COMP 3059 – Capstone Project I

Software Requirements Analysis and Design Assignment

This assignment is an overview to gather the software needs with requirements analysis and help to proceed with the design.

The requirements analysis helps to break down functional and non-functional requirements into a basic design view to provide a clear system development process framework. It involves various entities, including businesses, stakeholders, and technology requirements.

The design is the activity following requirements specification and before programming. Software design usually involves problem-solving and planning a software solution.

To work on this assignment you could use the references and a sample template given below. The sample template can be customized to suit the nature of your project.

Reference Readings/Example:
http://www.uacg.bg/filebank/acadstaff/userfiles/publ_bg_397_SDP_activities_and_steps.pdf

www.cse.msu.edu/~chengb/RE-491/Papers/SRSExample-webapp.doc

Reference template:
www.tricity.wsu.edu/~mckinnon/cpts322/cpts322-srs-v1.doc

1.0 Introduction

The Introduction section provides an overview of the system using software requirements analysis and design for the scope of the system.

In the fast-paced world, It's becoming harder for restaurants to effectively handle the flood of consumer calls in today's fast-paced, smartphone-enabled environment. Even with the best of intentions on the part of the restaurant, this overload frequently results in missed calls, which might give the appearance of poor service.

We want to transform this experience for restaurant owners with our cutting-edge offering. Restaurants may finally wave goodbye to the annoyance of missed calls by putting our unique system into place. Our system is built to handle incoming calls in an efficient manner, guaranteeing that no consumer question is left unaddressed. Every call will be effectively managed or routed to the appropriate department thanks to sophisticated call distribution and management capabilities, removing the possibility of unanswered calls leading to unhappy customers.

Furthermore, our technology has a powerful transcription feature in addition to call management. The restaurant will transcribe each call it receives in order to capture spoken discussions in writing form. After that, these transcriptions are neatly kept in a safe database. This accomplishes two things:

The transcriptions are available for viewing at any time to restaurant managers and owners. This helps them to monitor interactions, guarantee that quality service standards are upheld, and handle any possible problems that might emerge from the contacts.

The transcripts that have been saved are an invaluable source of information. Restaurants can learn about frequent questions, client preferences, and areas for development by examining these encounters. By using this data, services may be improved, procedures can be streamlined, and overall customer happiness can be raised.

The large amount of data gathered through call transcriptions gives this system a strategic edge in addition to reducing the stress on the restaurant's communication infrastructure.

Essentially, our software serves as a comprehensive tool for improving customer service, streamlining operations, and leveraging data to boost restaurant success, rather than merely addressing the immediate problem of missed calls.

1.1 Purpose

This document describes the high-level software requirements for the system. It describes the what, not how, of the capabilities of the system for the intended audiences.

With the help of the AI system created specifically for restaurant call management, staff members may more efficiently handle client interactions. Employees may handle customer calls more effectively by utilizing AI technology, which creates a smooth experience for both the restaurant staff and the patrons.

The AI is designed to reply to incoming calls intelligently, serving as a customer service representative. It can help with order taking, general inquiries, and commonly asked questions concerning the menu, hours of operation, and reservations. By doing this, it considerably lessens the workload for staff members, freeing them up to concentrate on other important duties related to the restaurant.

Order Fulfillment Assistance: Calls about orders and menu inquiries are common among the patrons. The AI can reliably collect orders, provide recommendations, and lead users through the menu with efficiency. In addition to helping consumers, this guarantees accurate order recording, reducing the possibility of mistakes that could arise from manually taking orders over the phone.

Managing Routine Inquiries: A lot of customer questions have similarities and frequently don't call for a human employee's knowledge. These common questions can be efficiently handled by the AI, giving the workforce more time to focus on more intricate customer needs or crucial operational duties.

Enhanced Customer Service: The AI improves customer service by responding to calls from customers quickly, giving precise information, and making ordering easier. It guarantees that clients receive accurate, timely, and polite support, which raises customer satisfaction.

Time management and focus: By letting the AI handle simple, repetitive tasks, restaurant staff members have more time to focus on more important duties like preparing food, serving diners, upholding hygienic standards, and making sure the business runs smoothly.

Through the utilization of artificial intelligence (AI), restaurants can achieve notable operational efficiencies, enhance customer satisfaction, and free up staff time for more challenging and valuable work, all of which contribute to the establishment's overall productivity and efficiency.

1.2 Scope

This explains what the proposed system will and will not do. Describe relevant benefits, objectives and goals. The description of scope should be consistent with the Project Plan.

For restaurants and similar organizations, the AI Call Assist solution is a complete and innovative system that is aimed to revolutionize call handling and customer support procedures. It combines several essential aspects with state-of-the-art automation and artificial intelligence technology to provide unmatched effectiveness and client pleasure.

Advanced Call Management and Routing: To effectively route incoming calls, the system makes use of sophisticated call routing algorithms. It makes that every call is promptly and precisely routed to the right department or person by intelligently identifying client demands and classifying queries. This function improves customer service and reduces call wait times.

Order Assistance and Processing: By guiding customers via a guided menu interaction, the AI makes order processing more efficient. It ensures a seamless and error-free ordering experience by suggesting popular or customized menu items based on preferences, accurately taking orders, and verifying facts.

Transcription and Archiving: By writing down incoming calls, the system generates a useful database of exchanges. Managers can check call transcripts for quality assurance, training, or to gain insightful information for operational changes. These transcripts are conveniently archived and kept safe.

Data Analysis and Reporting: The program offers analytical tools for obtaining insightful information from call logs. It produces analytics and reports that emphasize important data such as peak calling hours, commonly asked queries, and consumer preferences. Making educated judgments to improve services and optimize operations is made easier with the help of this data-driven methodology.

Personalization and Customer Recognition: The system may identify repeat consumers by using advanced caller identification and historical data analysis. This makes it possible to have individualized conversations, remember past preferences or orders, create a feeling of familiarity, and provide great customer service.

Overall, the AI Call Assist solution is a dynamic and versatile tool that not only optimizes call management but also provides actionable insights, personalized customer interactions, and ensures a seamless and efficient experience for both customers and restaurant staff.

2.0 System Overview

The System Overview section introduces the system context and design.

2.1 Project Perspective

The envisioned AI-powered call handling system is a new self-contained system designed to automate the process of answering incoming phone calls and addressing callers' queries through voice interactions. It is not a follow-on member of a system family nor a direct replacement for existing systems, but it will integrate with current telecommunication technologies to provide a seamless, efficient, and intelligent voice-response service. This system aims to improve customer satisfaction and operational efficiency by providing immediate, accurate, and 24/7 support.

2.2 System Context

The system is designed to operate within the context of customer service and support, intended to serve as a first point of contact for customers seeking information or assistance. It will interface with existing customer relationship management (CRM) systems to retrieve customer data, use AI to process and understand inquiries and apply text-to-speech technology to communicate with callers. Strategic issues addressed by the system include reducing human agent workload, minimizing wait times for customers, and providing a scalable solution to handle increasing call volumes.

2.3 General Constraints

The system will be subject to the following constraints:

- Privacy Compliance: Must adhere to privacy laws and regulations regarding the handling of personal information, including data storage, processing, and transmission.
- Scalability: Designed to efficiently scale up to handle a high volume of concurrent calls without degradation in performance.
- Interoperability: Must be compatible with existing telephony infrastructure and CRM software.
- Accuracy: Required to maintain high accuracy in both speech recognition and response generation to ensure customer trust and satisfaction.
- Reliability: Expected to have high uptime and robust error handling to manage exceptions without human intervention.
- Latency: Should respond with minimal delay to maintain a natural conversation flow with the caller.

2.4 Assumptions and Dependencies

Assumptions:

- Callers will interact with the system in one of the supported languages.
- The AI will have access to up-to-date and comprehensive knowledge bases to respond to inquiries.
- Existing CRM systems will be capable of integrating with the AI through APIs.

Dependencies:

- Continuous training data from customer interactions to improve AI accuracy and capability.
- Dependence on third-party service providers for speech-to-text and text-to-speech technologies.
- Reliable internet connectivity and infrastructure to support cloud-based AI computations.

3.0 Functional Requirements

This section describes specific features of the software project. If desired, some requirements may be specified in the use-case format and listed in the Use Cases Section.

3.1 <AI Call Assist Functional Requirement>

The AI Call Assist system must intelligently manage incoming calls to appropriately direct, handle, and process customer inquiries for enhanced efficiency and customer satisfaction.

Inputs:

- **Incoming Calls**: The system receives calls from customers, capturing relevant information such as caller ID, reason for the call (e.g., ordering, inquiries, reservations), and any specific details provided during the call.

Processing:

- **Natural Language Processing**: The system should employ advanced NLP algorithms to understand and interpret customer inquiries accurately, irrespective of accents, speech patterns, or variations in language usage.

- **Query Categorization**: The AI should categorize incoming queries based on predetermined criteria to effectively identify the nature of the call (e.g., order placement, general inquiries, reservations) for optimal handling.

Outputs:

- **Efficient Call Routing**: The system routes the call to the appropriate department or individual, ensuring prompt and accurate handling. For instance, calls requesting menu information are directed to the menu assistance module, while order-related calls are transferred to the order processing section.
- **Caller Information Display**: Relevant information about the caller, such as previous order history, frequent inquiries, or any personalized details, is displayed for staff reference (if available).

Use Case Title: **Intelligent Call Routing**

Actor: **AI Call Assist System, Restaurant Staff**

Scenario:

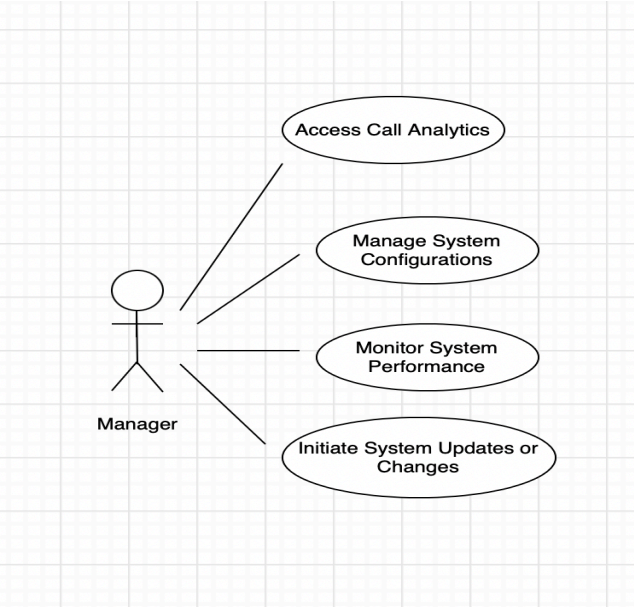
- **Input**: The AI receives an incoming call from a customer.
- **Processing**: NLP algorithms analyze the caller's query, categorizing it based on the nature of the request (e.g., menu inquiry, order placement).
- **Output**: The call is intelligently routed to the corresponding department or module (e.g., menu assistance, order processing), and pertinent caller information is displayed for the attending staff member.

Anticipated Result: The call is routed effectively, guaranteeing accurate and timely handling according to the type of consumer query.

By utilizing NLP and intelligent routing to manage incoming calls effectively and seamlessly, this functional requirement guarantees that the AI Call Assist system offers a positive and productive user experience.

3.2 Use Cases

3.2.1 Use Case #1 (Manager)



Access Call Analytics

- Description: To view reports and data insights, the manager logs onto the call analytics dashboard.
- Objective: To comprehend call patterns and acquire knowledge about operational effectiveness and service quality.

Manage System Configurations

- Description: The AI Call Assist system has parameters that the manager can control or modify.
- Objective: To optimize call handling and system performance by implementing the necessary modifications or improvements.

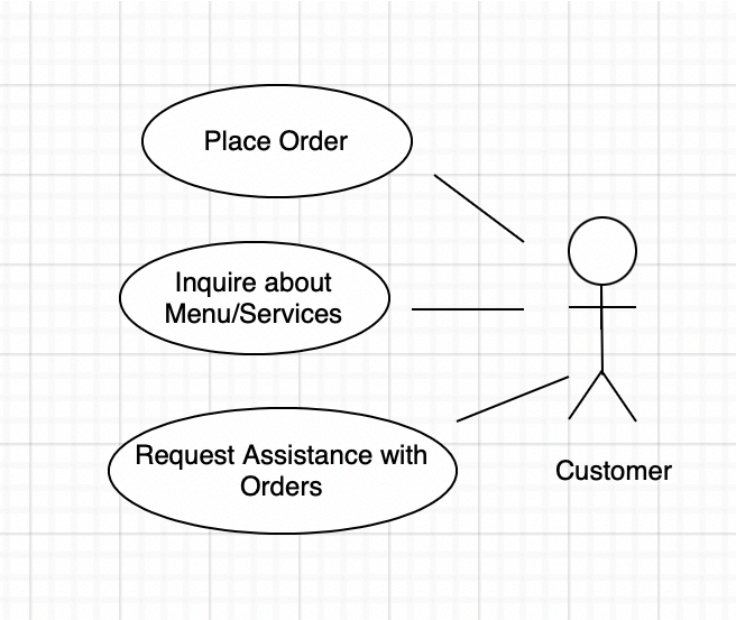
Monitor System Performance

- Description: The manager keeps an eye on the system's performance, spotting any problems or areas that need to be improved.
- Objective: To guarantee that the system is operating at peak efficiency and address any possible issues.

Initiate System Updates or Changes

- Description: The manager has the authority to start making changes or updates to the AI Call Assist system.
- Goal: The introduction of new functions, enhancements, or modifications is intended to improve service delivery.

3.2.2 Use Case #2 ...



Place Order

- Description: The customer can place an order through the AI Call Assist system.
- Goal: To request and confirm a food order or reservation.

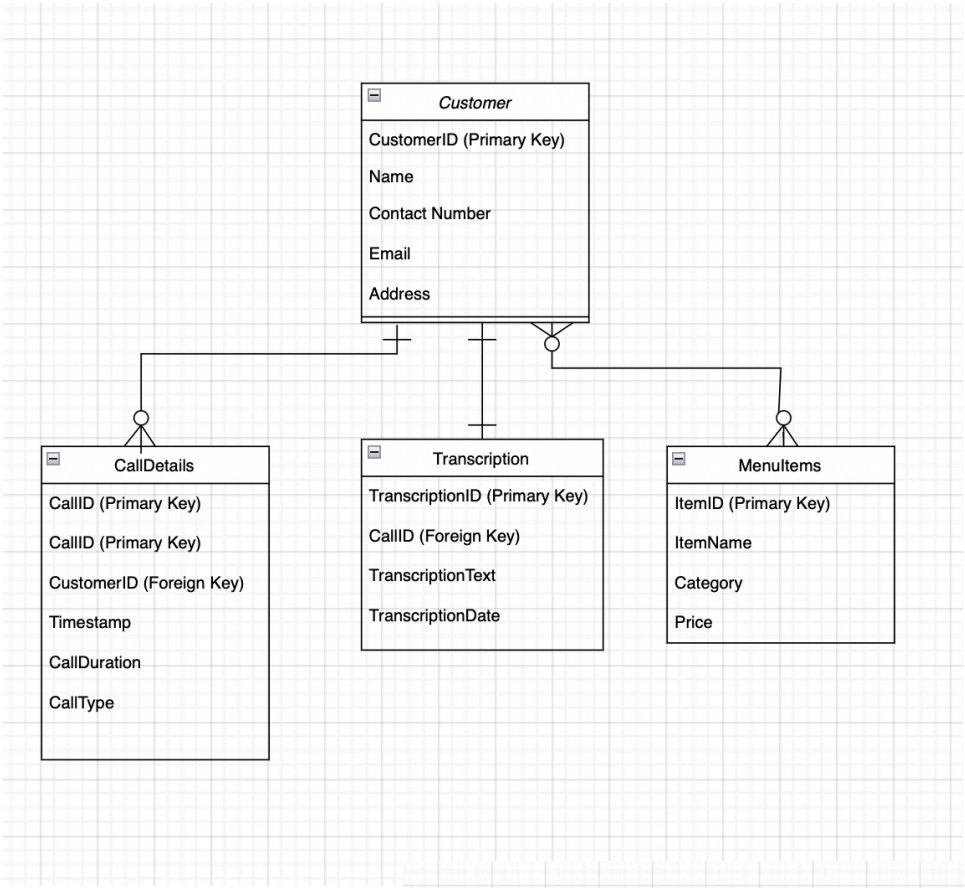
Inquire about Menu/Services

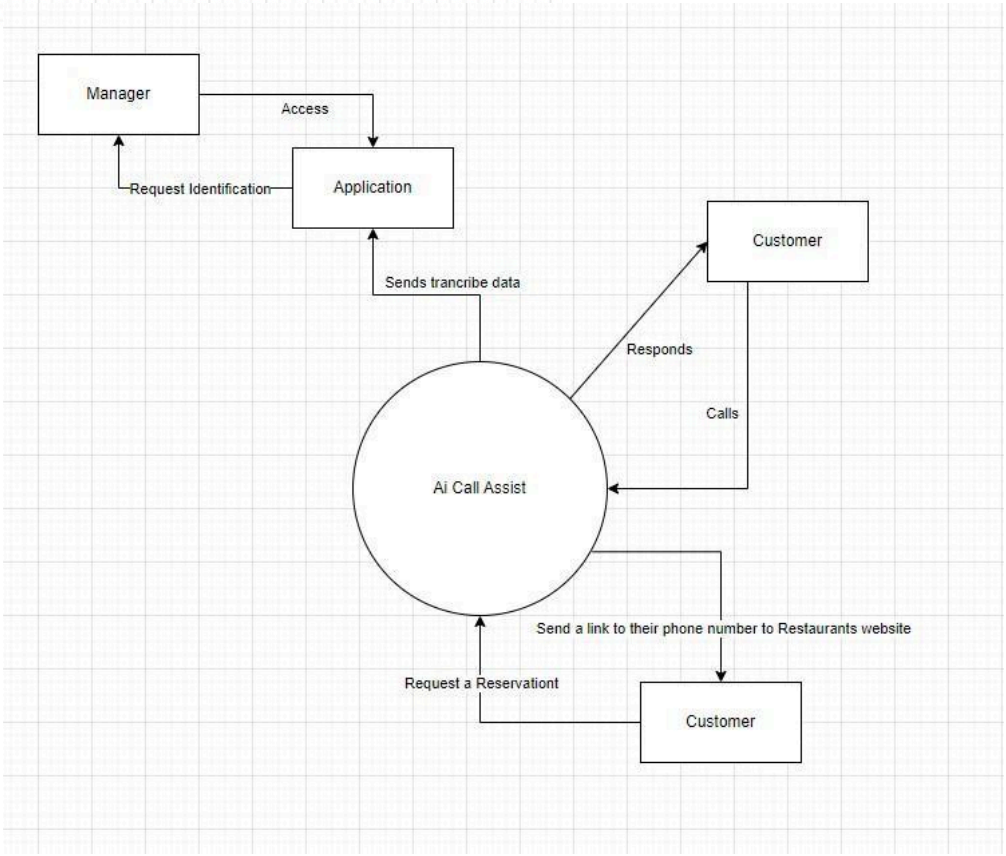
- Description: The customer can inquire about the menu, services offered, or general information.
- Goal: To seek information about the restaurant's offerings.

Request Assistance with Orders

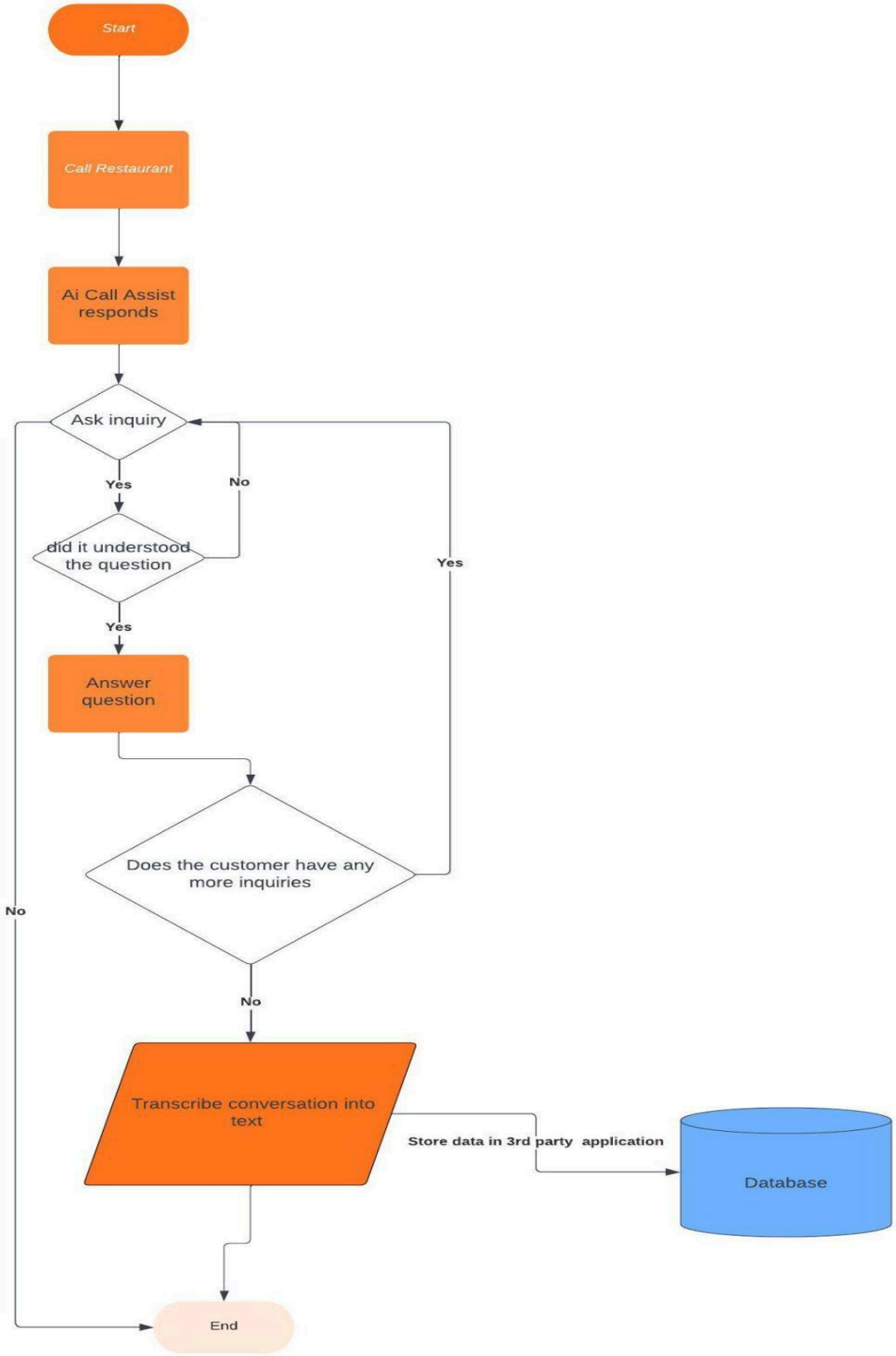
- Description: The customer can ask for guidance or recommendations in placing an order.
- Goal: To seek assistance and make informed decisions when ordering.

3.3 Data Modelling and Analysis





3.4 Process Modelling



4.0 Non-Functional Requirements

Performance:

- Response Time: After the first 20 seconds of contact with the consumer, 95% of call inquiries should be handled and processed.
- Speech Recognition Accuracy: For best data quality and customer satisfaction, transcribing customer calls into text should be done with at least 97% accuracy.

Reliability:

- System Uptime: To guarantee constant availability, the system should maintain an uptime of at least 99.5% and allow for a maximum of 7 hours of downtime annually.
- Error Rate: To ensure service dependability, strive for an error rate in call routing and transcribing operations of less than 0.5%.

Availability:

- Availability of Service: Make sure that customers can place purchases, ask questions, or get help at any time by having the AI Call Assist service available 24/7.

Security:

- Data Encryption: To protect data privacy and adhere to industry standards, use strong encryption techniques for call transcriptions that have been stored.
- Access Control: Only authorized personnel should be able to access databases due to strict access control procedures.

Maintainability:

- Scalability: Make sure the system can handle a minimum 30% increase in call volume without seeing any degradation in performance.
- Frequent Maintenance: To update and maximize system performance without compromising service availability, schedule routine maintenance for off-peak hours.

Portability:

- Cross-Platform Compatibility: Make sure the AI Call Assist system works with a range of gadgets and operating systems so that users can easily access services.
- Major web browsers (Chrome, Firefox, Safari, and Edge) are supported for comprehensive and consistent operation across platforms.

These non-functional requirements set provable guidelines for the AI Call Assist system's performance, availability, security, maintainability, and portability. These criteria guarantee excellent service along with an outstanding user experience and system efficiency.

5.0 Logical Database Requirements

In order to store and manage the data gathered from call transcriptions, client interactions, and system operations, a database will be used for the AI Call Assist system. The AI Call Assist system's logical database requirements include data formats, storage capacities, retention guidelines, and data integrity controls.

Data Structures:

- Audio Transcription Storage: The call's content will be preserved in written form for convenient accessibility and review by storing audio transcriptions in a text format that is compatible (such as JSON, XML, or plain text).

Storage Features:

- Modular Database Architecture: The database structure needs to be planned to efficiently handle the increasing amount of call transcriptions and related metadata.
- Safe Storage: Make sure that call transcripts and client information are stored in a secure environment that is protected from hackers and unauthorized access.

Data Integrity:

- Encryption Protocols: Use encryption techniques to safeguard private client data stored in the database.
- Backup and Recovery: It is important to have regular backup processes in place to guard against data loss and enable speedy recovery in the event of system malfunctions or corrupted data.

Access Control:

- Access Control: Implement access control to guarantee that, according to their positions within the organization, only individuals with the proper authorization can access particular database areas.
- Audit Trails: Keep track of who has viewed, changed, or removed data in your database logs for monitoring and traceability purposes.

Indexing and Search Capabilities:

- Effective Retrieval: Use indexing strategies to efficiently and quickly retrieve particular call transcriptions or data subsets.
- Including search functionality in the database will make it simple to retrieve call data that has been stored based on particular parameters, including caller ID, date, or keywords.

The AI Call Assist system will preserve data integrity, security, and accessibility by satisfying these reasonable database criteria, guaranteeing a strong basis for storing and handling call transcriptions and customer-related data.

6.0 Other Requirements

Additional requirements, if any.

(N/A)

7.0 Approval

The signatures below indicate their approval of the contents of this document.

Name	Project Role	Signature	Date
Amir	Project Manager and Project Management	AMIR YEKTAJOO	November 5, 2023
Alvaro	Back-End Developer and Database	Alvaro Aguirre Meza	November 5, 2023
Ali	Data Scientist and Data Analyst	Ali Al Aoraebi	November 5, 2023
Sam	UI Designer and User Experience	Samuel Ntambwe	November 5, 2023
Kaarish	Front-End Developer and Web Application	Kaarish Parameswaran	November 5, 2023