

Software Requirements Specification Template

Software Engineering

The following annotated template shall be used to complete the Software Requirements Specification (SRS) assignment.

Template Usage:

Text contained within angle brackets ('<', '>') shall be replaced by your project-specific information and/or details. For example, <Project Name> will be replaced with either 'Smart Home' or 'Sensor Network'.

Italicized text is included to briefly annotate the purpose of each section within this template. This text should not appear in the final version of your submitted SRS.

This cover page is not a part of the final template and should be removed before your SRS is submitted.

Movie Theater Ticketing System

Software Requirements Specification

Version 1

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Group 5

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Revision History

Date	Description	Author	Comments
9/26/2024	Version 1	James Johnson	First Revision
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Document Approval

The following Software Requirements Specification has been accepted and approved by the following:

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1. Introduction

1.1 Purpose

The purpose of this Software Requirements Specification (SRS) document is to provide a comprehensive description of the Movie Theater Ticketing System (MTTS). This document outlines the system's objectives, functionalities, and constraints to guide the development team in building an effective solution for selling movie tickets both in person and online. The intended audience for this SRS includes the software developers responsible for implementing the system, project managers overseeing the development process, quality assurance teams, and stakeholders from the company that has commissioned this system.

1.2 Scope

The Movie Theater Ticketing System (MTTS) is a comprehensive software solution designed to facilitate the sale of movie tickets both in person at theater locations and online through a user-friendly website. The software product aims to enhance the customer experience and streamline theater operations by providing the following key functionalities:

1. **Ticket Purchasing:** Customers can browse a catalog of available movies, select preferred showtimes, choose specific seats, and purchase tickets seamlessly.
2. **Purchase Modification and Cancellation:** The system allows customers to modify or cancel their ticket purchases within the theater's policy guidelines, offering flexibility and improving customer satisfaction.
3. **Account Creation and Management:** Customers have the option to create personal accounts, enabling them to save their preferences, view purchase history, and expedite future transactions.
4. **Rewards Program Integration:** To encourage repeat patronage, the MTTS incorporates a rewards program where customers earn points for each purchase. These points can be redeemed for discounts on future ticket purchases or special promotions.
5. **Administrative Management:** Theater management can add, modify, and remove movie listings, showtimes, and manage seat availability through an intuitive administrative interface connected to a centralized database.
6. **Information Dissemination:** The system generates detailed reports for accounting and management purposes, providing real-time insights into ticket sales, revenue, and customer behavior.

1.3 Definitions, Acronyms, and Abbreviations

This subsection provides the definitions of all terms, acronyms, and abbreviations required to properly interpret this Software Requirements Specification (SRS). This information may be provided by reference to one or more appendices in the SRS or by reference to other documents.

Definitions:

- **Theater:** One of the individual rooms in which a movie will be shown.
- **Location:** A cinema where multiple theaters are located.
- **Customer User:** A person who accesses the website to purchase tickets and can create, modify, or delete an account with the system.
- **Customer Service User:** An employee who assists Customer Users when they seek assistance, including modifying or refunding purchases and modifying or deleting customer accounts.
- **Management User:** An administrative user who can add, modify, and remove movies from which tickets can be purchased.
- **Movie Showing:** A specific screening of a movie at a designated date, time, theater, and location.
- **Seat Reservation:** The process of selecting and holding a specific seat for a movie showing.
- **Account Verification:** The process by which a Customer User confirms their email address to activate their account.
- **Loyalty Points:** Rewards accumulated by Customer Users through purchases, which can be redeemed for discounts or special offers.
- **Refund Window:** The period before the movie showing during which a customer can cancel their ticket for a refund.

Acronyms:

- Movie Theater Ticketing System - MTTS
- Amazon Web Services - AWS
- Unified Modeling Language - UML
- Software Architecture - SWA

1.4 References

This SRS does not reference outside documentation and works as a standalone document.

1.5 Overview

The rest of this document will provide key information regarding the purpose, scope, and functionalities of the movie theater ticketing system. The SRS document itself is organized into 4 parts. An introduction section describing the objectives and goals of the system, along with its limitations. It will also contain a list of definitions, references and overview. The second section contains the overall description and gives a high level overview of the ticketing systems functionalities. Describing the systems environment, its main features, its users, constraints and assumptions. Next there will be a subsequent section containing specific requirements. It will contain a list and description of both functional and non-functional requirements. The final section will contain appendices, providing additional information that supports the main content such as models, and designs.

2. General Description

2.1 Product Perspective

The Movie Theater Ticketing System, although an independent solution used to purchase tickets, serves as a component for several different systems.

The system integrates with payment gateways, such as Stripe and PayPal, to facilitate transactions.

The system interfaces with the theater's scheduling and seat management systems, ensuring that tickets purchased in-person are added to the database for online customers, and real-time updates for seat availability and showtime information are made.

In-theater operations such as ticket printers and card readers must handshake with the database in order to ensure all tickets are read by the system.

2.2 Product Functions

- **Purchase Tickets**
 - Allows a Customer user to purchase tickets for a movie with a given time, theater, and location. Within this function, available rewards from having an account may be applied.
- **Modify Purchases**
 - Allows Customers and Customer Service users to modify a purchase that has been made. Such as reducing the number of tickets or changing the chosen time, theater, and location.
- **Refund Tickets**
 - Allows Customer and Customer Service users to refund the purchase of tickets. It will also update the showing to reflect this change. With the Customer user being limited to purchases that they have made and the Customer Service user being able to refund any purchase.
- **Create Account**
 - Allows a Customer user to make an account with the system. The Customer will provide an email and will set a password for the account. The email should be verified to be owned by the Customer, and the password should meet minimum requirements.
- **Modify Account**
 - Allows a Customer and Customer Service user to modify a given account. Allowing the modification of the email and password along with any other information.
- **Remove Account**
 - Allows a Customer and Customer Service user to delete a given account.
- **Login**
 - Allows a Customer user to log into their account on the website.

- **Add Movie Showing**
 - Allows a Management user to add a new movie showing with the given movie name, time, theater, location, and number of seats. The movies will be added to the “Movie” database table.
- **Modify Movie Showing**
 - Allows a Management user to modify the information of a given showing.
- **Remove Movie Showing**
 - Allows a Management user to remove a given showing. In the case there were already purchases for a given movie, it should also issue refunds and send an email alerting the Customer users.
- **Movie Search**
 - Allows a Customer user to search for a movie. The user can enter in a date range, time range, select available titles, and select locations and this function will return all showings that meet those requirements.

2.3 User Characteristics

The users of the Movie Theater Ticketing System are categorized into three main types:

1. Customer User

- **Education:** No specific educational requirements.
- **Experience:** Minimal to no prior experience with the system is expected.
- **Technical Expertise:** Basic internet browsing skills; should be able to navigate a website and complete online transactions without assistance.

The Customer User accesses the website to purchase tickets and may create, modify, or delete an account with the system. The system is designed to be user-friendly to accommodate users with varying levels of technical proficiency.

2. Customer Service User

The Customer Service User assists Customer Users when they require support. Their responsibilities include modifying or refunding purchases and modifying or deleting Customer accounts.

- **Education:** High school diploma or equivalent is required.
- **Experience:** Prior experience in customer service roles is preferred, particularly in retail or hospitality industries where interaction with customers is frequent.
- **Technical Expertise:**
 - **Basic Computer Skills:** Proficient in using computers and navigating web-based applications.
 - **Software Proficiency:** Ability to learn and efficiently use the Movie Theater Ticketing System after training.
 - **Communication Skills:** Excellent verbal and written communication skills to effectively assist customers.

- **Problem-Solving Abilities:** Capable of handling customer inquiries and resolving issues promptly.
- **Data Entry Skills:** Accurate input of customer information and transaction details into the system.

The Customer Service User will receive training on the operation of the system to ensure they can provide effective assistance to customers.

3. Management User

- **Education:** Bachelor's degree in business administration, management, or a related field is preferred.
- **Experience:** Experience in managerial roles within the entertainment industry or related fields.
- **Technical Expertise:**
 - **Advanced Computer Skills:** Proficient in using administrative and database management tools.
 - **Analytical Skills:** Ability to interpret sales data and generate reports.
 - **Software Proficiency:** Skilled in using the administrative functions of the Movie Theater Ticketing System, including adding, modifying, and removing movie showings.
 - **Decision-Making Abilities:** Capable of making informed decisions based on system data and customer feedback.

Management Users will receive comprehensive training to utilize all administrative features of the system effectively.

2.4 General Constraints

Constraints:

1. **Regulatory Compliance:**
 - **Payment Card Industry Data Security Standard (PCI DSS):**
 - The system must comply with PCI DSS requirements to securely handle and process credit card transactions.
 - **California Consumer Privacy Act (CCPA):**
 - If applicable, the system must adhere to CCPA regulations for California residents.
2. **Technology Stack Constraints:**
 - **Standardization:**
 - The system must be developed using the company-approved technology stack to maintain consistency with existing infrastructure.
 - **Frontend Technology:**
 - Use of Next.js and Tailwind for the frontend.
 - **Backend Technology:**

- Stripe and PayPal for payment processing, NextAuth for user authentication, PostgreSQL for database management.
 - **Database Compatibility:**
 - The system must integrate with the existing Database Management System (DBMS) in PostgreSQL.
- 3. **Hardware Limitations:**
 - **Server Specifications:**
 - The system must operate within the hardware capabilities of the current servers without requiring significant upgrades.
 - **User Devices:**
 - Must support a wide range of customer devices, including desktops, laptops, tablets, and smartphones, without specialized hardware.
- 4. **Browser and Operating System Support:**
 - **Browser Compatibility:**
 - The system must be compatible with the latest two versions of major web browsers (Chrome, Firefox, Safari, Edge).
 - **Operating Systems:**
 - Support for common operating systems, including Windows, macOS, iOS, and Android.
- 5. **Integration Constraints:**
 - **Third-Party Services:**
 - The system must integrate with specified third-party payment gateways (e.g., Stripe, PayPal) and email service providers
 - **Legacy Systems:**
 - Must ensure compatibility with any existing legacy systems used by the company for accounting or management purposes.
- 6. **Security Constraints:**
 - **Data Encryption:**
 - All sensitive data must be encrypted both in transit (using SSL/TLS) and at rest.
 - **Authentication Protocols:**
 - Implementation of secure authentication methods, including multi-factor authentication for administrative access.
 - **Password Policies:**
 - Enforce strong password requirements and secure storage practices (hashing with salting). The same password should not result in the same entry in the database.
- 7. **Performance Constraints:**
 - **Scalability:**
 - The system must handle peak traffic periods (e.g., during blockbuster releases) without performance degradation.
 - **Response Time:**

- Page load times and transaction processing should not exceed 3 seconds under normal operating conditions.
- 8. **Time and Budget Constraints:**
 - **Project Timeline:**
 - Development and deployment must be completed within the stipulated time frame as per the project schedule.
- 9. **Data Retention:**
 - **Retention Policies:**
 - Keep transaction records for a minimum of five years for audit purposes.
- 10. **Internationalization and Localization:**
 - **Language Support:**
 - The system must support multiple languages as required by the company's market presence.
 - **Date and Time Formats:**
 - Must handle various international date and time formats based on user settings or location.
- 11. **Dependency on External Systems:**
 - **Service Availability:**
 - The system's functionality may be limited by the availability and reliability of external services like payment gateways and email providers. Therefore, rely on external APIs only if necessary.
- 12. **Legal Constraints:**
 - **Intellectual Property Rights:**
 - Ensure that all software components, including third-party libraries, comply with licensing agreements.
 - **Content Restrictions:**
 - Must not display unauthorized content, adhering to copyright laws and regulations.
- 13. **Environmental Constraints:**
 - **Hosting Environment:**
 - All systems should be deployed through AWS.
- 14. **Maintenance Constraints:**
 - **Update Schedules and Downtime:**
 - The system should retain an uptime of 99.9% year-round. If necessary, crucial maintenance downtime should occur between the hours of 12 a.m. and 3 a.m. PST.

2.5 Assumptions and Dependencies

Assumptions

- It assumes that payment is processed through either Stripe or Paypal and that no user credit card information is stored in this system.
- It is assumed that theaters have the necessary hardware to talk to the database and complete in-person ticket purchases

- It is assumed that all third party services we use conduct security standards in an appropriate manner (Stripe, SendGrid)
- We are assuming that each theater would update its information on its own, including the showtimes and types of movies that will be available at each theater.

Dependencies

- Payment gateways such as PayPal and Stripe
- SendGrid for email services
- Amazon Web Services AWS for PostgreSQL and server hosting
- Hardware devices located on theater premises are responsible for communicating to the database when a purchase is made offline, in order to update seats and availability.

3. Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

The MTTTS will feature a web-based user interface for a seamless and intuitive experience for customers and other users. Such interfaces include:

- Home Page
 - Displays the movie showtimes, promotions, and login/register options.
- Movie Selection
 - Allows users to filter movies by date, time, genre, and location.
- Ticket Purchase
 - Provides a clear seat map, pricing information, and payment options for the user.
- Account Management
 - Enables users to view past purchases, redeem rewards, and manage account settings (account deletion, password modification)
- Admin Dashboard
 - If necessary, an administrator can remove or add movies in the case of a database failure.
- Locations page
 - Interactive Google map view showing all theater locations.

3.1.2 Hardware Interfaces

- Card Terminals
 - Integration if a ticket is purchased in-person.
- Ticket Printers
 - Provides ticket data to printers to print tickets and receipts.
- Server Infrastructure
 - The system is hosted on servers that support the necessary bandwidth and processing power to handle peak loads.

3.1.3 Software Interfaces

- Payment Gateways
 - The system will need to integrate Stripe and PayPal for all online ticket purchases.
- Emails
 - The system will use SendGrid to send emails to users for the following reasons:
 - Account verification
 - Ticket receipts
 - Discounts and offers
- Database
 - Uses PostgreSQL for storing user data, transaction records, movie listings, and seat availability

3.1.4 Communications Interfaces

The MTTTS requires communication through:

- HTTP/HTTPS Protocol
 - Facilitates secure web based communication for the server and browser users.
- API Integrations
 - Utilizes REST APIs for exchange with third party services (payment processors and email services)
- Internal Networks
 - For in-theater purchases, the system will communicate with the local network for printing tickets and accessing the database.

3.2 Functional Requirements

3.2.1 Purchase Ticket

3.2.1.1 Introduction

This function is for Customer users to purchase a ticket for a movie.

3.2.1.2 Inputs

User selection of the movie, date, time, location, theater

User's payment information (Visa, Master Card, PayPal)

User account information (optional for registered users)

If user is logged in, they're given a choice to use reward points for a price discount

3.2.1.3 Processing

Confirm the ticket is still available in the system.

Conduct the user's payment through the payment processor

If the user has opted to use reward points, ensure they have the amount requested in their account, and apply the discount (100 points = \$1)

If the user purchased the ticket while registered, apply 25 points of rewards to their account.

3.2.1.4 Outputs

Give receipt to customer via email address on file if registered
If not registered, display the ticket and provide an option to print and send to an email address.
Send receipt to accounting
User's with an account will have award points added to their account

3.2.1.5 Error Handling

The transaction cannot go through because there is no money in the user's account.

3.2.2 Create Account

3.2.2.1 Introduction

This system allows users to optionally create an account. By registering an account, users can receive notifications about early purchases for movie tickets. This feature enables account holders to have priority access to tickets before they are made available to the general public.

3.2.2.2 Inputs

User provides e-mail and password to system
User confirms email to system by clicking verification link

3.2.2.3 Processing

The system verifies the user's email is not already registered.
The system verifies the user's password meets the following criteria:

- Greater than 8 characters
- Less than 64 characters
- Contains at least one number and one special character (!@#\$\$%^&*())

The user's email, and salted, hashed password is stored into the database along with the following information:

- Account verification status
- Account creation date
- Tickets bought
- Loyalty points (default 0)

The user is sent a unique URL which upon visiting will set the user's verification status to true.

3.2.2.4 Outputs

The account has been successful. A message confirming it has been displayed.
The user gets an email confirming their order.
The user is asked to sign up for alerts on movie showings ahead of time.

3.2.2.5 Error Handling

If the email is already in use by another account registered on the platform the user will be notified with an error message and is prompted to either sign in or choose an email address.

3.2.3 Refund Ticket

3.2.3.1 Introduction

This system is for users who wish to refund their ticket prior to the showing.

3.2.3.2 Inputs

Refund the purchase of a ticket at most a day before the showing.

3.2.3.3 Processing

The system verifies if the ticket is able to be refunded based on the following condition:

- Ticket date is no less than 1 day in the future

The system processes the cancellation and refunds the user's purchase with their existing credit card on file.

3.2.3.4 Outputs

Display a confirmation of the refund to the user.

E-mail the user and the administrators a confirmation of the refund.

3.2.3.5 Error Handling

If the user isn't eligible for a refund, notify the user with an appropriate message.

If there is an issue with the refund process, inform the user and log the error for review.

3.2.4 Modify Purchase

3.2.4.1 Introduction

This function lets customer service representatives make changes to customer's purchases post sale like adjusting movie showtimes or seat preferences after the initial transaction is completed.

3.2.4.2 Inputs

Purchase ID or customer information (such as an email or phone number) so we can access the Purchase information for you. Recent acquisition specifics including;

New purchase details, such as:

- Update showtime
- Number of tickets
- Seating preferences
- Payment adjustments (if necessary)

3.2.4.3 Processing

The system fetches the purchase information using either the Purchase ID provided or customer details.

The system verifies whether changes are permissible (, for example; within a specified time period, before the movie commences; availability of seats).

3.2.4.4 Outputs

When a customer service representative confirms the information, on the purchase screen a message pops up and the customer also receives an email with the purchase information.

The latest transaction has been saved in the database.

3.2.4.5 Error Handling

If the time for changes has already elapsed (for example if it's too close to the time of the show) or if there are no seats left to book, an error message will appear with an explanation of the problem.

If there's an issue with processing payment adjustments, a notification will be displayed prompting the representative to try another payment method.

3.3 Use Cases

3.3.1 Search For Movie

The client must be able to search various movie theaters for particular movies and showtimes. As well as view information related to the movies they want to watch and the available seating.

3.3.2 Purchase Ticket

The client must be able to purchase movie tickets for a particular time, place, showing, and seating.

3.3.3 Create Account

The client must be able to create an account in order to keep track of their ticket information and rewards points.

3.3.4 Access Account

The client or administrator must then be able to access their account in order to view their information.

3.3.5 Modify Purchases

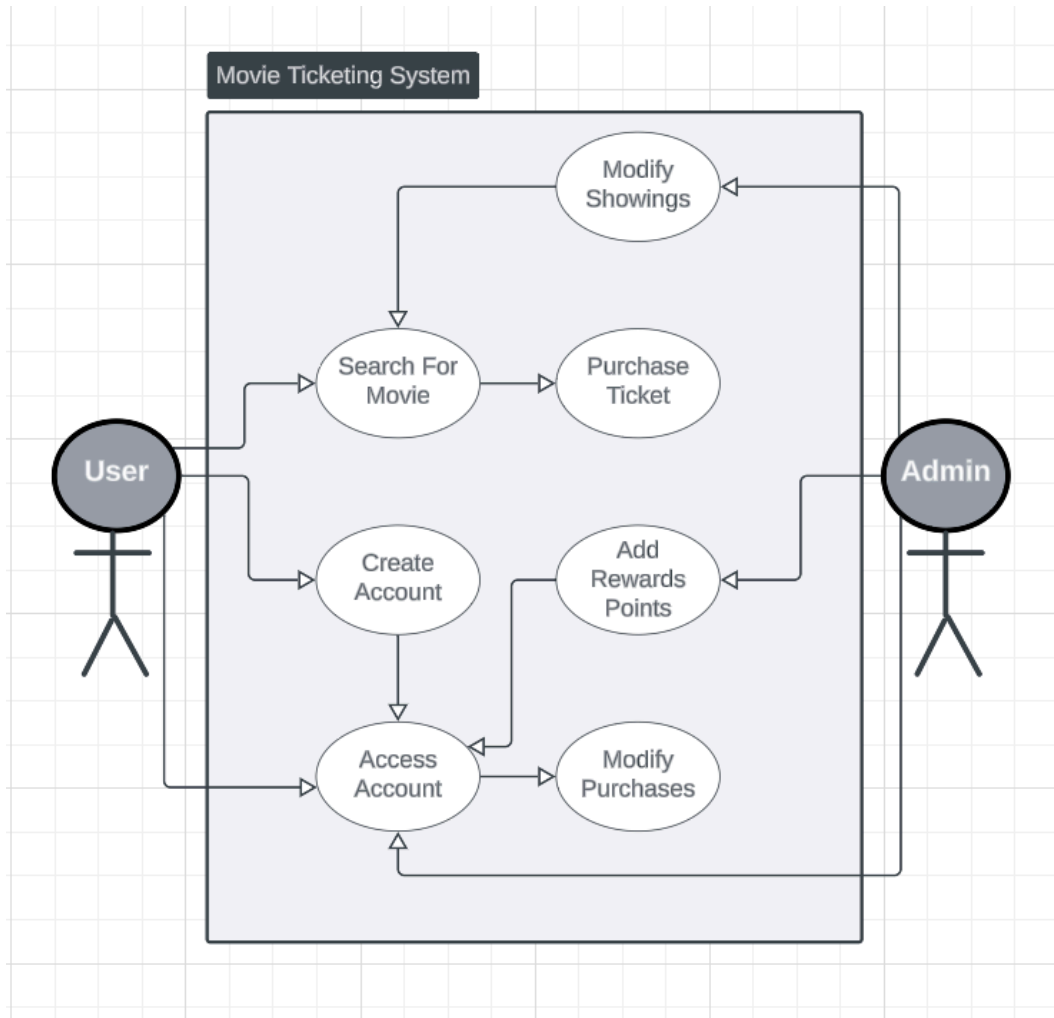
There must also be a way for the clients or administrators to access their tickets in order to make modifications, cancellations or refunds.

3.3.6 Add Rewards Points

The system or administrator must be able to add rewards points to certain accounts for client purchases.

3.3.7 Modify Showings

The administrator must have a way to modify the information related to the movies available, their showtimes, their available locations or any other information necessary.



- **showingTime**: Specifies the time when the movie starts.
- **theaterNumber**: Denotes the number of the theater where the movie is being shown.
- **location**: Refers to the physical address of the movie theater.
- **availableSeats**: Represents the number of seats currently available for the showing.
- **totalSeats**: Indicates the total seating capacity of the theater.
- **pricePerTicket**: Specifies the cost of a single ticket for the showing.
- **showingID**: A unique identifier assigned to each movie showing for tracking purposes.

3.4.1.2 Functions

The **MovieShowing** class provides functions to manage and retrieve information about movie showings:

- **getAvailableSeats()**: Returns the current number of available seats for the showing.
- **reserveSeat(seatNumber)**: Reserves a specific seat for a customer, updating the available seats accordingly.
- **cancelReservation(seatNumber)**: Cancels a seat reservation, making the seat available for others.
- **updateSeatAvailability()**: Updates the count of available seats after reservations or cancellations.
- **getShowingDetails()**: Retrieves all pertinent details about the movie showing, including movie title, date, time, theater number, location, and pricing information.

References to Functional Requirements and Use Cases

The *MovieShowing* class is associated with the following:

- **Functional Requirements:**
 - 3.2.1 Purchase Ticket
 - 3.2.5 View Available Movies
 - 3.2.11 Movie Search
- **Use Cases:**
 - 3.3.1 Search For Movie
 - 3.3.2 Purchase Ticket
 - 3.3.7 Modify Showings

3.5 Non-Functional Requirements

3.5.1 Performance

The system should be capable of handling up to 500 concurrent users without performance degradation. The system should be prepared to scale in the case that more locations are constructed, or certain movies are high in demand.

95% of transactions shall be processed within 3 seconds under normal operating conditions.

Page load times for all user interfaces shall not exceed 3 seconds for the first load and 1.5 seconds for subsequent loads.

3.5.2 Reliability

The system shall maintain an average of 30 days between any failure or instance of downtime. The system shall ensure data integrity with a rate of 100%.

3.5.3 Availability

The system shall maintain 99.9% uptime, with a maximum of 8.8 hours per year. Scheduled maintenance windows shall not exceed 2 hours per month and will occur during off-peak hours (between 12 a.m. and 3 a.m. PST).

3.5.4 Security

All sensitive data, including payment and personal information, shall be encrypted using industry-standard AES-256 encryption. The system shall implement multi-factor authentication (MFA) for administrative access.

User passwords shall be stored using salted and hashed encryption techniques.

3.5.5 Maintainability

The system's codebase shall adhere to modular design principles, and past versions of the software should be updatable or replaceable without impacting the system.

Routine software updates should be implemented without requiring complete system downtime.

Comprehensive documentation shall be provided for all software components.

3.5.6 Portability

The system shall be compatible with all major web browsers (Chrome, Firefox, Safari, Edge).

The system shall be deployable on Windows and Linux-based servers without requiring, if any, significant changes to the codebase.

The system should be compatible with mobile devices due to responsive CSS practices.

3.6 Inverse Requirements

- The system shall not store user's credit card information in any way
- The system shall not allow more than 10 failed login attempts from an IP address within the span of 5 minutes
- The system shall not allow the refund of tickets 24 hours prior to movie screening

- The system shall not support the streaming of movies
- The system shall not support the sale of concession items

3.7 Design Constraints

Specify design constraints imposed by other standards, company policies, hardware limitations, etc. that will impact this software project.

3.8 Logical Database Requirements

Will a database be used? If so, what logical requirements exist for data formats, storage capabilities, data retention, data integrity, etc.

3.9 Other Requirements

Catchall section for any additional requirements.

4. Analysis Models

List all analysis models used in developing specific requirements previously given in this SRS. Each model should include an introduction and a narrative description. Furthermore, each model should be traceable to the SRS's requirements.

4.1 Sequence Diagrams

4.3 Data Flow Diagrams (DFD)

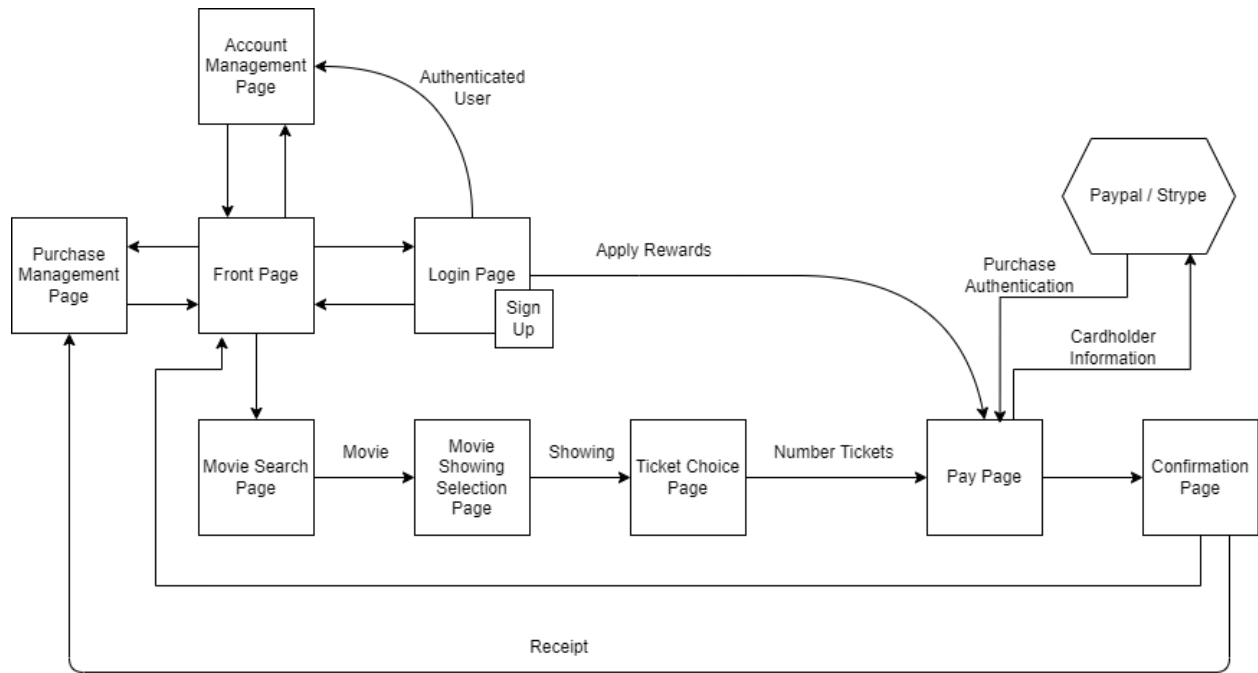
4.2 State-Transition Diagrams (STD)

5. Change Management Process

Identify and describe the process that will be used to update the SRS, as needed, when project scope or requirements change. Who can submit changes and by what means, and how will these changes be approved.

6. Design Specifications

6.1 Software Architecture Diagram



6.1.2 SWA Description

The diagram shows the streamlined process for users to register, sign up, search for their movies, pick showtimes, choose tickets, and pay.

6.2 UML Diagram

A. Appendices

Appendices may be used to provide additional (and hopefully helpful) information. If present, the SRS should explicitly state whether the information contained within an appendix is to be considered as a part of the SRS's overall set of requirements.

Example Appendices could include (initial) conceptual documents for the software project, marketing materials, minutes of meetings with the customer(s), etc.

A.1 Appendix 1

A.2 Appendix 2