Non-Emergency Medical Transportation (NEMT) System - Software Requirements Specification

Contents

1. Introduction

1.1 Purpose of the Document

This Software Requirements Specification (SRS) document outlines the functional and non-functional requirements for the development and implementation of the Non-Emergency Medical Transportation (NEMT) System. The primary purpose of this document is to provide a comprehensive and detailed description of the NEMT System, including its features, capabilities, and integration with insurance providers through APIs. It serves as a vital reference for stakeholders involved in the design, development, testing, and deployment of the NEMT System.

1.2 Scope of the NEMT System

The scope of the NEMT System encompasses the creation and management of a sophisticated software platform designed to facilitate non-emergency medical transportation services. This system will streamline the coordination and delivery of transportation services for patients, ensuring timely and efficient transportation to medical facilities and appointments. Key components of the NEMT System include job creation and assignment, job status updates, data synchronization, error handling, billing and invoicing, and seamless integration with various insurance providers via application programming interfaces (APIs).

1.4 References

[List any external documents or sources referenced in this SRS.]

2. Overall Description

2.1 Product Perspective

1. System Overview

The NEMT System is designed as a comprehensive and modular software solution to support non-emergency medical transportation services. It operates within the context of the broader healthcare and transportation ecosystem, facilitating the seamless coordination of transportation services for patients. The system comprises various components, modules, and external interfaces to fulfill its objectives.

1.1. System Architecture

The NEMT System follows a multi-tier architecture to ensure scalability, maintainability, and robustness. The key architectural components include:

Presentation Layer:

This layer provides user interfaces for different user roles, including administrators, dispatchers, drivers, and potentially patients. It facilitates user interaction with the system.

Application Layer:

This layer contains the core business logic of the NEMT System. It handles functions such as job creation, assignment, status updates, billing, and integration with insurance providers.

Data Layer:

The data layer is responsible for storing and managing data related to trips, patients, providers, and other system entities. It includes a relational database management system (RDBMS) for data storage.

Integration Layer:

This layer facilitates communication with external entities, including insurance providers, through APIs. It ensures data synchronization and seamless job exchange.

1.2. Integration with Insurance Providers

One of the critical aspects of the NEMT System is its integration with multiple insurance providers. This integration allows insurance providers to submit transportation requests (jobs) to the system and receive corresponding job status updates. The system employs a set of APIs and data exchange protocols to facilitate these interactions securely and efficiently.

2.2 Product Functions

1. User Registration and Authentication

Elaboration:

- ***User Registration****:* This function allows individuals, including patients, transportation coordinators, and drivers, to create user accounts within the NEMT system. During registration, users provide necessary personal and contact information.
- ***Authentication****:* After registration, the system authenticates users securely to verify their identity. Authentication methods may include username/password, biometrics, or two-factor authentication (2FA) for enhanced security.

2. Insurance Providers Integration

Elaboration:

- ***API Integration****:* The NEMT system establishes robust API integrations with specific insurance providers. These APIs serve as communication channels to facilitate the exchange of transportation job requests and real-time status updates.
- ***Job Request Processing****:* Insurance providers initiate job requests through the API, specifying the transportation requirements for patients. The NEMT System processes these requests, ensuring validity and accuracy.
- ***Real-Time Updates****:* The system provides real-time updates to insurance providers, including trip confirmations, driver assignments, estimated arrival times, and any significant changes to the trip. This ensures that insurance providers have current information about their clients' transportation.

3. Trip Booking and Management

Elaboration:

- **Patient Requests:** Patients can request non-emergency medical transportation services for medical appointments through the NEMT system. They provide trip details, including date, time, pickup/drop-off locations, and any special requirements.
- **Transportation Coordination:** Transportation coordinators use the system to manage trip requests efficiently. They can view and assign trips to available drivers based on factors like proximity, vehicle type, and driver availability.
- ***Trip Modification and Cancellation****:* Users and coordinators can modify or cancel trips when necessary, reflecting changes in patient schedules or other unforeseen circumstances.

4. Real-Time Tracking

Elaboration:

- ***Vehicle Tracking:*** The NEMT system implements real-time tracking of vehicles in the fleet. This feature enables patients and administrators to monitor the current locations of vehicles, enhancing transparency and accountability.

5. Vehicle and Driver Assignment

Elaboration:

- ***Driver Assignment:*** The system assigns drivers to trips based on various criteria, such as their availability, qualifications, proximity to pickup locations, and vehicle type. This ensures efficient and timely service.
- ***Driver Information:*** The system maintains comprehensive information about drivers, including their qualifications, schedules, and other relevant details to ensure that only qualified and available drivers are assigned to trips.

6. Routing and Scheduling

Elaboration:

- ***Route Optimization:*** The system optimizes routes for drivers to minimize travel time and distance. This optimization takes into account factors such as traffic conditions, road closures, and patient preferences.
- ***Driver Schedules:*** The system creates and manages driver schedules, considering driver availability, vehicle capacity, and trip assignments. Notifications are sent to users and drivers in case of schedule changes.
- ***Notifications****:* Users and drivers are notified of any changes to trip details or schedules, ensuring that they are aware of updates and can plan accordingly.

7. Billing and Payment

Elaboration:

- ***Fare Calculation:*** The system calculates trip fares based on multiple factors, including distance traveled, time spent, and any additional criteria specified by insurance providers or fare structures.
- ***Invoice Generation:*** Invoices are generated for patients, healthcare providers, or insurance companies, depending on the payment arrangement. These invoices provide detailed information about trip costs.
- ***Payment Tracking****:* The system tracks and manages payment status, ensuring that payments are processed accurately and in a timely manner. This feature supports financial transparency and accountability.

8. Reporting and Analytics

Elaboration:

- ***Performance Reporting****:* The system provides reports and analytics on key performance indicators (KPIs), such as on-time arrivals, driver performance, revenue generated, and trip statistics. These reports assist in monitoring and improving service quality.
- ***Compliance Reporting****:* The system generates compliance reports required by regulatory authorities or healthcare providers. These reports ensure adherence to industry standards and regulations, such as HIPAA compliance for healthcare data.

9. Notifications and Alerts

Elaboration:

- ***Notification Types****:* The system sends notifications to users and administrators for various purposes, including trip confirmations, updates on trip status, and alerts in cases of delays, cancellations, or emergencies.
- ***Communication Channels****:* Notifications are delivered through multiple communication channels, such as mobile app notifications, email, or SMS, to ensure that users receive timely information.

10. Accessibility and Compliance

Elaboration:

- ***Accessibility Standards****:* The system is designed to adhere to relevant accessibility standards, such as the Web Content Accessibility Guidelines (WCAG). This ensures that users with disabilities can access and use the system effectively.
- ***Regulatory Compliance****:* The NEMT system complies with regulatory requirements specific to the healthcare and transportation industries. This includes adhering to data protection regulations, ensuring the security and privacy of patient and trip data, and complying with standards like HIPAA when applicable.

11. User Management

Elaboration:

- ***User Account Management****:* Administrators can manage user accounts, roles, and permissions within the system. This includes creating, modifying, and deactivating user accounts as needed.
- ***Role-Based Access Control (RBAC):*** The system implements RBAC to ensure that users have appropriate data access and privileges based on their roles and responsibilities.

12. Fleet Management

Elaboration:

- ***Fleet Information****:* The system maintains detailed information about the NEMT fleet, including vehicle maintenance records, inspection history, and current availability. This information is crucial for ensuring the reliability and safety of vehicles.

13. Communication Interfaces

Elaboration:

- ***Healthcare Data Exchange****:* The system establishes secure communication interfaces with healthcare providers to receive appointment information and patient data. These interfaces may include HL7, FHIR, or other relevant healthcare data exchange protocols.
- ***Mapping and Navigation****:* Integration with mapping and navigation services enhances route optimization. The system communicates with these services to retrieve real-time traffic data, maps, and optimal routes

14. Equipment Management

Elaboration:

- **Equipment Tracking**: In addition to managing drivers and vehicles, the NEMT System includes equipment management. This function allows for the tracking and maintenance of essential medical equipment, such as wheelchairs, stretchers, oxygen tanks, or other specialized equipment used during patient transportation.
- **Inventory Management**: The system maintains an inventory of available medical equipment, tracking quantities, condition, and maintenance schedules. This ensures that equipment is readily accessible and in good working order when needed for patient transport.
- **Assignment and Allocation**: When scheduling trips, transportation coordinators can allocate necessary equipment based on patient requirements. This function helps ensure that each trip is equipped with the appropriate resources for safe and comfortable transportation.
- **Maintenance Scheduling**: The system schedules regular maintenance, inspections, and servicing of medical equipment to ensure compliance with safety standards and regulatory requirements. Automated alerts and notifications are sent to maintenance staff when equipment requires attention.
- **Equipment History**: Detailed records of equipment usage, maintenance history, and any issues or incidents are maintained for auditing and accountability purposes. This information helps in assessing equipment reliability and performance.
- **Reporting**: The system generates reports on equipment utilization, maintenance schedules, and compliance with safety standards. These reports assist in optimizing equipment resources and ensuring patient safety during transport.
- **Integration**: Equipment management may integrate with the overall fleet and scheduling components of the NEMT System, allowing for seamless coordination of equipment, drivers, and patients for each trip.

2.3 User Classes and Characteristics

1. Patients

Characteristics:

- **Primary Users:** Patients are the end-users of the NEMT system, often individuals with medical appointments requiring non-emergency transportation.
- **User Accounts:** Patients can create user accounts, providing personal and medical information, contact details, and accessibility requirements.
- **Trip Booking:** Patients can request transportation services, specifying trip details such as appointment date, time, pickup and drop-off locations, and any special needs (e.g., wheelchair accessibility).
- **Feedback and Reviews:** Patients can provide feedback and reviews about their transportation experience, helping improve service quality.
- **Notifications:** Patients receive trip confirmations, updates, and alerts via email, SMS, or mobile app notifications.
- **Accessibility Requirements:** Patients may have specific accessibility needs, such as wheelchair-accessible vehicles, which are considered when scheduling trips.
- **Payment Information:** Patients provide payment information if they are responsible for trip costs.

2. Dispatchers

Characteristics:

- **Primary Users:** Dispatchers are responsible for managing and coordinating transportation services within their respective tenant.
- **User Accounts:** Dispatchers have administrative accounts for their tenant, enabling them to manage trips, drivers, and other dispatch-related tasks.
- **Trip Scheduling:** Dispatchers schedule trips on behalf of patients, assign drivers, and allocate necessary equipment or medical resources within their tenant.
- **Equipment Assignment:** Dispatchers can assign specific medical equipment, such as wheelchairs or oxygen tanks, to vehicles based on patient needs and trip requirements.
- **Real-Time Monitoring:** Dispatchers have access to real-time tracking of vehicles and can monitor the progress of ongoing trips within their tenant.
- **Notifications:** Dispatchers receive alerts and updates on trip status within their tenant, allowing them to address any issues or changes promptly.
- **Billing:** Dispatchers may have access to billing and payment functions specific to their tenant, enabling them to manage invoices and payments within their domain.
- **Reporting:** Dispatchers generate reports for trip statistics, compliance, and performance analysis within their tenant, aiding in decision-making and auditing.

3. Tenant Administrators

Characteristics:

- **Primary Users:** Tenant administrators oversee and manage their specific tenant within the NEMT system.
- **User Accounts:** Tenant administrators have administrative accounts for their respective tenant, allowing them to manage users, dispatchers, and system settings within their domain.
- **Tenant Configuration:** Administrators configure settings specific to their tenant, such as custom billing rules, tenant-specific compliance requirements, and user roles and permissions.
- **Tenant Monitoring:** Tenant administrators monitor the performance, security, and compliance of their tenant, ensuring the smooth operation of transportation services.
- **Tenant Support:** Administrators provide support to users and dispatchers within their tenant and address tenant-specific technical issues.
- **Equipment Assignment:** Tenant administrators can assign specific medical equipment, such as wheelchairs or oxygen tanks, to vehicles based on patient needs and trip requirements within their tenant.
- **Tenant Reporting:** Tenant administrators generate reports on tenant-specific system usage, financial transactions, and compliance for their decision-making and auditing purposes.

4. Drivers

Characteristics:

- **Primary Users:** Drivers are responsible for transporting patients to medical appointments and ensuring their safety during transit.
- **User Accounts:** Drivers have user accounts with detailed profiles, including qualifications, licensing, schedules, and contact information.
- **Trip Assignments:** Drivers receive trip assignments based on their availability, proximity to pick up locations, and the specific requirements of the trip.
- **Real-Time Tracking:** Drivers are tracked in real-time to ensure their safety and to provide accurate information to patients and dispatchers.
- **Communication:** Drivers can communicate with patients and dispatchers through the system for trip-related updates and coordination.
- **Equipment Management:** Drivers are responsible for ensuring that any necessary medical equipment is on board and properly secured for each trip.
- **Emergency Protocols:** Drivers are trained to handle emergencies, such as medical issues or vehicle breakdowns, and follow established protocols for patient safety.

5. System Administrators

Characteristics:

- **Primary Users:** System administrators oversee and manage the entire NEMT system, ensuring its smooth operation.
- **User Accounts:** System administrators have superuser or administrative accounts with access to all system functionalities.
- **System Configuration:** Administrators configure system settings, including integration with insurance providers, billing rules, and compliance requirements for the entire system.
- **Monitoring:** System administrators continuously monitor system performance, security, and compliance with regulations.
- **Support:** Administrators provide support to tenant administrators and resolve system-level technical issues.
- **Reporting:** System administrators generate comprehensive reports on system usage, financial transactions, and compliance across all tenants for decision-making and auditing purposes.

2.4 Operating Environment

2.4.1 Hardware Requirements

The NEMT system will operate on hardware that meets or exceeds the following requirements:

1. **Cloud Server Hardware:**
    - Processor: Quad-core or higher
    - RAM: 8 GB or more
    - Storage: 100 GB or more of free disk space
    - Network: Internet connectivity with sufficient bandwidth for real-time data exchange
2. **Client Hardware:**
    - Web Browsers: The system will be accessible through modern web browsers, such as Chrome, Firefox, Safari, and Edge, on standard desktop and mobile devices.
    - Mobile Devices: Mobile applications, if provided, will be compatible with Android and iOS devices with recent versions.
3. **Mobile Devices (if applicable):**
    - Android Devices: Support for Android OS version 6.0 (Marshmallow) and above.
    - iOS Devices: Support for iOS version 11 and above.

2.4.2 Software Requirements

The NEMT system will be compatible with the following software environments:

1. **Server Software:**
    - Operating System: Linux (e.g., Ubuntu, CentOS) or Windows Server (version based on the organization's infrastructure).
    - Web Server: Apache, Nginx, or equivalent.
    - Database: PostgreSQL, MySQL, or equivalent relational database management system.
    - Programming Languages: PHP, Node.js, or equivalent for server-side scripting.
2. **Client Software:**
    - Web Browsers: The system will support the latest stable versions of popular web browsers, including Chrome, Firefox, Safari, and Edge.
    - Mobile Applications (if applicable):
        - Android: Development using Java or Kotlin.
        - iOS: Development using Swift or Objective-C.
3. **Dependencies and Frameworks:**
    - Use of relevant web frameworks, libraries, and third-party APIs (e.g., mapping and geolocation services) as needed.
4. **Data Storage and Backup:**
    - Data will be securely stored in a relational database and regularly backed up to prevent data loss.

2.4.3 Additional Considerations

1. **Scalability:** The system architecture should be designed to scale horizontally to accommodate increased user loads and data growth.
2. **Security:** Implement security measures, including firewalls, encryption, and intrusion detection, to protect both data and user information.
3. **Data Privacy:** Comply with data privacy regulations, such as HIPAA, to safeguard patient information and maintain confidentiality.
4. **Redundancy and Failover:** Implement redundancy and failover mechanisms to ensure system availability in case of hardware or network failures.
5. **Accessibility:** Ensure that the system is accessible to users with disabilities, in compliance with relevant accessibility standards (e.g., WCAG).

6. **Performance Monitoring:** Implement monitoring tools to track system performance, identify bottlenecks, and optimize resource utilization.

This section of the SRS document outlines the hardware and software requirements and considerations for the NEMT system's operating environment. It serves as a guide for developers and administrators to set up and maintain the system effectively. Specific hardware and software requirements may vary depending on your organization's infrastructure and technology stack.

2.5 Design and Implementation Constraints

[List any specific design or implementation constraints that the development team must adhere to.]

2.6 Assumptions and Dependencies

[List any assumptions made during the requirements gathering process and dependencies on external factors.]

3. Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

[List and describe the user interfaces, including web and mobile interfaces, if applicable.]

3.1.2 Hardware Interfaces

Mobile Devices only

3.1.3 Software Interfaces

1) **Database**: it will be on separate server preferable on (AWS LIVE SQL) system will connect with this using secure auth provided by AWS security of this data base other than (SSL) keys will be responsibility of AWS.
2) **Google Console/Cloud/API`s:** connection with these services will be handled using their own libraries which the most secure and faster method faster than custom API`s connections and It will provide us with flexibility to use its multiple services with easy e.g. Maps/Bart AI/Bucket for storage and other service if required and we will have Access to Google analytics.

3.2 Functional Requirements

- Job Creation and Assignment
- Job Status Updates
- Data Synchronization
- Error Handling and Notifications
- Billing and Invoicing
- Job Lifecycle Management

3.3 Tenant Data Requirements

3.3.1 Tenant Registration Data

Tenant administrators are required to provide the following data during the registration process:

- **Organization Name:** The legal name of the tenant organization. (Entity Name)
- **Tax ID:** Its a 9-digit code assigned by IRS to an entity
- **PTAN:** Provider Transaction Access Number (Medicare Issue Number to a provider) Group PTAN / Individual PTAN
- **Contact Information:** Contact details for the tenant administrator, including email address and phone number.
- **Address:** Office location.
- **Billing Information:** Billing details, including billing address and accepted payment methods.

- **Validation Rules:**

  The organization name must be unique within the system.

  The email address provided must be a valid email format.

  The billing address must adhere to standard postal address formatting.

3.3.2 Tenant Data Model

The system maintains tenant-specific data to ensure data segregation and customization. This includes:

- **Tenant Profile:** A record containing all tenant-specific information, including organization details and billing information.
- **User Accounts:** Tenant administrators can create and manage user accounts within their organization, each with defined roles and permissions.

3.4 Patient Data Requirements

3.4.1 Patient Registration Data:

1. **Full Name:**
    - **Required:** Patients must provide their full legal name.
2. **Date of Birth:**
    - **Required:** Patients must provide their date of birth for age verification and eligibility.
3. **Contact Information:**
    - **Phone Number:** Patients' primary contact number.
    - **Email Address:** Patients' email address for communication (optional).
4. **Address:**
    - **Street Address:** The patient's physical address.
    - **City:** City or locality.
    - **State/Province:** State or province.
    - **Postal/ZIP Code:** Postal or ZIP code.
5. **Medical Information:**
    - **Medical ID:** If applicable, a unique medical identification number.
    - **Primary Care Physician (PCP):** The name and contact information of the patient's primary care physician.
    - **Medical Conditions:** Any relevant medical conditions or allergies.
6. **Emergency Contact:**
    - **Name:** The name of an emergency contact person.
    - **Phone Number:** Contact number for the emergency contact.
7. **Insurance Information (if applicable):**
    - **Insurance Provider:** Name of the patient's insurance company.
    - **Policy Number:** Patient's insurance policy number.
    - **Group Number:** Group number associated with the insurance policy.

3.4.3 Consent and Authorization:

1. **Patient Consent:**
    - Patients may need to provide consent for using their data for transportation services and billing.

2. **HIPAA Authorization (if applicable):**
    - Patients may need to authorize the sharing of their medical information for transportation and billing purposes, in compliance with HIPAA regulations.

3.4.4 Patient Data Model:

Patient Profile:

3.5 Performance Requirements

[Specify performance-related requirements, including response times, scalability, reliability, and availability.]

3.6 Security Requirements

[Detail the security measures and requirements for data protection, user authentication, and authorization.]

3.7 Software Quality Attributes

[Specify usability, maintainability, compatibility, and portability requirements.]

3.8 Constraints

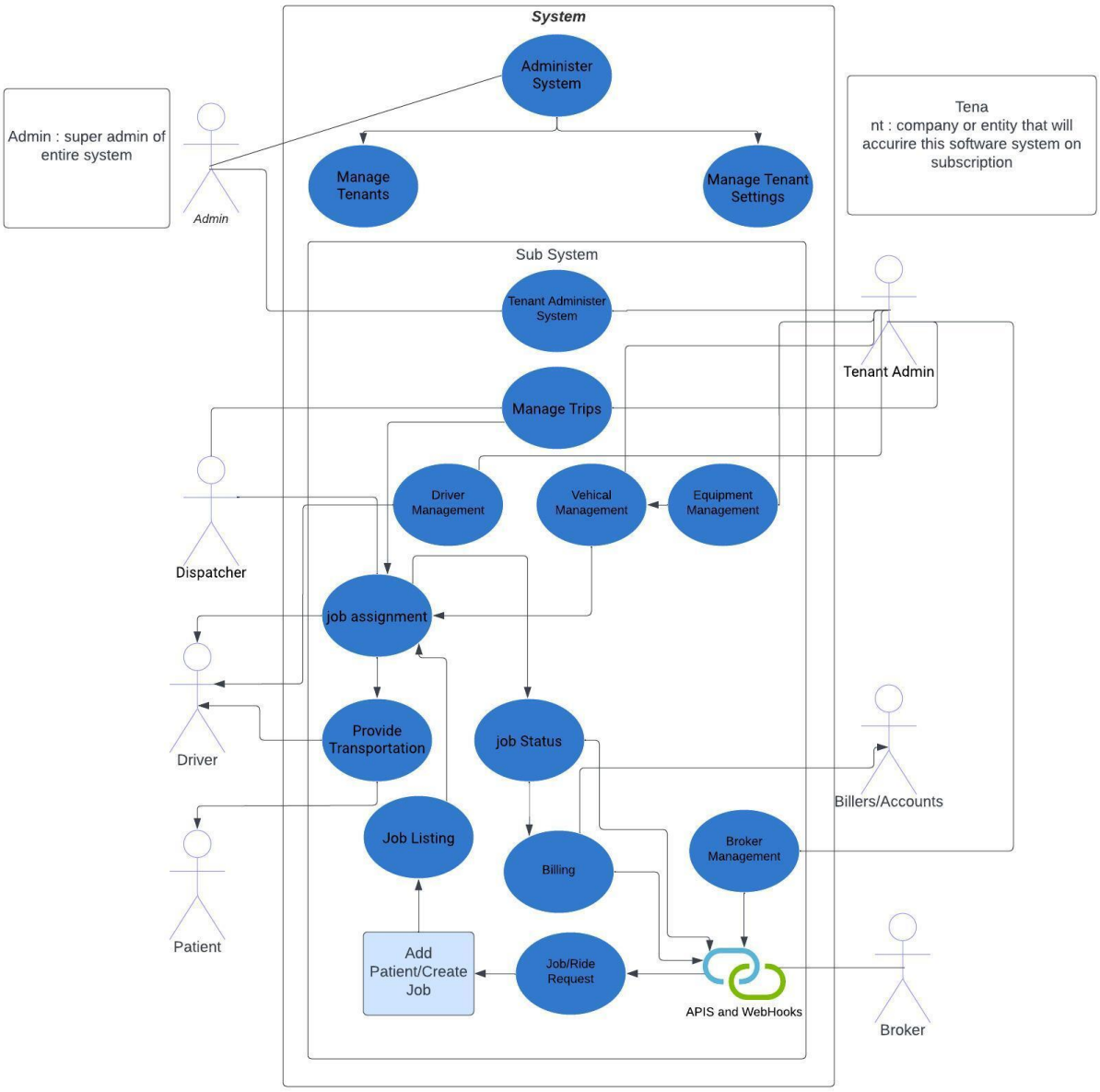
[List any constraints or limitations, including regulatory compliance, budget, technology stack, and data storage requirements.]

4. Appendices

4.1 Glossary

[Include a glossary of terms and acronyms used in this document.]

4.2 Use Case Diagrams



4.3 Data Flow Diagrams

[Include data flow diagrams to visualize data movement within the system.]

4.4 Entity-Relationship Diagrams

[Include entity-relationship diagrams if applicable to demonstrate data models.]