternative Flow	• Live chat agent may not be available user will have to wait.
Special Requirement	Availability of Internet and Live Chat Agent
Frequency of Use	High
Assumption	Chat Agent is available.

6.4. Bot Efficiency Report

Use Case Reference	UC-07
Use case Name	Bot Efficiency Report
Actor	Users, System
Description	System will calculate the model's accuracy and validation and show it to the admin.
Trigger	Admin opens the reports tab.
Pre-Condition	Model has been trained once.
Post Condition	Reports are successfully generated.

Normal Flow	• Model has been trained once and the reports are generated.
Alternative Flow	• Reports will have to be generated after the model has been trained.
Special Requirement	Model training data must be available.
Frequency of Use	High
Assumption	System training yields a good accuracy and validation efficiency.

7. Domain Model

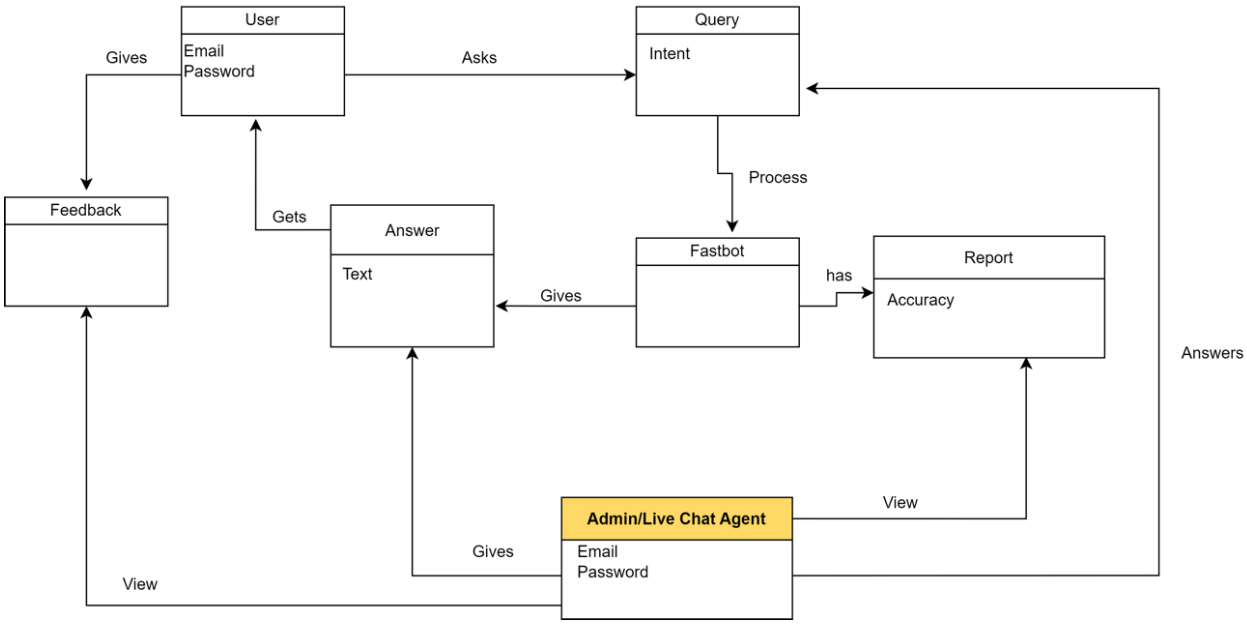

Figure 2: Domain Model

8. Class Diagram

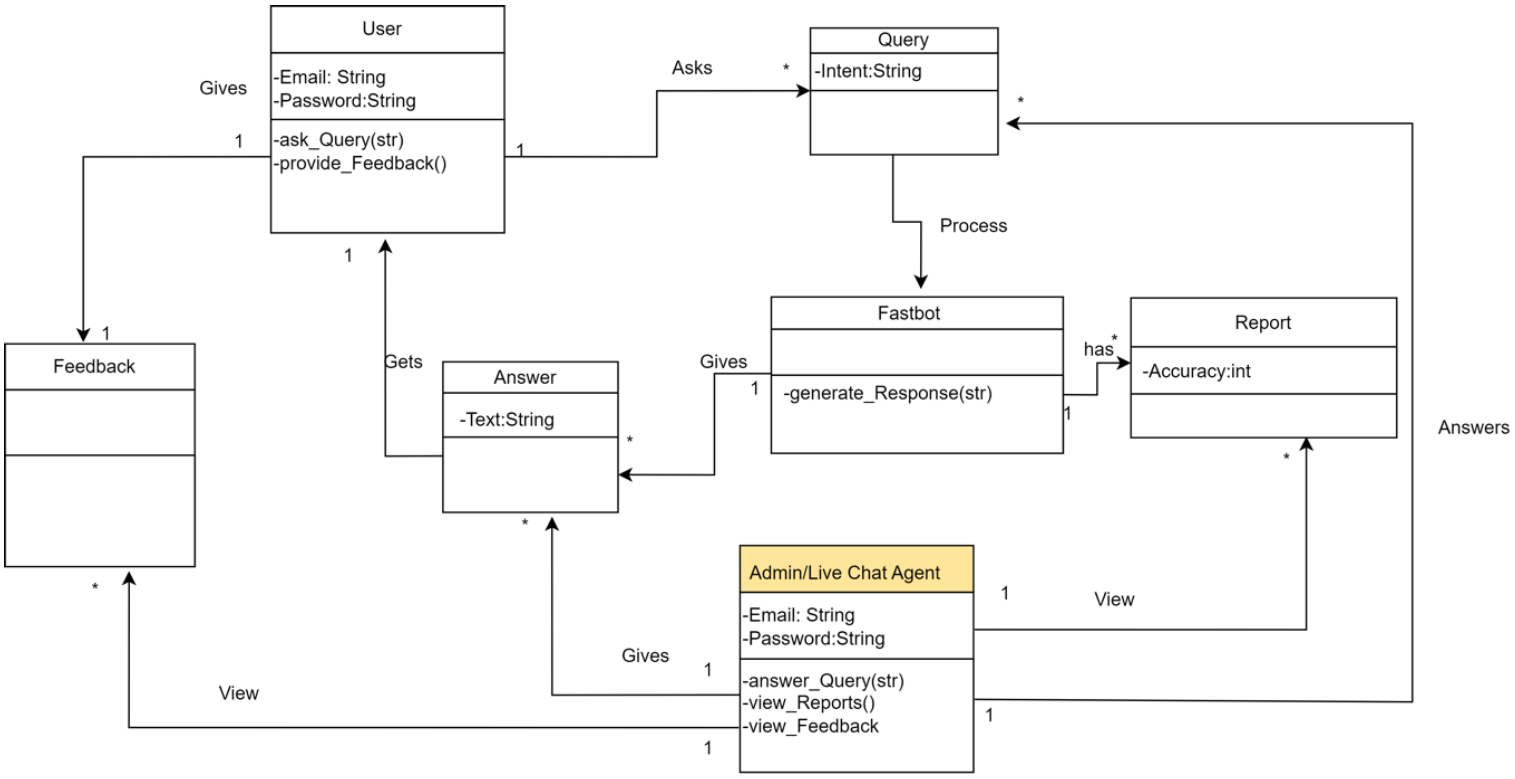

Figure 3: Class Diagram

9. Sequence Diagram

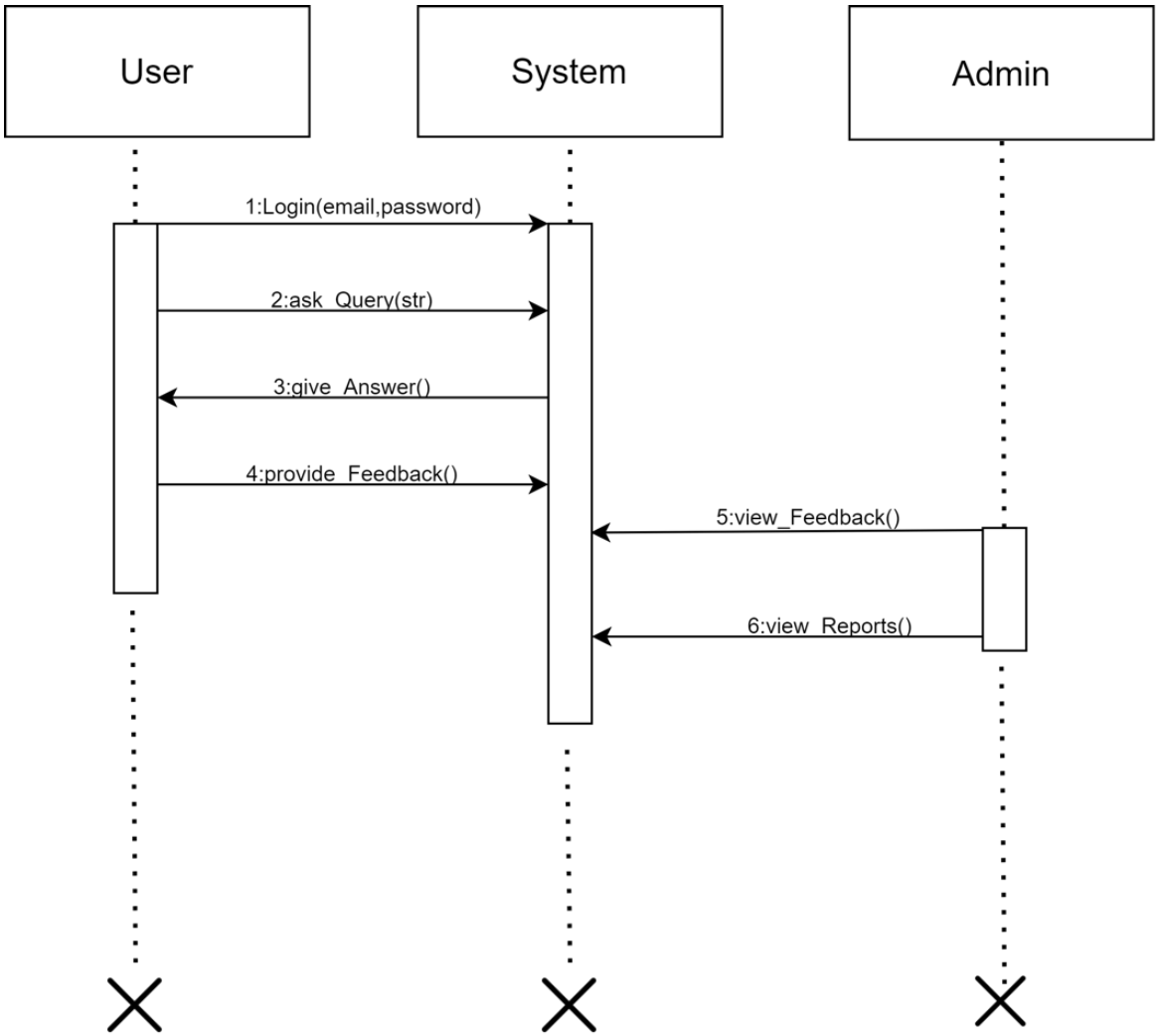

Figure 4: Sequence Diagram

10. Architecture Diagram

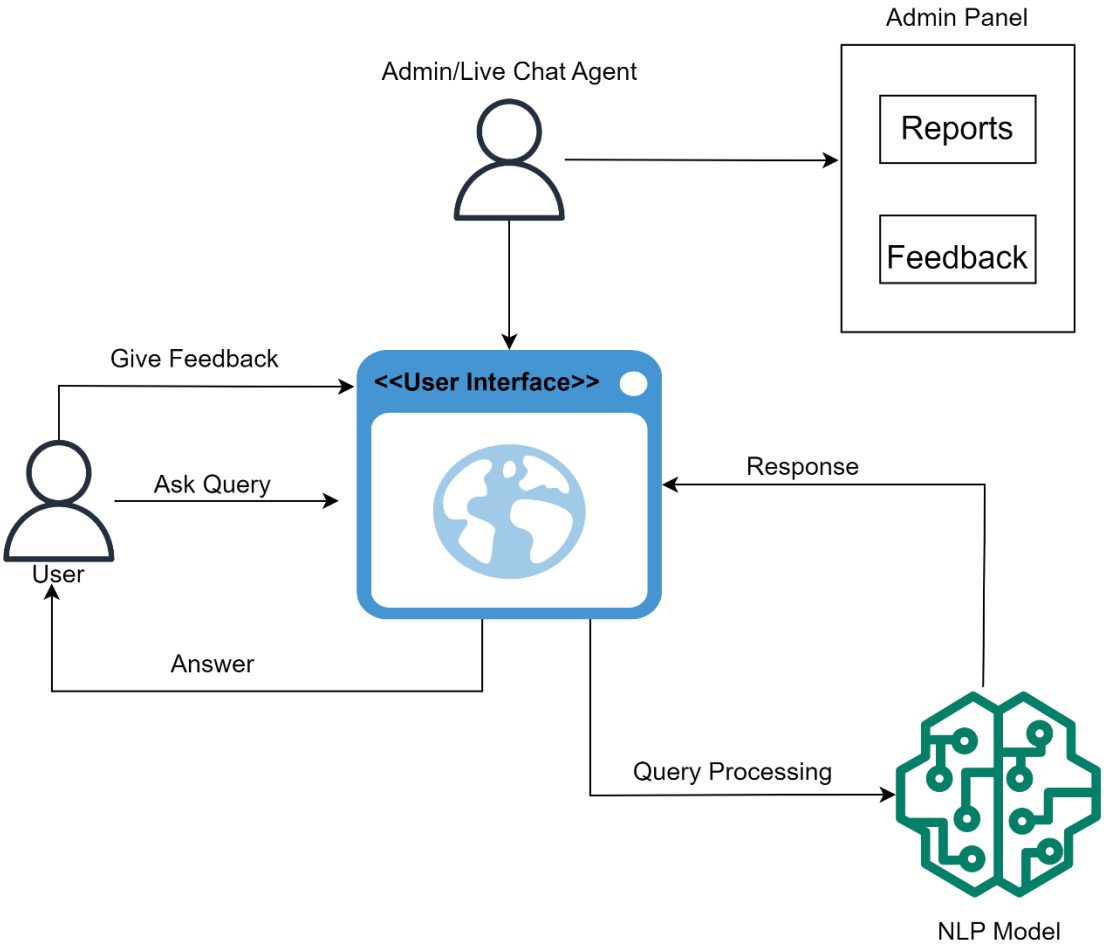

Figure 5: Architecture Diagram

11. System Sequence Diagram

11.1. Login

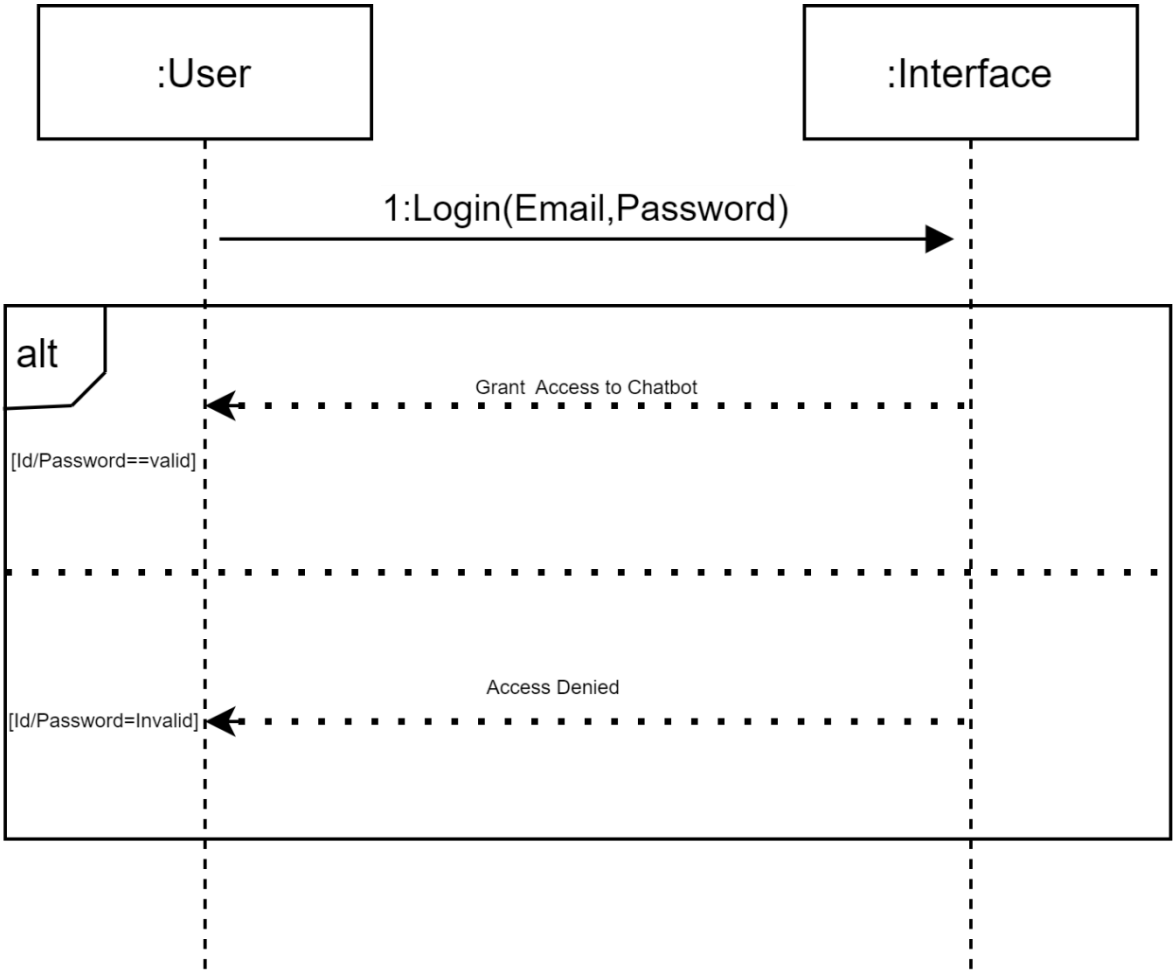

Figure 6: SSD-Login

11.2. Live Chat

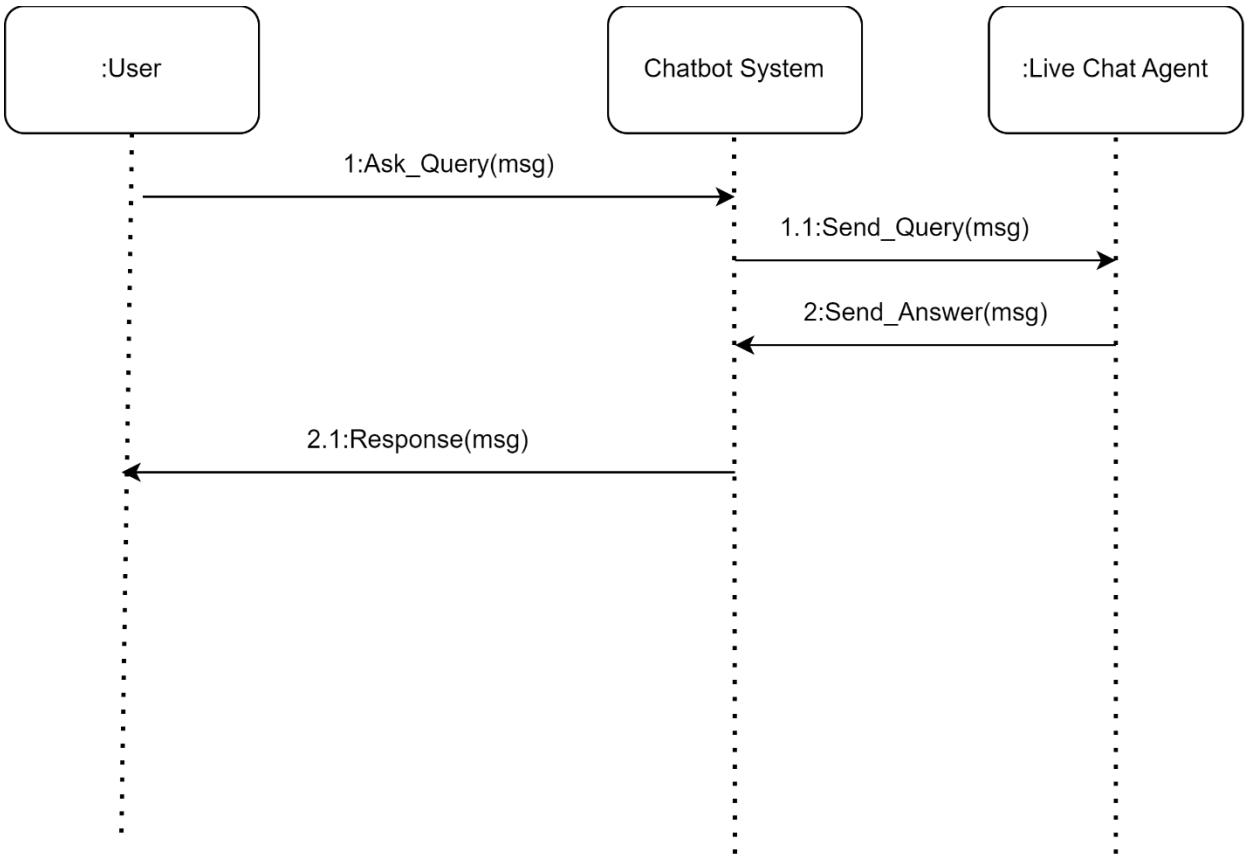

Figure 7: SSD-Live Chat

11.3. Give Feedback

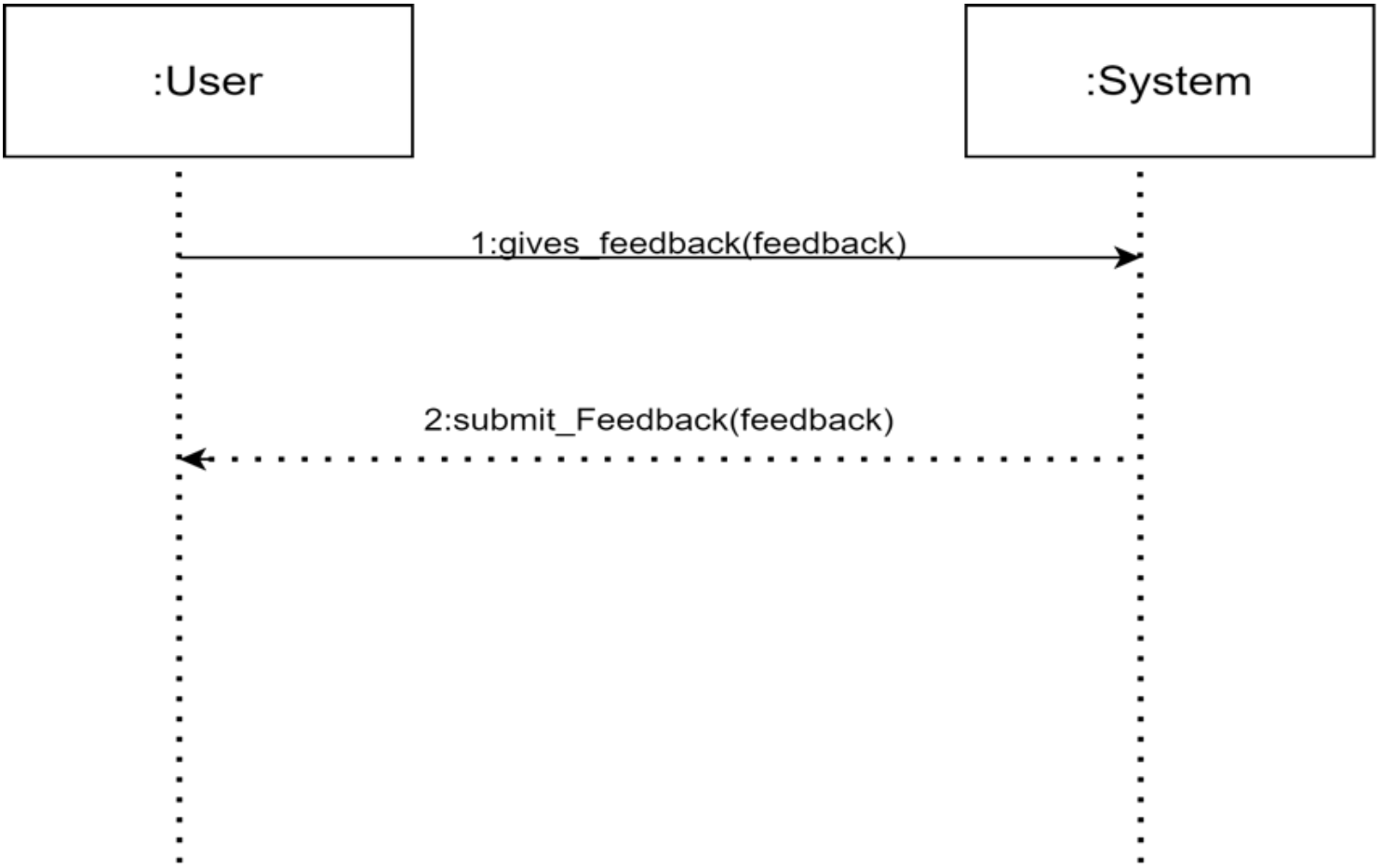

Figure 8:SSD-Give Feedback

11.4. View Feedback

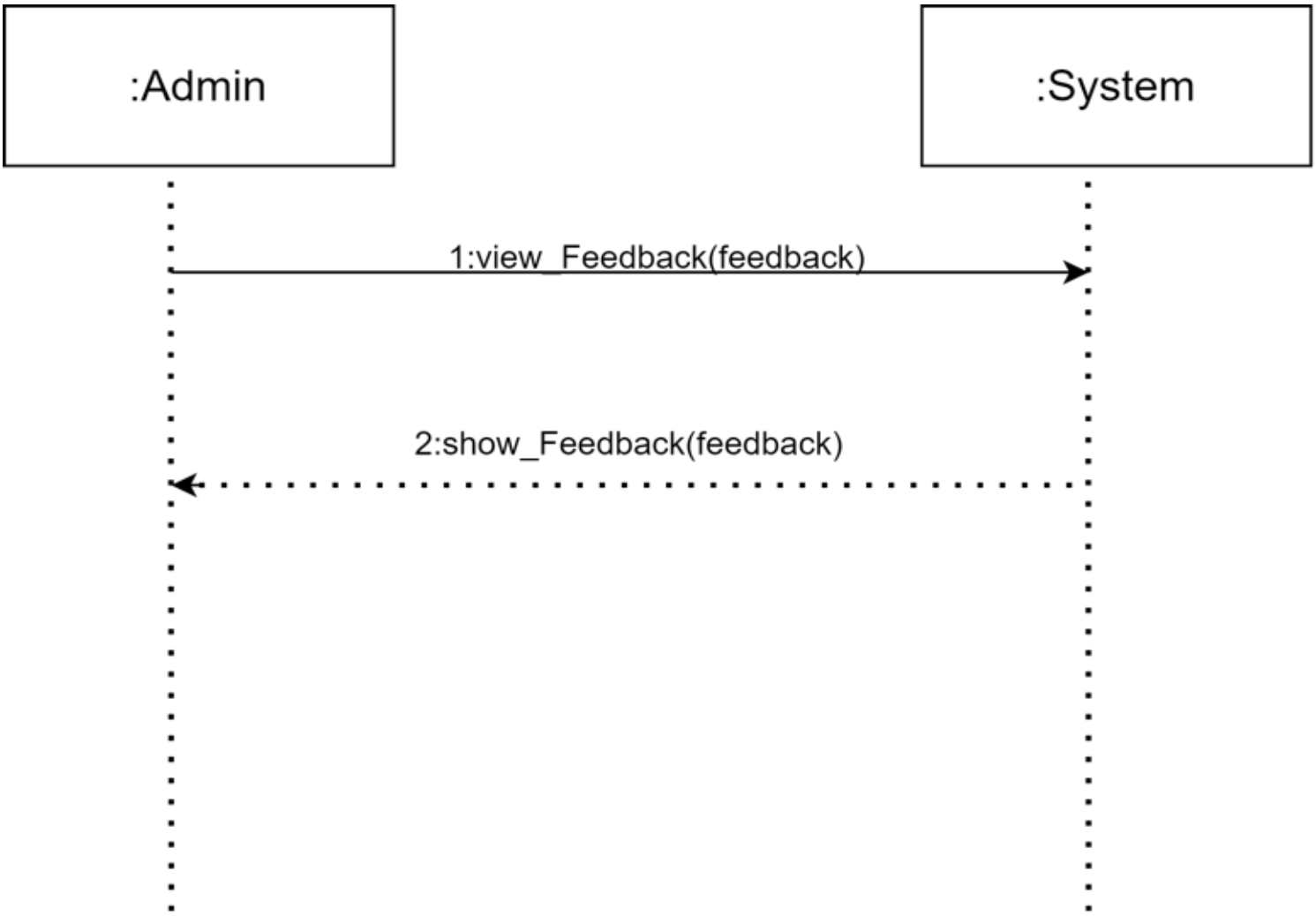

Figure 9:SSD-View Feedback

11.5. View Reports

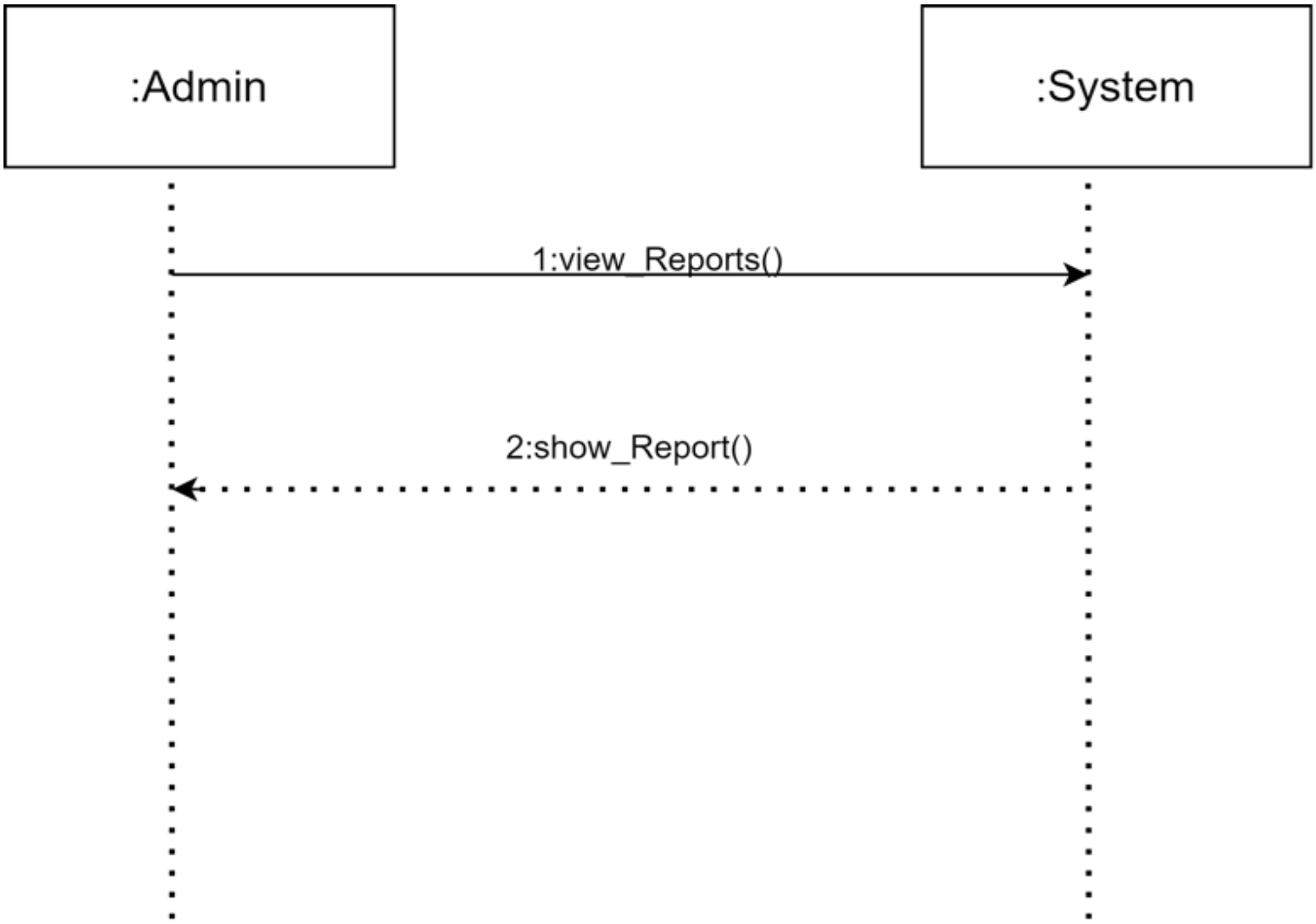

Figure 10:SSD-View Report

12. Activity Diagram

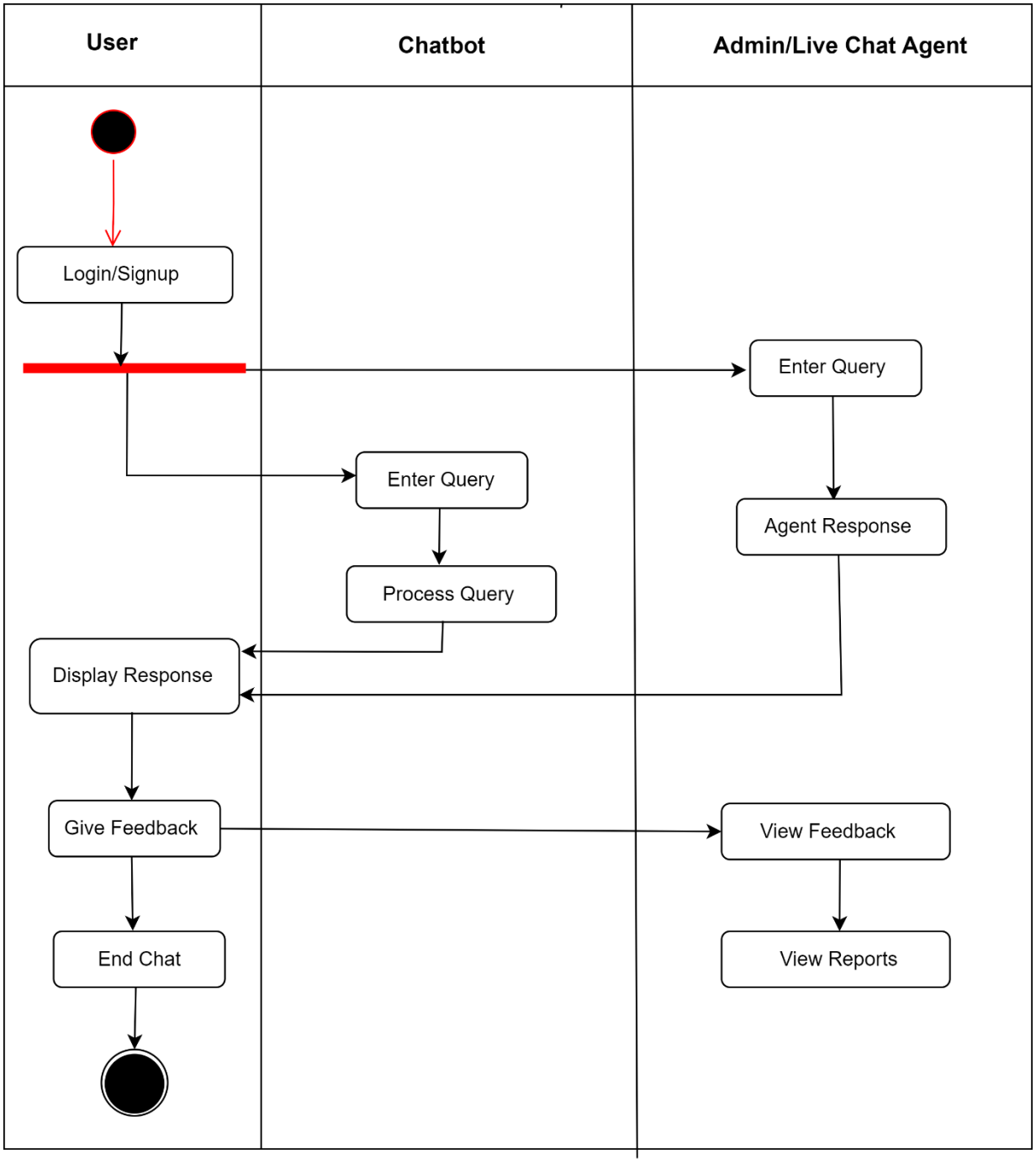

Figure 11:Activity Diagram

13. Package Diagram

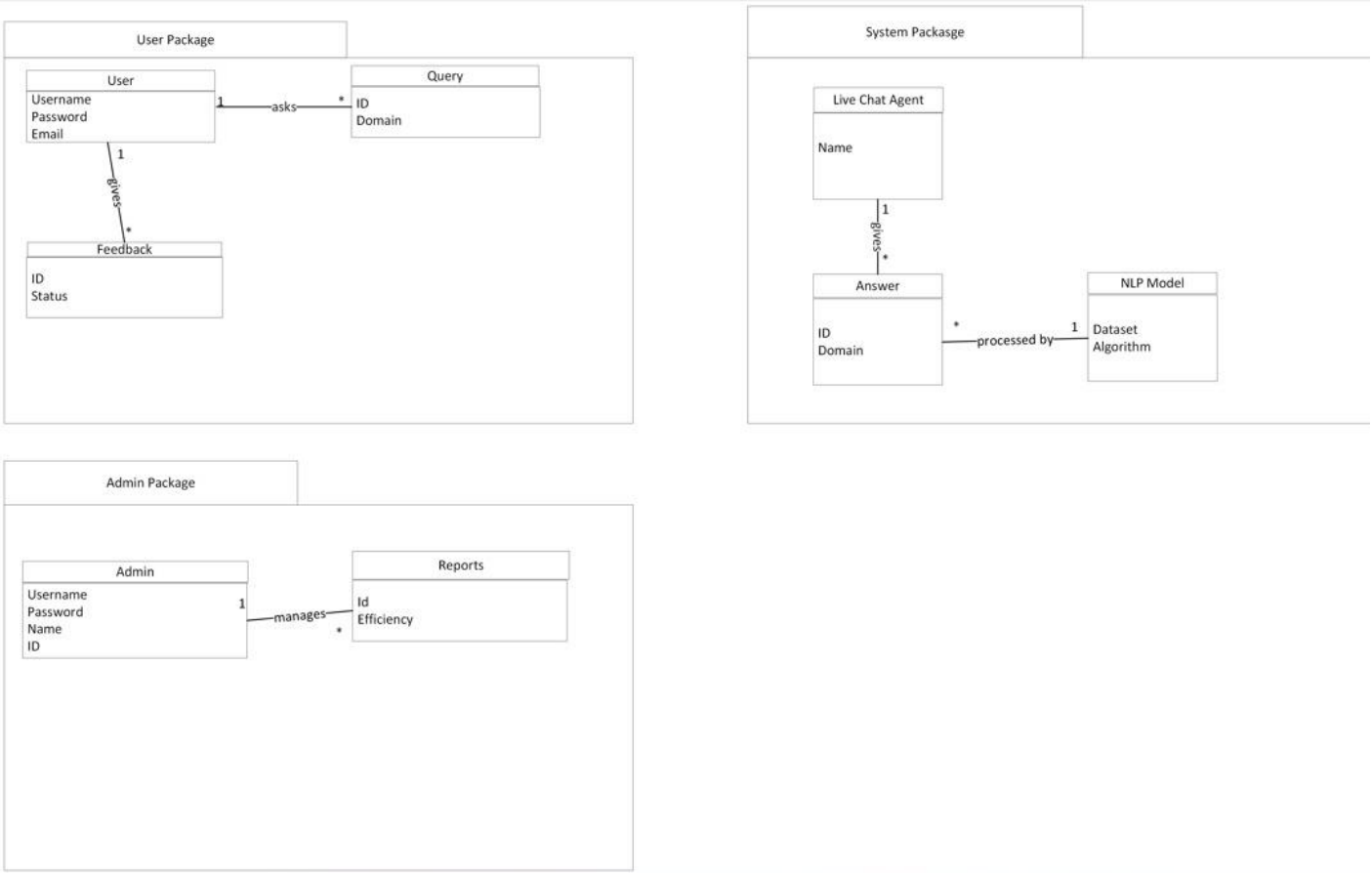

Figure 12:Package Diagram

14. Component Diagram

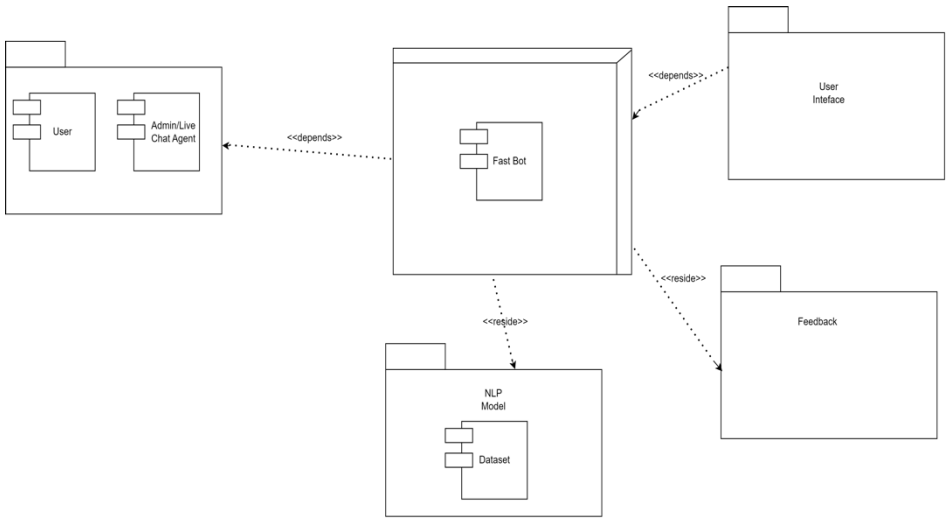

Figure 13:Component Diagram

15. Data Flow Diagram

15.1. Level 0 DFD

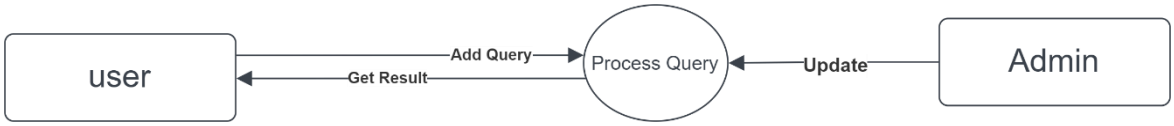

Figure 14:DFD-Level0

15.2. Level 1 DFD

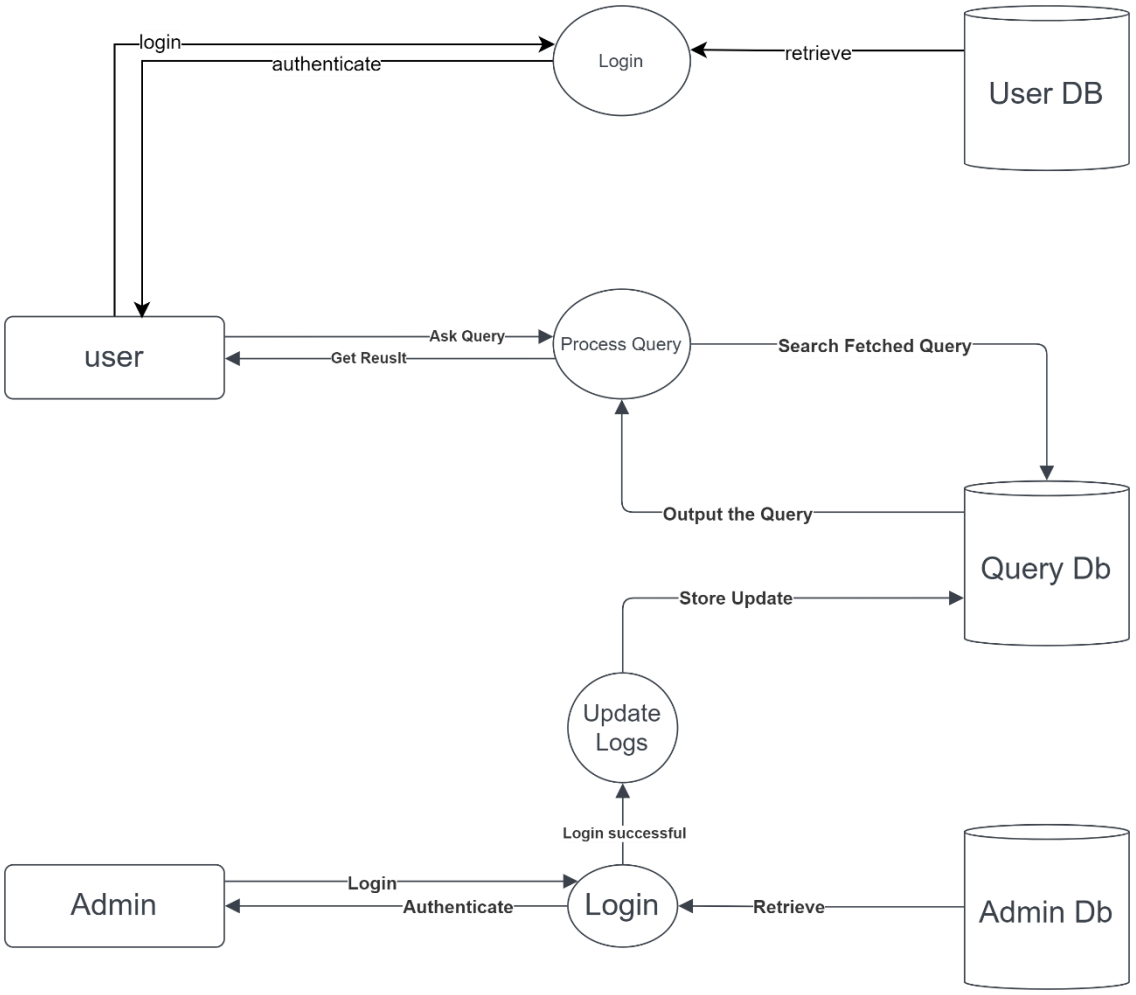

Figure 15:DFD-Level1

16. State Machine Diagram

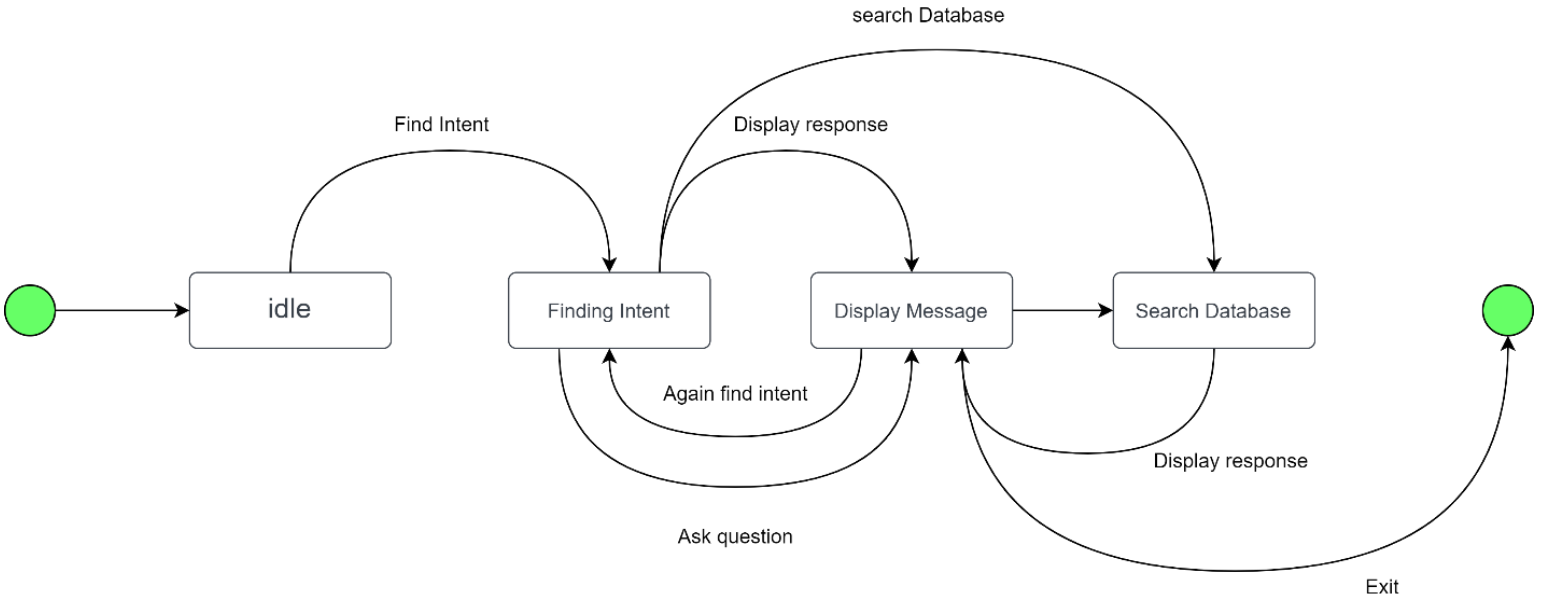

Figure 16:State Machine Diagram

17. Test Plan for FASTBot

17.1. Introduction:

The purpose of this Test Plan is to document the testing approach and test cases for Fast bot. Fast bot is a web-based chatbot to assist students and admission aspirants with their queries in a smart way.

17.2. Test Environment:

- Postman
- Operating System: Windows 10
- Web Browser: Google Chrome
- Hardware: Desktop/Laptop

17.3. Test Approach:

The following approach will be used to test FastBot :

1. The scope of testing in our case entire website and its modules, including Login, Live Chat, Ask Fast bot, Answer Query, Give Feedback, View Feedback, View Reports.
2. Postman will be user for API testing for the NodeJs backend, while UI testing will be used for the React frontend.
3. Test cases will be created for each module, including input values, expected output, and actual output. These test cases will cover all possible scenarios and edge cases.

17.4. Test Reporting:

Test results will be reported in the following format:

- Test case ID
- Input values
- Expected output
- Actual output
- Pass/Fail status

17.5. Test Deliverables:

The following deliverables will be produced from the unit testing:

- Unit Test Plan
- Unit Test Results.

17.6. Test Management:

The developers will be responsible for conducting and verifying the unit tests i.e., writing the unit tests, executing them, verifying the test results and reporting any issues.

17.7. Test Cases:

17.7.1. TC-ChatLive:

Test Case ID	TC-ChatLive
Test Case	Chat Live with Agent
Objective	To verify if the user can chat with the live agent in order to solve user's query.
Preconditions	The user has successfully logged in to the system and has opted live chat for the resolution of his query.
Test Steps	1. Navigate to the "Chat Live" part of website. 2. Enters his email in order to start the chat. 3. Enter his query in the box to the live chat agent. 4. Ensure that the message is transferred to the live chat agent and live chat agent answer his query.
Expected result	• The user can communicate with the live chat agent.
Input	User clicks on the live chat button.
Actual result	• The user successfully communicates with the live chat agent.
Test Status	Passed.

17.7.2. TC-GiveFeedback :

Test Case ID	TC-GiveFeedback
Test Case	Give Live Chat/Fast Bot Feedback
Objective	To verify that the user can give his/her feedback to the service he/she received.
Preconditions	The user has once asked a query from live/chat agent. The user clicks on the feedback bar.

Test Steps	1. Navigate to the "Feedback" part of website. 2. Fills his credentials. 3. Type in any kind of feedback he/she wants to give. 4. Rate the service with stars as the level of overall satisfaction. 5. Submit the feedback. 6. Verify that the feedback has been saved and is visible to the admin.
Expected result	• Verify that the feedback is submitted. • Verify that the feedback is visible to the admin.
Input	User selects the feedback menu and gives feedback in the form of message and stars.
Actual result	• The feedback menu appears successfully. • User submits his credentials and feedback. • Star Rating done by the user works fine. • The feedback has been saved on the admin server.
Test Status	Passed.

17.7.3. TC-AskFastBot:

Test Case ID	TC-AskFastBot
Test Case	Ask Fast Bot
Objective	To verify that the user effectively communicates with FAST Bot.
Preconditions	The user has logged in and has opted fast bot for the resolution of his query.
Test Steps	1. Navigate to the "Fast Bot" section of the webpage. 2. Type in your query for fast bot. 3. Fast bot answers your query. 4. Verify that Fast Bot's answer is relevant and specific for the question.
Expected result	• Verify that the user is able to communicate with Fast Bot. • Verify that the answer given by the fast bot is relevant and answers your questions.
Input	User selects fast bot and type his/her query.
Actual result	• The user is effectively able to communicate with fast bot.

	• Fast Bot replies to the question. • The reply answers the user's query.
Test Status	Passed.

17.7.4. TC-ViewReport:

Test Case ID	TC- ViewReport
Test Case	View Report
Objective	To verify that the admin is able to view the model's accuracy.
Preconditions	Admin selects the View Report button on the admin panel.
Test Steps	1. Open Admin Module. 2. Click on the view report button on the web page.
Expected result	• Verify that the admin is able to view the model's accuracy and validation on the admin module.
Input	Admin selects the view report button.
Actual result	• Admin is able to see the report.
Test Status	Passed.

17.7.5. TC-ViewFeedback:

Test Case ID	TC- ViewFeedback
Test Case	View Feedback
Objective	To verify that the admin is able to view the user's feedback.
Preconditions	Admin selects the View Feedback button on the admin panel.
Test Steps	3. Open Admin Module. 4. Click on the "View Feedback" button on the web page.
Expected result	• Verify that the admin is able to view the customer's feedback.
Input	Admin selects the view feedback button.
Actual result	• Admin is able to see the user's feedback.
Test Status	Passed.

17.8. Unit Test Results/REPORT:

Module: User				
Test case ID	**Input Values**	**Expected Output**	**Actual Output**	**Pass/Fail Status**
TC-Login	Username: ahmad@gmail.com Password:1234	User has been logged in successfully!	User account created. User logged in successfully.	Passed
TC- ChatLive	Hi! I am Anas! Can you tell me where Fast Faisalabad is located?	Hello Anas! This is Talal! How may I help you? Yes, it is located on Sargodha Road Near Loonaywala Stop.	Yes, it is located on Sargodha Road Near Loonaywala Stop.	Passed

TC-GiveFeedback :	Fills the Credentials: Name:Anas Email:aatiq145@gmail.com Message: Fast Bot is excellent!	Submitted	Submitted	Passed
TC-AskFastBot:	Can I pay my fee in installments?	Yes, you can pay your fee in installments.	Yes, you can pay your fee in installments to do that you have to submit a general request form to the committee stating your reason and get it approved by the committee head and then finally submit it to the account's office.	Passed
Module: Admin				
TC-ViewReport	Admin clicks on the View Report Button on the webpage.	The Report is visible to the admin.	The Report is visible to the admin.	Passed
TC-ViewFeedback	Admin clicks on the View Feedback Button on the webpage.	The feedback is visible to the admin.	The feedback is visible to the admin.	Passed

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Final Year Project FAST BOT FYP Group Anas Rao 19F-0376 Talal Ahmed 19F-0245 Abdul Saboor 19F-0252 Supervised by Mr. Asif Ameer Department of Computer Science National University of Computer and Emerging Science Chiniot- Faisalabad Campus, Pakistan 2023 ii Anti-Plagiarism Declaration This is to declare that the above publication produced under the: Title: is the sole contribution of the author(s) and no part hereof has been reproduced on as it is the basis (cut and paste) which can be considered as Plagiarism. All referenced parts have been used to argue the idea and have been cited properly. I/We will be responsible and liable for any consequence if a violation of this declaration is determined. Date: Student 1 Name: Signature: Student 2 Name: Signature: Student 3 Name: Signature: iii Abstract Fast Bot would provide a platform that connects Admission Aspirants, New Admissions, and Existing Students with expert Information on FAST NUCES Chiniot Faisalabad Campus. The main purpose of the application is to solve the admission and hostel queries of the students of FAST NUCES Chiniot Faisalabad Campus without ever needing to contact any staff member. A better knowledge of campus facilities before admission would help students start their academic journey with confidence. Our admin and live chat agent would also be helping them throughout the process of getting admission and securing a hostel seat, providing authentic and timely alerts to the admission aspirants and students. The admin panel will manage the answers given through the chatbot making sure that all the queries of users are solved swiftly. iv Table of Contents

1. Introduction Fast Bot would be an intelligent chatbot which will be able to answer queries. In our project we will be covering hostel and admission queries only. Fastbot would also have a live chat agent and feedback feature. Fastbot will be a source of authentic answers available 24/7 in a user-friendly environment. A web app that is efficient and easier to use. 2. Vision Document In this section, project vision is discussed in detail. 2.1. Problem Statement Problem of 1. No Authentic Source of Information 2. Students relying on unverified information on social media 3. Students and families have to visit campus physically or call university staff for information regarding hostel and admissions Affects 1. It creates unnecessary confusion over admission procedures 2. University staff are burdened with calls during office timing Impact of which 1. Admission aspirants having vague mind about campus 2. Posting queries on social media apps such as Facebook Successful solution would be 1. A 24/7 available interactive source of information 2. A live chat agent to explain things further 3. Bridge between admission aspirants and information Table 1: Problem Statement 2.2. Business Opportunity Fast Bot would be a web based chatbot to automate all the queries related to admission and hostel facilities. Now a days, everything is attracted towards software technology to make life easier so Fast Bot will facilitate students in an effective way. It will provide an effective way to handle the queries of students and guide them regarding admission and hostel facilities. It would also help the university to attack more admissions and would also in result reduce the workload on the staff. This first of its kind system will have a wide range of questions usually asked by a student or student's parent. This will be a one stop-shop for all the queries related to the campus. Answers shall be simple and easy to understand. 2.3. Objectives The aim of this project is to contribute to the solution of the problem of direct communication between applicants and the university. The main objectives of the project are as follows: • To develop a database where all the relevant information about questions, answers, keywords, logs and feedback will be stored. • Natural Language Processing (NLP) algorithm in order to retrieve the best possible answer. • To develop a web interface which aims to give the ability to potential students and their families to submit questions in a chatbot and get authentic solutions. 2.4. Scope FAST Bot is a web application. The main problem we're currently facing is the information gap between admission applicants and our campus. Fast Bot will connect the students directly with authentic information in an interactive environment. Fast Bot will make admission process and securing hostel seat easier and efficient. Studies have shown that people find it easier and hassle free to talk to a bot. Furthermore, after being deployed at the campus website Fast Bot will be available 24/7 to the students and applicants for any query. 2.5. Constraints • The system shall not require any hardware development or procurement. • Internet connectivity issues may result in the system not working properly. • The system would be able to understand sentences in the English language only, use of any other language would not produce any result. 2.6. Stakeholder and User Descriptions Stakeholder and User

Descriptions are defined in detail below. 2.6.1. Market Demographics Our target market is FAST NUCES students and admission applicants and to provide a better platform for their queries and to make it easy for university to communicate effectively. Use of android phones and websites is increasing day by day, everything is now shifting from manual system to automated systems. It can be used for different universities but for this project FAST NUCES is targeted. 2.6.2. Stakeholder Summary Name Description Responsibilities FAST Bot Developers It includes those who are involved in designing and implementing of this project. 1. Design and develop Fast Bot and Deploy it on the website. 2. Proper testing should be applied End-User End users include all FAST students and admission applicants. 1. Should have knowledge of using web applications Supervisors of project Supervisor will be stakeholders of this product as they are involved in development process of this project with the development team. 1. Gives direction to development 2. team Ensures that the system 3. will be maintainable Ensures that there will be a market demand for the product's features 4. Monitors the project's progress 5. Ensures that project follows the documents generated during project planning and work products are properly delivered Table 2: Stakeholder Summary 2.6.3. User Environment Any user with internet connection will be able to access the website. End-users must have knowledge of using a web application and other basic information about asking a query. The proper user interface and guidelines must be sufficient to educate the users on how to use the web application without facing any problems. It is a chat bot so it must be deployed on the website. 2.6.4. Stakeholder Profiles The Stakeholder Profiles Attributes of the system are listed in this section. 2.6.4.1. Supervisors of the Project Representatives Supervisor: Mr. Asif Ameer Co-supervisor: Mr. Sajid Anwar Description They are involved in supervising activities of development process Type They are technical stakeholders. They have expertise in domains which are being applied to this project i.e., natural language processing, machine learning, artificial intelligence. Responsibilities 1. Gives direction to development team 2. Ensures that the system will be maintainable 3. Ensures that there will be a market demand for the product's features 4. Monitors the project's progress 5. Ensures that project is in compliance with the documents generated during project planning and work products are properly delivered 6. They will facilitate development team to complete this project within specified resources. Success Criteria The completion of features which are being committed by development team at start of the project. Involvement 1. Requirement reviewer 2. Senior managers 3. Reviews implementation Comments/Issues None Table 3: Supervisors of the Project 2.6.4.2. Development Team of the Project Representatives Mr. Anas Rao Mr. Talal Ahmed Mr. Abdul Saboor Description They are involved in designing of the web app. Type They are technical stakeholders. Responsibilities 1. Should design this chat bot considering user's needs 2. Proper testing should be applied to make it as effective as possible 3. Proper dataset is required for better answers Success Criteria The completion of features which are being committed by development team at start of the project. Involvement 1. Designers 2. Testers Deliverable 1. Documentation 2. Data acquisition 3. System Training Comments/Issues None Table 4: Development Team of the Project 3. System Requirement Specification In this section, features and requirements of the system are explained. 3.1. System Features • NLP Powered Chatbot • Admin Module • User Module 3.2. Functional Requirements The functional requirements of the system are listed below. 3.2.1. Complex Dialogues In addition to understanding and interacting within conversations, Fast Bot has Natural Language Processing to analyze the intent of a conversation. It can identify the intent of a question to provide an accurate answer and suggest options to confirm or resolve the issue. 3.2.2. Fast onboarding Staring a conversation on Fast Bot is extremely easy. Fast Bot can be launched quickly and answer custom query readily. 3.2.3. Easy Handling Fast Bot uses a well-designed user interfaces and experience (UI/UX). It can manage huge amounts of data seamlessly. It can answer queries, connect the user to live chat agent and send alerts to users and has a clear and structured overview of conversations. 3.2.4. Analytics and Reporting Fast Bot is an excellent source of data and customer information. An in-depth Fast Bot analytics and

analysis of customer information will give us the information we need to tailor it according to user's expectation. Moreover, this analysis will provide us with the valuable information on the efficiency of Fast Bot. 3.3. Non-Functional Requirements The functional requirements of the system are listed below. 3.3.1. Performance Requirements • The application would access the server Database within no time when the user access it. • Very less response time is expected. • Fast Bot would compute results effectively and quickly, • The system will connect the user to live chat agent instantly. 3.3.2. Safety Requirements This is a web application to be used by students and applicants. As only one user can use application at a time on the website, so in this case, no safety requirements would be required. There is a separate module for Administration only. We will take standardized input from user. We will prevent our database Injection attacks. Therefore, our system always will be in a safe state. 3.3.3. Security Requirements As it is a chatbot which will be readily available to anyone who wants to access it. There will be no user authentication. However, the data of private conversations would be in secure hands. 3.3.4. Software Quality Attributes The Software Quality Attributes of the system are listed below. 3.3.4.1. Availability The application would be available 24 hours a day, 7 days a week. 3.3.4.2. Usability The System would be easy-to-use and would be appropriate for the target market of applicants and students. The application would include help, within itself, for the user. Users would not require the use of a hardcopy Manual to use the web app. 4. Use Case Diagram Figure 1: Use Case Diagram 5. Use Cases 5.1. Login Use case ID UC-01 Use case Name Login Actor Users, system Type Primary Description The user would provide his credentials to be logged in to the system. After logging in the user would be able to use the Fast bot. 5.2. Chat Live Use case ID UC-02 Use case Name Chat Live Actor Users, Live Chat Agent Type Primary Description Connects the user to a live chat agent who can answer the complex queries which are out of scope for the chatbot. 5.3. Give Feedback Use case ID UC-03 Use case Name Give Feedback Actor Users, system Type Primary Description The user would be able to give feedback on the answer received by the Chatbot. 5.4. View Feedback Use case ID UC-04 Use case Name View Feedback Actor Admin Type Primary Description Admin will be able to view all the feedbacks from the users. 5.5. Ask Fast bot Use case ID UC-05 Use case Name Ask Fast bot Actor User, Fast bot Type Primary Description The user will be able to ask queries directly to fast bot. 5.6. Answer Query Use case ID UC-06 Use case Name Answer Query Actor Fast bot, User Type Primary Description Fast bot will appropriately answer user queries 5.7 View Reports Use case ID UC-07 Use case Name View Reports Actor System, Admin Type Primary Description Admin will be able to view the efficiency reports generated by the system. 6. Expanded Use Case 6.1. Communication with Fastbot Use Case Reference UC-05 Use case Name Sending/receiving messages Actor Users, system Description The user would be able to communicate with the chatbot and get their queries answered and resolved. Trigger User has selected fastbot for a query. Pre-Condition User has logged in. Post Condition Conversation has been initiated successfully. Normal Flow • Enter the question/ query and the bot will answer it. Alternative Flow • User can communicate with live chat agent if Fastbot does not respond Special Requirement Availability of Internet Frequency of Use High Assumption The user knows how to navigate and ask queries from the bot. 6.2. User Feedback to Fast bot's Response Use Case Reference UC-03 Use case Name User Feedback to Fast bot's Response Actor Users, System, Admin Description The user will give feedback to the bot's response to user query. User can write his/her remarks and experience in the feedback. Trigger User opens the feedback tab. Pre-Condition Fastbot answers to user's query. Post Condition Feedback is submitted successfully. Normal Flow After receiving answer, user opens feedback tab. Alternative Flow User can contact Live Chat Agent to give feedback. Special Requirement Availability of Internet Frequency of Use High Assumption The NLP model can answer query successfully. 6.3. Live chatting with Chat Agent Use Case Reference UC-02 Use case Name Live chatting Actor Users, Chat Agent Description Connects the user to a live chat agent who can answer the complex queries which are out of scope for the chatbot. Trigger The user selects the option for live chat in case if the bot cannot answer a query Pre-Condition The

user selects the option for live chat with agent. Post Condition User's queries are successfully answered by the university representative through live chat support. Normal Flow • The user communicates with live chat agent. Alternative Flow • Live chat agent may not be available user will have to wait. Special Requirement Availability of Internet and Live Chat Agent Frequency of Use High Assumption Chat Agent is available. 6.4. Bot Efficiency Report Use Case Reference UC-07 Use case Name Bot Efficiency Report Actor Users, System Description System will calculate the model's accuracy and validation and show it to the admin. Trigger Admin opens the reports tab. Pre-Condition Model has been trained once. Post Condition Reports are successfully generated. Normal Flow • Model has been trained once and the reports are generated. Alternative Flow • Reports will have to be generated after the model has been trained. Special Requirement Model training data must be available. Frequency of Use High Assumption System training yields a good accuracy and validation efficiency. 7. Domain Model l Figure 2: Domain Model 8. Class Diagram Figure 3: Class Diagram 9. Sequence Diagram Figure 4: Sequence Diagram 10. Architecture Diagram Figure 5: Architecture Diagram 11. System Sequence Diagram 11.1. Login Figure 6: SSD-Login 11.2. Live Chat Figure 7: SSD-Live Chat 11.3. Give Feedback Figure 8:SSD-Give Feedback 11.4. View Feedback Figure 9:SSD-View Feedback 11.5. View Reports Figure 10:SSD-View Report 12. Activity Diagram Figure 11:Activity Diagram 13. Package Diagram Figure 12:Package Diagram 14. Component Diagram Figure 13:Component Diagram 15. Data Flow Diagram 15.1. Level 0 DFD Figure 14:DFD-Level0 15.2. Level 1 DFD Figure 15:DFD-Level1 16. State Machine Diagram Figure 16:State Machine Diagram 17. Test Plan for FASTBot 17.1. Introduction: The purpose of this Test Plan is to document the testing approach and test cases for Fast bot. Fast bot is a web-based chatbot to assist students and admission aspirants with their queries in a smart way. 17.2. Test Environment: • Postman • Operating System: Windows 10 • Web Browser: Google Chrome • Hardware: Desktop/Laptop 17.3. Test Approach: The following approach will be used to test FastBot : 1. The scope of testing in our case entire website and its modules, including Login, Live Chat, Ask Fast bot, Answer Query, Give Feedback, View Feedback, View Reports. 2. Postman will be user for API testing for the NodeJs backend, while UI testing will be used for the React frontend. 3. Test cases will be created for each module, including input values, expected output, and actual output. These test cases will cover all possible scenarios and edge cases. 17.4. Test Reporting: Test results will be reported in the following format: • Test case ID • Input values • Expected output • Actual output • Pass/Fail status 17.5. Test Deliverables: The following deliverables will be produced from the unit testing: • Unit Test Plan • Unit Test Results. 17.6. Test Management: The developers will be responsible for conducting and verifying the unit tests i.e., writing the unit tests, executing them, verifying the test results and reporting any issues. 17.7. Test Cases: 17.7.1. TC-ChatLive: Test Case ID TC-ChatLive Test Case Chat Live with Agent Objective To verify if the user can chat with the live agent in order to solve user's query. Preconditions The user has successfully logged in to the system and has opted live chat for the resolution of his query. Test Steps 1. Navigate to the "Chat Live" part of website. 2. Enters his email in order to start the chat. 3. Enter his query in the box to the live chat agent. 4. Ensure that the message is transferred to the live chat agent and live chat agent answer his query. Expected result • The user can communicate with the live chat agent. Input User clicks on the live chat button. Actual result • The user successfully communicates with the live chat agent. Test Status Passed. 17.7.2. TC-GiveFeedback : Test Case ID TC-GiveFeedback Test Case Give Live Chat/Fast Bot Feedback Objective To verify that the user can give his/her feedback to the service he/she received. Preconditions The user has once asked a query from live/chat agent. The user clicks on the feedback bar. Test Steps 1. Navigate to the "Feedback" part of website. 2. Fills his credentials. 3. Type in any kind of feedback he/she wants to give. 4. Rate the service with stars as the level of overall satisfaction. 5. Submit the feedback. 6. Verify that the feedback has been saved and is visible to the admin. Expected result • Verify that the feedback is submitted. • Verify that the feedback is visible to the admin. Input User selects the feedback menu and gives feedback in the

form of message and stars. Actual result • The feedback menu appears successfully. • User submits his credentials and feedback. • Star Rating done by the user works fine. • The feedback has been saved on the admin server. Test Status Passed. 17.7.3. TC-AskFastBot: Test Case ID TC-AskFastBot Test Case Ask Fast Bot Objective To verify that the user effectively communicates with FAST Bot. Preconditions The user has logged in and has opted fast bot for the resolution of his query. Test Steps 1. Navigate to the "Fast Bot" section of the webpage. 2. Type in your query for fast bot. 3. Fast bot answers your query. 4. Verify that Fast Bot's answer is relevant and specific for the question. Expected result • Verify that the user is able to communicate with Fast Bot. • Verify that the answer given by the fast bot is relevant and answers your questions. Input User selects fast bot and type his/her query. Actual result • • • The user is effectively able to communicate with fast bot. Fast Bot replies to the question. The reply answers the user's query. Test Status Passed. 17.7.4. TC-ViewReport: Test Case ID TC- ViewReport Test Case View Report Objective To verify that the admin is able to view the model's accuracy. Preconditions Admin selects the View Report button on the admin panel. Test Steps 1. Open Admin Module. 2. Click on the view report button on the web page. Expected result • Verify that the admin is able to view the model's accuracy and validation on the admin module. Input Admin selects the view report button. Actual result • Admin is able to see the report. Test Status Passed. 17.7.5. TC-ViewFeedback: Test Case ID TC- ViewFeedback Test Case View Feedback Objective To verify that the admin is able to view the user's feedback. Preconditions Admin selects the View Feedback button on the admin panel. Test Steps 3. Open Admin Module. 4. Click on the "View Feedback" button on the web page. Expected result • Verify that the admin is able to view the customer's feedback. Input Admin selects the view feedback button. Actual result • Admin is able to see the user's feedback. Test Status Passed. 17.8. Unit Test Results/REPORT: Module: User Test case ID Input Values Expected Output Actual Output Pass/Fail Status TC-Login Username: ahmad@gmail.com Password:1234 User has been logged in successfully! User account created. User logged in successfully. Passed TC-ChatLive Hi! I am Anas! Can you tell me where Fast Faisalabad is located? Hello Anas! This is Talal! How may I help you? Yes, it is located on Sargodha Road Near Loonaywala Stop. Yes, it is located on Sargodha Road Near Loonaywala Stop. Passed Fills the Credentials: TC-GiveFeedback : Name:Anas Email:aatiq145@gmail.co m Submitted Submitted Passed Message: Fast Bot is excellent! TC-AskFastBot: Can I pay my fee in installments? Yes, you can pay your fee in installments. Yes, you can pay your fee in installments to do that you have to submit a general request form to the committee stating your reason and get it approved by the committee head and then finally submit it to the account's office. Passed Module: Admin Admin clicks on the View TC-ViewReport Report Button on the webpage. Admin clicks on the View TC-ViewFeedback Feedback Button on the webpage. The Report is visible to the admin. The feedback is visible to the admin. The Report is visible to the admin. The feedback is visible to the admin. Passed Passed 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34