Theater Ticketing System

Software Requirements Specification

Version 1

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Group #8
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Prepared for
CS 250- Introduction to Software Systems
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Revision History

Date	Description	Author	Comments
Feb 12	Version 1	Kyle Doran	First Draft

Document Approval

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

Signature	Printed Name	Title	Date
	Kyle Doran	Software Eng.	
	Dr. Gus Hanna	Instructor, CS 250	

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1. Introduction

1.1 Purpose

This SRS document is intended for the software designers and developers to guide their work, as well as the customer to review and provide feedback on the requirements and specifications they desire.

1.2 Scope

The scope of this project is to create an online software for end users to purchase movie theater tickets. The software will manage movie information, descriptions, and start times, theater seatings and reservations, price listings, and purchase histories, allowing for refund and purchase management both by the end user and employees of the customer. What is not included is the cossension stand information and in theater food and beverage purchases. Purchases should be safe and secure as well as updated in real time so seats are not double booked. The software should be accessible through a website that is easily accessible and usable by any end user, a mobile application is not required. Tickets after purchase will be sent as a printable document to the end user's email, as well as a receipt of payment.

1.3 Definitions, Acronyms, and Abbreviations

1.4 References

1.5 Overview

The SRS is designated into four main sections. The first section provides the general overview of the project and its specifications. The second section goes into depth on the product's functions and constraints as well as the user characteristics. The third section defines the specific requirements of the User interface accessible by the end user and customer

2. General Description

2.1 Product Perspective

This ticketing system would work with the customer's existing financial systems, providing specific and detailed information on ticketing sales. It would also integrate automatically with the customers existing system for planning movie showtimes and prices as well as seating and ticket availability. This would include information surrounding movie length and description, cast and crew names, movie title, rating, critic ratings, and genre. The provided tickets would require scannability by the existing ticket scanning system, both virtual and printed, to be checked in at the door.

2.2 Product Functions

The software will show users the available movies and showtimes with location of the theater, including movie titles, descriptions, cast and crew, rating, critic ratings, and genre.
Seats will be shown as available or reserved, as well as standard or disabled seating, and users can reserve seats for checkout.
A checkout system that provides the total price to the user after discounts are applied from military service, senior citizens, children, and students. The checkout system then provides a way for the user to pay for the selected seats and sends the customer a receipt and printable physical ticket or a scannable E-ticket to their email address.
Users have the option to sign in with an account which would save their purchase information as well as provide a subscription based membership bonus that provides other benefits in theater, such as skipping lines and concession discounts.

2.3 User Characteristics

The general user for the system would be a member of the general population looking to pre-purchase their ticket in advance of traveling to the theater.

2.4 General Constraints

This system will support 1 theater with 3 show rooms, 2 show rooms are smaller and have 48 standard seats and 2 disabled access seats, the final show room contains 72 seats and 6 disabled access seats.
The purchasing system will support Visa, Mastercard, and American Express credit card systems only. Paypal and Zelle and other third party payment systems will not be accepted. No direct bank account wiring systems will be accepted.
The website will work only on the following supported browsers: Chrome, Firefox, Edge, Opera GX, Safari, Internet Explorer

2.5 Assumptions and Dependencies

We can assume that there are a multitude of options for implementing a system of this caliber in both hardware and software fields.

3. Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

Users will be able to access the movie catalog and showtimes as well as pricing. They can view a more detailed description of each film, including genre, movie length, cast, crew, and reviews. Users can create an account or login for perks such as rewards, purchasing a membership, saving credit card information, etc. Account information can also be edited, this includes switching/adding credit cards or canceling any existing membership.
The user can view the available seats in the theater and switch to any open seat of their liking.

There is a payment system where the customer can enter a one time payment option, and receive a confirmation through email.
A theater details page that has the address of the theater, theater open dates/times, and parking information.
A help screen that provides directions for the website and a contact information box containing contact phone number and email.

All of this will be created on an html website in a graphical form that provides an easy to use process for any user.

3.1.2 Hardware Interfaces

The hardware interface would show the following information:

- Whether the server is accepting inputs and providing outputs
- How much storage space is available to the server
- The ability to view stored data and clear old data
- Connection to the internet and its strength
- RAM usage

This would be hosted on a rented windows server. The system will be accessible by desktops and laptops, but no mobile or tablet version will be provided.

3.1.3 Software Interfaces

The Software interface would show how the program is interfacing with the existing adjacent programs (banking, communication email service, preexisting in person ticketing system). We can directly edit purchases and seat availability, this is to provide workers at the theater the ability to move customer's seats. Canceling and providing refunds will be available through this system. Membership information can be viewed and edited by employees.

This software would work on Windows and Apple systems.

3.1.4 Communications Interfaces

An automated Gmail account that provides receipts and ticket information to customers.
A customer support email run by employees to answer questions and help confused customers.

3.2 Functional Requirements

3.2.1 Movie Showtimes List

3.2.1.1 Introduction
This list contains all movies and their showtimes, as well as the details of the film, including genre, movie length, cast, crew, and reviews. Pricing for individuals would also be listed.
From this screen, end users can reserve seats and add them to their cart.
A search function would exist that allows users to search for films based on title, genre, cast, crew, and showtime.
3.2.1.2 Inputs

Employees can input new movies and their showtimes manually through the adjacent existing in person ticketing system, and that information will be read by this system, and uploaded automatically after an update each day at 9:00AM.
If a movie is canceled, an update can be made manually, to update the information at any time.
3.2.1.3 Processing
This information would create an opportunity to purchase tickets to these movies and reserve seats, and based on that information, the movies may be marked as sold out.
3.2.1.4 Outputs
Simple viewable table of all showtimes and movie information to the user interface.
3.2.1.5 Error Handling
If someone attempts to add a ticket to their cart of a sold out film or reserved seat, the purchase will be blocked. A message would be displayed explaining the issue.
If a search reveals no results, display a message saying as such and recommend the user uses less filters, or if the movie searched is not available at the theater, recommend other similar movies that the user may like.

3.2.2 Payment System

3.2.2.1 Introduction
The payment system allows for a user to pay for their selected tickets/seats from the showtime list. The selected tickets can be removed freely from the users cart. Credit card information will be accepted for payment, and saved credit card information from a user's account will be automatically filled.
After payment, an authorization of payment will be required from the customer's banking system.
3.2.2.2 Inputs
Selected seats and ticket prices from the Showtimes List
Customer Credit card information and banking authorization
3.2.2.3 Processing
Confirmation of Credit information
3.2.2.4 Outputs
Seats will be marked as sold, and reserved permanently.
Receipts will be generated and sent to both the customer and theater by email
Scannable tickets will be sent to the customer as well via email.
3.2.2.5 Error Handling
If someone attempts to buy more than five tickets, a captcha will be generated to check if they are human. If the captcha is failed, the payment will not be accepted and no tickets will be sold until the captcha is completed.
If someone puts in a non-supported card, an error will be given explaining our list of accepted payment options.
If a payment is not authorized, the customer will be notified and asked to confirm their payment information or input a different form of payment.
If the customer does not receive the emails, they can select an option to resend the emails, or download the documents directly.
If a refund is requested 24 hours before the movie showtime or after, the customer will not be provided the refund, but they can still unreserve the seats if they do not plan on attending.

3.2.3 Account System

3.2.3.1 Introduction
A secure system that safely stores customer login information (username and password), credit information, and membership information.
3.2.3.2 Inputs
Customer payment for membership
New login credentials
Credit information, including billing address
Purchased tickets
3.2.3.3 Processing
Creation of an account in the system with attached information
Log of purchases and reserved seats
3.2.3.4 Outputs
Viewable credit information
Viewable membership information
Viewable receipts and purchased tickets
3.2.3.5 Error Handling
If a login is put in incorrectly, the account is not accessible. If three incorrect attempts are made, a captcha will be generated as a third requirement for login.
If membership payments are not made, an email will be generated informing the customer, and the membership status will be removed.

3.3 Use Cases

3.3.1 Use Case #1

A customer visits the website and searches for a movie. They select their filters and get a table of possible showtimes that meet their specifications. They select a movie to view more details about it, this includes a longer description and ratings. They select their showtime and then are asked how many tickets and which tickets they'd like to purchase. Then, the website brings them to the seat selection screen and shows them which seats are available so that they can add desired seats to their cart. They proceed to the payment screen where they input their credit card information and confirm the purchase. They receive a receipt and scannable ticket in their email. They then save their credit card information in a new account, and then log off the website.

3.3.2 Use Case #2

A previous customer visits the website and logs into their existing account. They view their credit card information that is stored in the system, and decide to remove the existing credit card and add a new one. After doing so they decide to start paying for the membership service offered. A confirmation and welcome email is sent to the customer. They then decide to go through the movie search process and proceed to the payment screen where their new credit card is automatically filled into the system, they can review the purchase and then confirm it. A receipt and ticket are sent to their email address. The customer then logs off the website.

3.3.2 Use Case #3

A previous customer visits the website and logs onto their account. They view their purchase history, and select a purchased showtime in the future. They request a refund for their purchased tickets and it is evaluated by the system. If the refund is approved, they receive a confirmation via email and the seats are unreserved for other users to purchase. Then the user logs out.

3.4 Classes / Objects

3.4.1 User

Any customer visiting the website
3.4.1.1 Attributes
Account information (if applicable)
3.4.1.2 Functions
View seats, reservation status, and pricing information
Reserve seats and pay for them
Cancellation and refund options for their purchases
Ability to edit membership options for themself

3.4.2 Employee

An authorized employee at the theater
3.4.1.1 Attributes
Login Information
3.4.1.2 Functions
Ability to edit seat reservations
Ability to apply refunds for any user
Ability to edit account information including credit card information and membership options for any user
Ability to edit theater specifications such as seats amounts, showtimes, and available movies. This includes cancellations and other edits.

3.5 Non-Functional Requirements

3.5.1 Performance

Purchases must be authorized within 30 seconds, or considered failed.
Unpaid seats will only be reserved in the cart for 5 minutes before being released and accessible to other customers.

3.5.2 Reliability

The saved credit card information can be accessed within 3 seconds.
The receipt and ticket are immediately sent to the customer's email address after the purchase

3.5.3 Availability

We will be accessible by email for any technical issues and responses can be expected within 48 hours.
We will be accessible by phone M-F from 9:00AM to 4:00PM

3.5.4 Security

The credit and email information will be encrypted and saved in a way that isn't accessible to anyone but the user.

3.5.5 Maintainability

The system will be using an approach where individual pages and systems can be modified and updated separately with the other functional systems, and seamlessly fit together.

3.5.6 Portability

The system will not be portable, only accessible through the internet and direct hardware access.

3.6 Inverse Requirements

All Inverse Requirements were covered in the Use Cases, or can be handled in person by an employee.

3.7 Design Constraints

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

Web Browser: The system would be compatible with the most current versions of major web browsers such as Safari, Google Chrome, Microsoft Edge, Firefox, and Opera.

Internet Access: The system requires that all users have a reliable internet connection to the system to operate properly.

The system requires that all user data and transaction records are stored securely in compliance with consumer data protection regulations.

The payment system will accept payments that are no more than $2000 and payment frequency is limited to $2000 payment per minute. The gateway accepts payments from all major credit card networks.

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.

Data formats: The database should support various data formats for storing information related to movies, showtimes, theaters, seating arrangements, tickets, customer details, and transactions, Common data formats include text, numbers, dates, images, and multimedia files.

Storage Capabilities:The database should have sufficient storage capacity to accommodate a large volume of data, including information about multiple movies, theaters, showtimes, and ticket sales. it should be to handle dynamic updates and addition to the database without compromising performance.

Data Retention: The database should support data retention policies that specify how long different types of data should be retained. For instance, transactional data may need to be retained for a certain period for auditing and accounting purposes.

Data Integrity: The database should enforce data integrity constraints to ensure the accuracy, consistency, and reliability of stored data.

The database should have built-in backup and recovery mechanisms to protect against data loss due to hardware failures, software errors.

3.9 Other Requirements

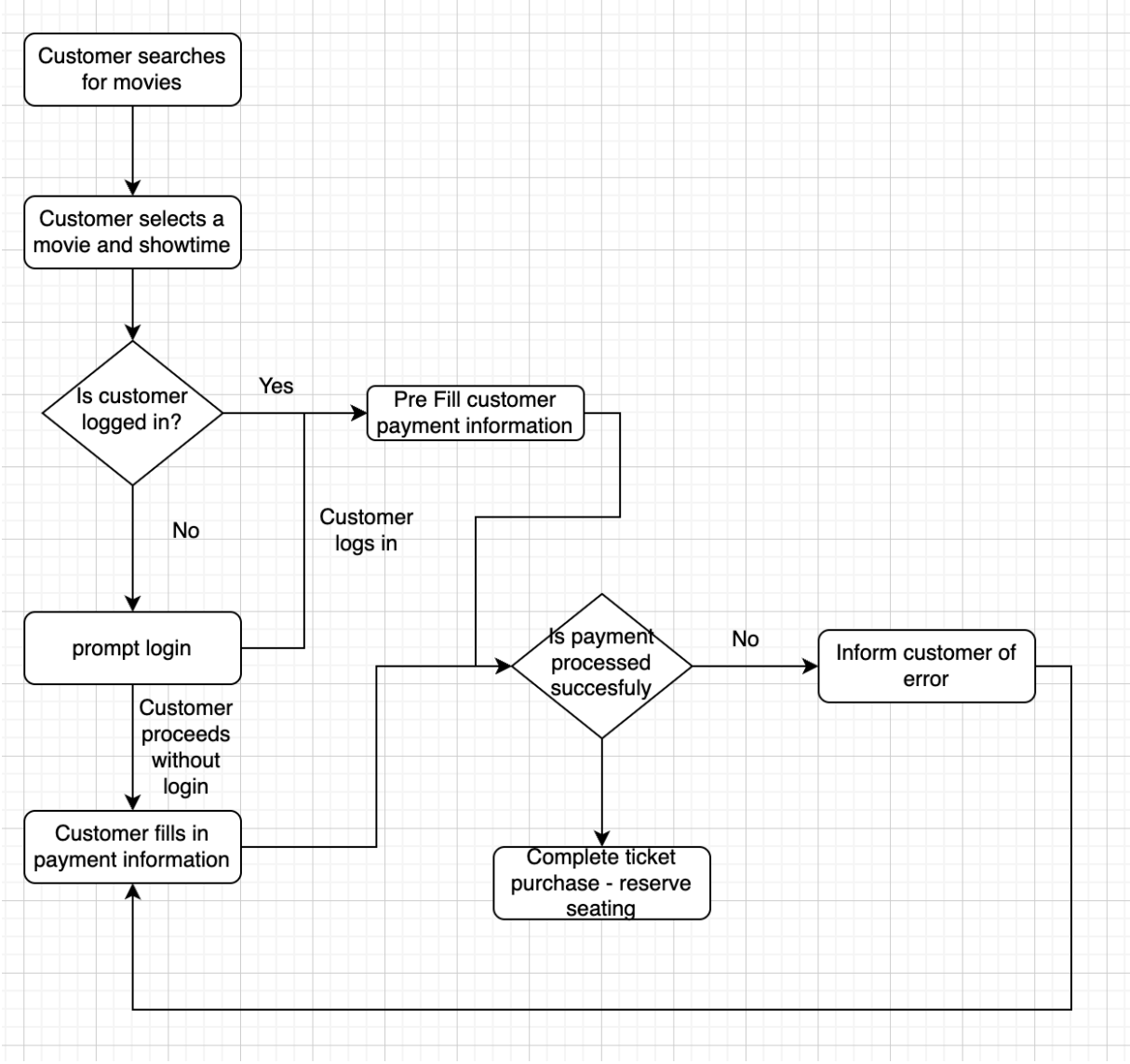
Catchall section for any additional requirements.

The ticketing system provides a user-friendly interface across all platforms such as web, kiosk, and mobile applications to enhance customer satisfaction and usability.

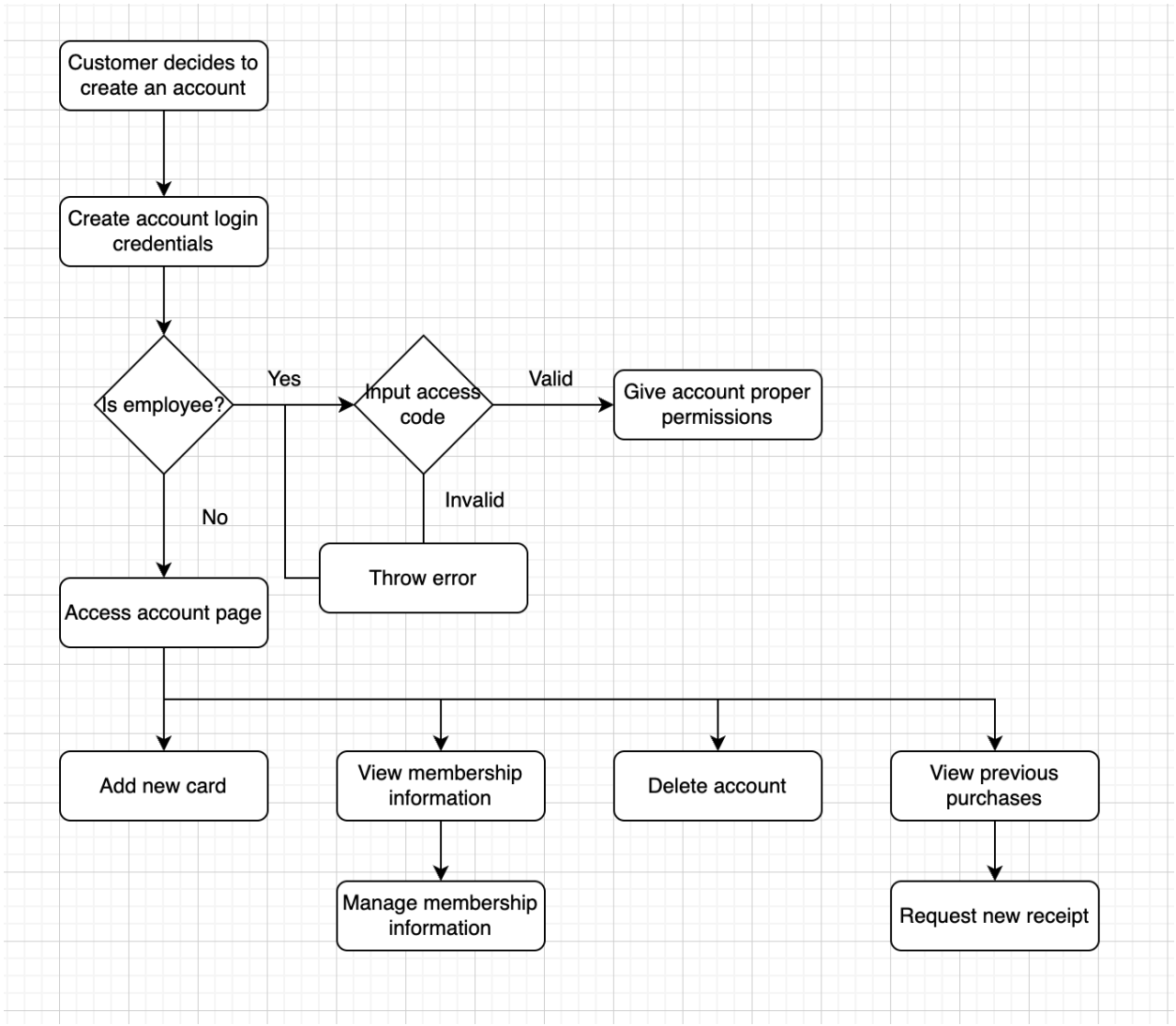
Implement a robust customer support system, including FAQs, live chat, email support, and phone assistance to address user inquiries and feedback promptly.

4. Analysis Models

4.1 Sequence Diagrams

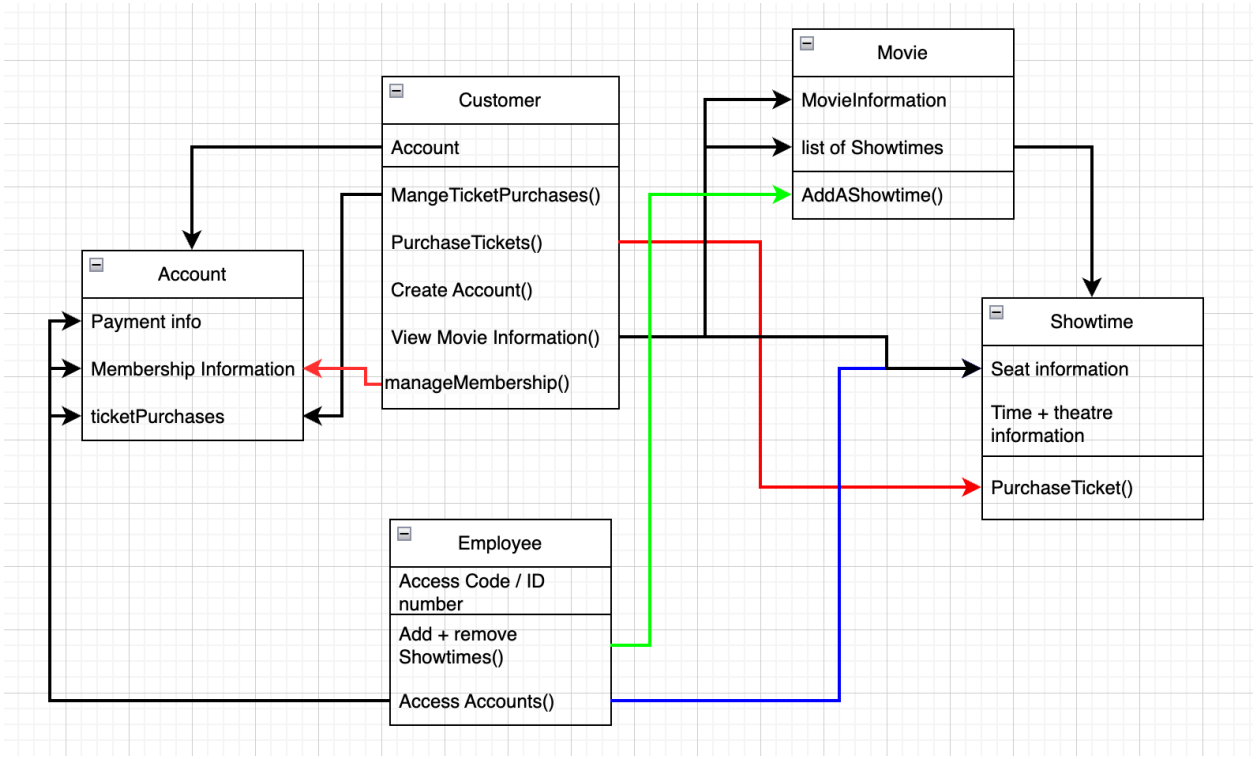


This sequence diagram shows the logical flow of a customer purchasing a ticket for the movie. It begins with the customer searching for and selecting a movie showtime from the database. If they are already logged in their payment information is automatically filled, and the customer may make the purchase. If they are not logged in they are prompted to do so, and they may log in and proceed normally or manually fill their information if they do not wish to use an account. If the payment is accepted by the system, the seats are reserved and the customer is given their receipt and tickets.



This Sequence diagram shows the process of a customer deciding to create an account. All accounts begin with a creation of account credentials, a username and password. If the account creator is an employee they may input their employee access code, which is checked for validity. If the account creator is an employee they are given the permissions and accesses for an employee. If the account creator is not an employee they are immediately directed to the main account landing page and are given the option to add a new payment option, view membership information, view their purchase history, or delete their account. These menus may have submenus for managing their membership information or requesting a new receipt or refund.

4.2 Data Flow Diagrams (DFD)



Customer Class:

- Account (See account class)
- Managed Purchased Tickets()
    - The customer can access the tickets they purchased inside their account class, request refunds, and manage ticket receipts and scannable printouts.
- PurchaseTickets()
    - Customers can access movie information and showtimes in order to select seats and purchase tickets.
- CreateAccount()
    - Customers can create accounts to meet the required personal information such as your name, desired email address, password and mobile phone number.
    - After successfully creating the account, you can access your new email by logging in with your email address and password.
- ViewMovieInformation()
    - Display the movie's tile prominently at the top of the page.
    - include a high-quality cover image of the movie to attract the user's attention.
    - Provide a brief synopsis or description of the movie.
    - Keep it concise but informative, giving users an idea of what the movie is about.
    - Include key details such as release date, duration, genre, director, cast ratings.
- manageMembership()
    - Members may have access to premium or exclusive content that is not available to non-members.

        - Members might receive special discounts or promotional offers on the movies selling.
        - Members may get early access to new movies.

Account Class:
- Payment Info
    - Stored Information of the customer's credit card
- Membership Information
    - The Customer's Membership status and benefits
- TicketPurchases
    - The customer's ticket purchase history

Employee Class:
- Access Code / ID number
    - The employees access code and ID number for granting greater access to other classes
- Add+Remove Showtimes()
    - A manual method for adding and removing showtimes in case the automated API fails
- Access Accounts()
    - An Employee can access any Customer Accounts as well as Showtime seating information in order to fix any problem a customer may have

Movie Class:
- Movie Information
    - The main information holder for the film, including cast, crew, description, genre, and reviews
- List Of Showtimes
    - A list of Showtimes for the movie(See Showtimes Class)
- AddAShowtime()
    - This is a function that is accessible by an employee in case of an error in the automatic API implementation failing to autofill new showtimes, the employee may create or remove the showtimes of their choice.

Showtime Class:
- Seat Information
    - The information about which seats have been reserved in showtime, as well as the ticket pricing information
    - Viewable by Customer Class
    - Editable by Employee Class
- Time + Theatre Information
    - The Time and Theatre location for the showtime
- PurchaseTicket()

- A customer or employee can execute this to purchase and reserve a seat; employees may do this for a customer on-site.

4.3 Development Plan Timeline

Kyle Doran	Adaika Obub	Jenny Do
Initial Framework and Backend Development - Account System - 1 Week	Initial Framework and Backend Development - Movie Database System - 1 Week	Initial Framework and Backend Development - Payment System - 1 Week
Front End Development - Website Layout - All Pages - 1 Week	Hardware Planning and Server Appraisal - 3 days	Security Planning and Implementation for Payment System and Account Storage - 1 Week
	Domain Apprehension - 1 Day	
	Initial Unit Testing - Frontend - 2 Days	
Initial Unit Testing - Payment System - 3 Days		Initial Unit Testing - Movie Database System - 1 Day
	Initial Unit Testing - Account System - 2 Days	API and communication between New System and Customer's Existing System - 1 Week

Main Linking Between Main Modules - 3 Days	Hardware Setup - 1 Day	
	Hardware Implementation - 1 Day	
	Frontend Testing - Entire Site - 3 Days	
Security Testing - 2 Days		Hardware Testing - 2 Days
Front End Development With New Knowledge - 2 Days	Hardware Development With New Knowledge - 2 Days	Security Development With New Knowledge - 2 Days

Total development time before Beta launch: 19 Business Days
During open Beta launch, Site will be open to the public for use by the customer and all users, and all site traffic will be closely monitored by the entire staffing for any issues that may arise. The Beta Period will last approximately three weeks.

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. Verification Test Plan

6.1 Functions To Be Tested For

The intended functions to be tested for include:

- ➢ Customers should be able to search for and find movies based on a number of criteria including movie title, cast and crew, and ratings.
- ➢ Customers can view available showtimes and select the available seats in each that they desire to purchase.
- ➢ These seats will be reserved in the system so they cannot be double booked.
- ➢ Customers should be able to enter in valid credit card information and receive a receipt to their provided email address once payment has been received.
- ➢ Customers receive a printable and scannable ticket to be presented in person to the theater employees.

- ➢ Detection systems for fraudulent purchases, like mass ticket buying and predatory refund schemes.
- ➢ Customers can have access to change the selection of the movies and showtimes at any time.
- ➢ Customers should be able to fully refund their tickets at any time as long as it is 24 hours before the movie.
- ➢ Customers should be able to manage their account information, this includes updating/canceling their membership status or removing the credit card information they have saved on their account, etc.
- ➢ Customers should have access to create an account or to sign in to the website at any time and change the account password.

6.2 Tests and Their Function

We will need a system of tests to confirm the validity of the movie search system. This will confirm that all movies will be findable by the system and that all search queries yield accurate results. This can be achieved through a unit test of the movie class, mainly focused on acting as the customer would search.
This testing system will extend to the available showtimes, as they need to be displayed alongside the movies, as well as their available seats.

We will need a system of tests for the seat reservation system to ensure that all seats cannot be double booked or falsely left empty. This will need to have an integrated testing process with the payment system, as the seats do need to be successfully paid for to be reserved.

We will need a system of tests for customer login and account management, ensuring that accounts are easily accessible without error and useful to the customer in its reliability and security. This will include a complete system testing methodology for the crosspoint between the customer accounts, payment history, and ticket and seat management systems. This will extend to customer membership functions and subscription payment systems and their validity.

We will need a system of tests for the refund system and its propagation to all parts of the system. This will require a system-wide testing regime for the payment system's approval and confirmation of the refund, the account system's data management and storage of the refund receipts, and the movie system's releasing of the previously purchased seats for later purchase.

We will need a system of tests that assures security over the customer's account login and incorporated information. The account should only be accessible through the customer's uniquely created username and password. Customers' membership status and credit card information should only be able to be updated/managed through the customers' account.

We will need a system of tests for ticket purchases to ensure that digital (scannable or printable) tickets and receipts are sent out to the customers' email addresses once their payment has been confirmed and received for their purchased movie ticket.

We need a system to test that the password entered by the user is masked on the screen for security reasons that prompts the customers to enter a strong password while creating a new account.

7. Data Management Strategy

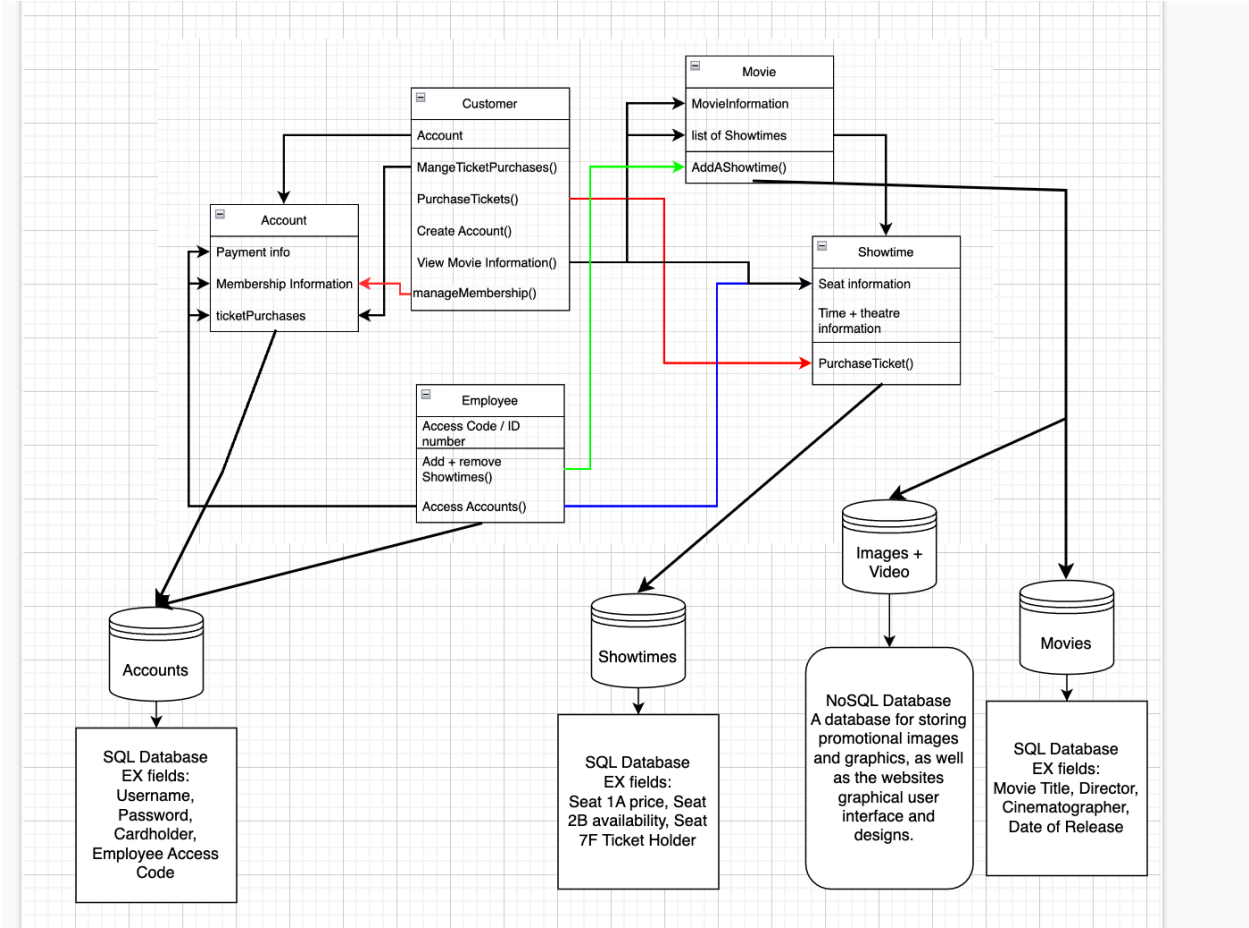
7.1 SQL Databases

1. Account System
    a. The storage of account login information and card information will be stored in a SQL database as this is the simplest option and is easy to retrieve quickly for the user. Additional information such as membership info and previous ticket purchases can easily be stored inside this account SQL database.
    b. Additionally the access of an account can be expressed in a single field, i.e. employee and customer accounts can be stored in the same place.
2. Movie Information
    a. Movies fields such as Name of the film, Director, date of release, cast and crew is most optimized to be stored in a SQL database.
3. Showtimes
    a. Seat availability and price can be expressed in a SQL database and easily implemented to our automated system. The time and date of the show is also something stored simply in the database.

7.2 NoSQL Databases

1. Movie Promotional Images
    a. Movies posters and advertisements as images need to be saved in a database more suited for that datatype.
2. Website Graphics
    a. The website's graphics and user interface features will need to be saved in a database more suited for the images and their quick retrieval.

7.3 Software Architecture 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