TEMPORARY PAGE

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ReelEasy (Movie Theater Ticketing System)

Software Requirements Specification

Version 1.3

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Prepared for
CS 250 - Introduction to Software Systems
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Revision History

Date	Description	Author	Comments
7/15/2025	Version 1.1	Bavongkhoun, Wold, Rodin	Created to include sec. 3
7/29/2025	Version 1.2	Bavongkhoun, Wold, Rodin	Created to include SDS Test Plan
8/4/2025	Version 1.3	Bavongkhoun, Wold, Rodin	Features Data Management & Revised SWA Diagram

Document Approval

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

Signature	Printed Name	Title	Date
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Table of Contents

1. Introduction

This section provides a broad overview of the software requirements by detailing its purpose, intended audience, overall scope, and key terminology pertaining to the system.

1.1 Purpose

The purpose of this SRS is to define the functions and non-functional requirements for ReelEasy. It is an online ticketing system designed to support SDSU's School of Theatre, Television, and Film's movie theater operations. The system aims to provide a secure, easy-to-use and accessible platform for students, faculty, and community patrons to browse movie showtimes and select seats. This document is a guide for developers, designers, quality assurance teams, and project stakeholders who are responsible through the software development life cycle.

1.2 Scope

Demands for the use of SDSU's School of Theatre, Television, and Film facilities have created the need for a local ticketing system that is simple, secure, and accessible across multiple platforms. The software product to be developed is named ReelEasy. ReelEasy will enable students, faculty, staff, and community patrons to: (1) Manage digital ticket reservations and sales for movie screenings hosted by SDSU's School of Theatre, Television, and Film. (2) Enable customers purchase tickets and allow seat selection through web and mobile devices. (3) Provide electronic tickets for online purchases and support physical ticket printing for box sales. The ReelEasy system will NOT: (1) Process payments unrelated to ticketing or seating reservations to movie screenings. (2) Manage or process any food or beverage orders or payments. (3) Manage live performances or non-movie theater events.

ReelEasy system is designed to provide a secure, ease-of-use, cross-platform system for patrons to reserve and purchase tickets for movie screenings. Accommodate the unique dine-in movie theater environment by enabling seat reservations for dining sections. Efficiency of handling wait times through online ticket purchases only. Provide staffers with the tools needed to manage schedules, seating layouts, ticket availability, and generate attendance and sale reports. The strategic objective is to support SDSU's School of Theatre, Television, and Film's mission to deliver accessible, high-quality movie experiences in a modern and flexible facility. The system's scope is strictly limited to ticketing and seat reservations for movie screenings and excludes food and beverage services.

1.3 Definitions, Acronyms, and Abbreviations

This subsection provides the definitions of all terms, acronyms, and abbreviations utilized throughout this document.

ReelEasy	Online ticketing system developed for SDSU's School of Theatre, Television, and Film movie theater operations.
SDSU	San Diego State University
Dining Sections	Designated seating areas within the movie theater that provide dining services, coordinated separately by SDSU's Dining Services
Ticket	Electronic or physical ticket for proof of purchase to grant admission to a movie screening.
Patron	Any individual purchasing tickets for screenings through ReelEasy.

1.4 References

IEEE Recommended Practice for Software Requirements Specifications, IEEE Std 830-1998, 25 June 1998, IEEE-SA Standards Board
Your 2025 Guide to Writing a Software Requirements Specification – SRS Document, June 4, 2025, Relevant Software
Scenarios and Use Cases, CS 5150 Software Engineering, Cornell University Computing and Information Science

1.5 Overview

Section 2: Discusses everything that is taken into consideration before planning for the product itself and its design can begin. Section 2 includes relation to adjacent projects such as the dining services, functions it should be expected to perform, a description of the expected end user, constraints applicable to the development of this project, and conditions we can expect to be present for the product.

Section 3: Lists out specific requirements the product is meant to facilitate, use cases we expect the end user to have with the product, requirements for functionality, thresholds to maintain for the functions, and design constraints.

Section 4: Includes documentation of models and diagrams that were used to establish requirements and how we should expect the product to behave.

Section 5: Documents changes made to the SRS over time and how the SRS changing process should proceed.

2. General Description

Section 2 will not be going over requirements for the product, but instead will provide a broad look at the outside factors impacting how the product is being designed and a vague description of functionality.

2.1 Product Perspective

ReelEasy will include the usage of a third party database software for saving accounts, payment methods, schedules, and seating availability. ReelEasy handles the interface for customers to purchase tickets online for the SDSU's School of Theatre, Television, and Film's movie theater and its showings. Dining services are mentioned as a feature of the establishment, but are not handled by ReelEasy.

2.2 Product Functions

ReelEasy allows customers to purchase tickets for the shown available seats for that showing. Include a section of the website dedicated to providing information about what movies are being shown throughout the week, what specific times a movie is being played, and what section of the theater it is planned on being played in. Incorporate a section of the website that displays reviews for each movie that come from critics. And contain methods for theater staff to manually update the currently shown schedule as well as input the planned schedule for future showings.

2.3 User Characteristics

Customer:

This end user is expected to be either SDSU students or individuals adjacent to the SDSU institution. The end user will be interacting with ReelEasy via their web browser. Login information will not be required, but the customer can opt in to create an account. Customers are expected to be able to navigate web pages already.

Critic:

Audience members who have attended showings of a movie will be able to leave a review which will then be shown on the ReelEasy website. This critic will require an account to leave any reviews so that we can verify a ticket was bought for the movie being reviewed and to ensure safety of what is being shown on the website. A basic word processing textbox will be provided to the critic for them to write their review in.

Staff:

Staff members of the theater itself will have access to updating prices and scheduled showings. An account will be required for the staff member to make these changes. The staff member is expected to be comfortable with spreadsheets, as the scheduling interface will be similar to one.

2.4 General Constraints

ReelEasy is expected to operate on a personal computing platform with access to the internet and web-surfing applications such as Google Chrome, Microsoft Edge, Safari, and Mozilla Firefox. ReelEasy should use HTTPS, have secure account information storing methods, and role-based access for varying levels of authority to provide a sense of security. The system must also comply with SDSU IT security policies. The website should be responsive and allow for an ease of use for the end user. The website should be available at all times outside of scheduled maintenance times. User data should be stored according to data protection laws.

2.5 Assumptions and Dependencies

All users using the software will have access to internet-connected devices for online purchases. Furthermore, SDSU Dining Services will provide updated information on dining section availability to ensure seat reservation accuracy. The system will utilize and depend on SDSU's existing network infrastructure for hosting data security.

3. Specific Requirements

This section will highlight the specific requirements that ReelEasy will be required to meet.

3.1 External Interface Requirements

3.1.1 User Interfaces

3.1.1.1 The system interface is accessible from standard browsers.

3.1.1.2 The system has a responsive design that adjusts for mobile device screens.

3.1.1.3 The system requires account login to verify identity.

3.1.1.4 The system shall support different languages (English, Spanish, French, and Vietnamese)

3.1.1.5 The system permits users to search for movies using keywords, filters, and or categories.

3.1.1.6 The system allows for users to select preferred showtimes and available seats (including dining sections).

3.1.1.7 The system supports universal design and accessibility with seating arrangements for people with disabilities

3.1.1.8 The system has a box office interface for physical tickets.

3.1.1.9 The system allows for an administrative interface for management of the system.

3.1.1.10 The system admin interface shall add, update, and or remove movie listings and descriptions.

3.1.1.11 The system admin manages showtimes, seat maps, and dining reservations

3.1.1.12 The system permits the real time monitoring of ticket sales and seat availability.

3.1.2 Hardware Interfaces

3.1.2.1 The system is integrated with box office ticket printers for physical ticket printing.

3.1.2.2 The system is compatible with barcode or QR code scanners at the theater entrances.

3.1.3 Software Interfaces

3.1.3.1 The system is integrated with SDSU's CASHNET Payment portal for secure transaction processing.

3.1.3.1 The System receives dining section availability updates from SDSU's Dining Services

3.1.4 Communications Interfaces

3.1.4.1 The system utilizes HTTPS for secure data transmissions

3.1.4.2 The system uses email and SMS gateways for sending electronic tickets and confirmation of purchases.

3.2 Functional Requirements

This section defines the core operations and features that the system will support. These requirements will specify how the software will interact and behave in response to the user's input and system events to ensure it fulfills its intended purpose.

3.2.1 Search and Browse Movies

3.2.1.1 Introduction

This functionality shall allow patrons to search for available movie screenings and browse listings based on title, genre, and or keywords.

3.2.1.2 Inputs

The user can input keywords and or optional filters (i.e movie titles, genres, dates, time, rating)

3.2.1.3 Processing

The system shall validate input format (i.e no invalid characters).

Query the movie database for listings that match the search criteria.

Sort and filter results as requested.

3.2.1.4 Outputs

Display a list of matching movies with basic details (i.e title, showtimes, rating).

Allow the user to clock on a movie to view all the necessary information (description, duration, and available seats).

3.2.1.5 Error Handling

The system will display “No results found” when no results match the search.

The system shall display an input validation message if the input is invalid (unsupported characters).

3.2.2 Seat Reservation / Selection

3.2.2.1 Introduction

The system shall allow patrons to view available seats for a chosen movie and select preferred seats, including standard and dining section seats.

3.2.2.2 Inputs

The system shall take the user’s selected movie and showtime into consideration for selection

The app shall take the user’s desired seat into consideration for selection.

The system shall take into consideration the availability of the seat for selection.

3.2.2.3 Processing

The system shall retrieve a seat map for selected showtimes.

The system temporarily hold marked seats during checkout to prevent double booking or subsequent changes.

The system shall have a final reservation for the seat reservation upon successful payment.

3.2.2.4 Outputs

Display real-time seat mapping.

Highlight selected seats

Show final confirmation of selected seats

Show available seats after each confirmed reservation and transaction

3.2.2.5 Error Handling

System notify user of seat becomes unavailable during checkout, notify user to prompt for new selection.

The system shall output an error and retry option if data retrieval fails.

3.2.3 Payment Processing

3.2.3.1 Introduction

The system shall secure online payments for ticket purchases to ensure compliance with university and industry payment security standards.

3.2.3.2 Inputs

Payment details (credit/debit card, digital wallet, or other digital payment methods)

Ticket cost and user confirmation

3.2.3.3 Processing

Validate user payment information.

Communicate with SDSU CASHNET Payment portal

The system can authorize or decline transactions.

3.2.3.4 Outputs

Confirmation of successful payment and transaction ID.

Issue of electronic ticket

3.2.3.5 Error Handling

Notify the user of payment failures (i.e card declined)

System outputs clear instruction to retry to use an alternate payment method if payment fails.

3.2.4 Administrative Movie Management

3.2.4.1 Introduction

The system shall authorize staff to be able to add, update, or remove listings, showtimes, and seating configurations through a secure administrative interface.

3.2.4.2 Inputs

Movie details (i.e title, description, genre, duration)

Showtimes and theater building assignments.

Seat map configurations.

3.2.4.3 Processing

Validate data input for accuracy and completeness

Update movie listings database.

Sync seat maps with availability in real-time.

3.2.4.4 Outputs

Updated listings visible to patrons through search and browse feature.

Confirmation of successful changes

Administrative reports that summarizes movie schedules.

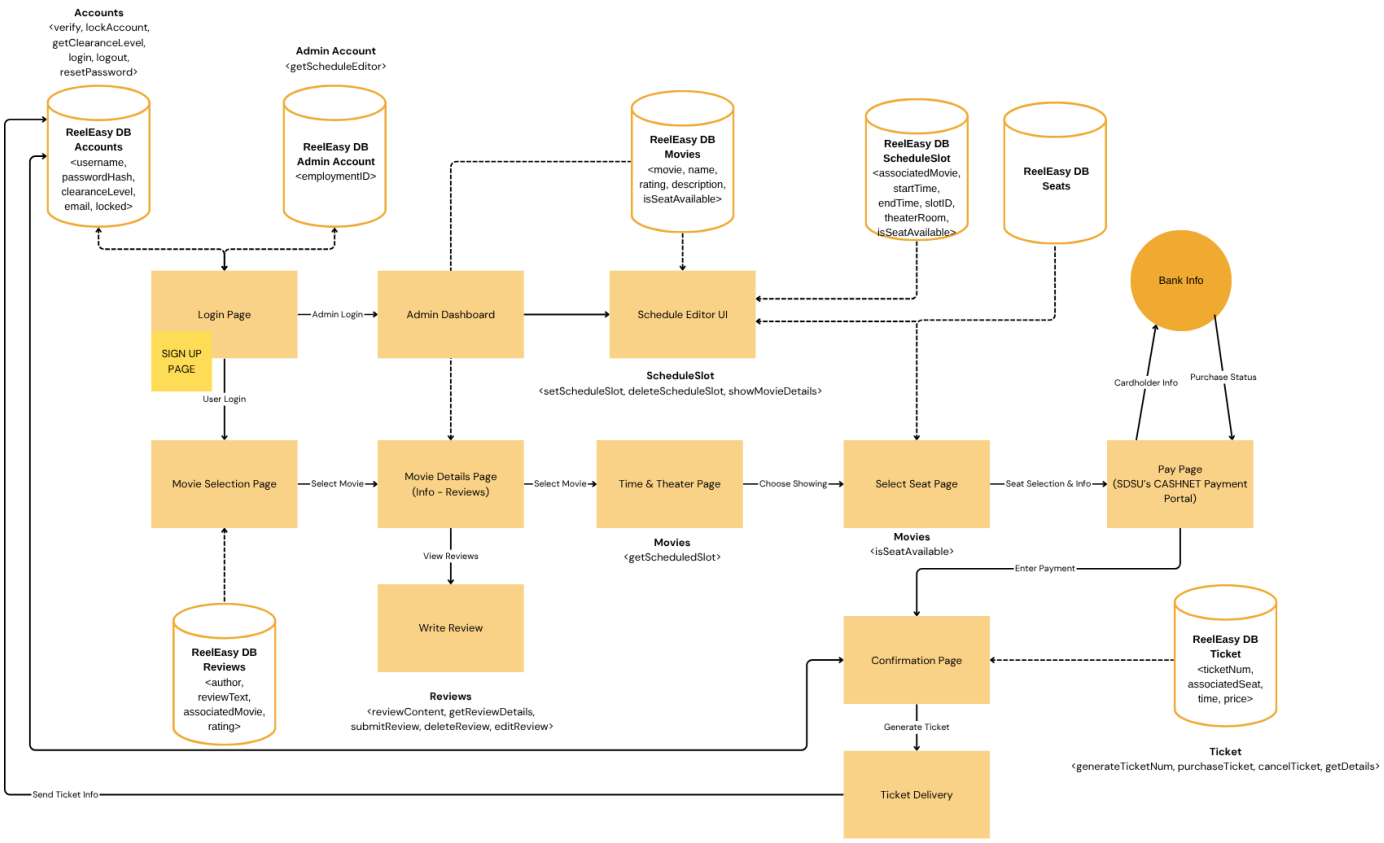
3.2.4.5 Error Handling

Alert admin of missing or invalid data.

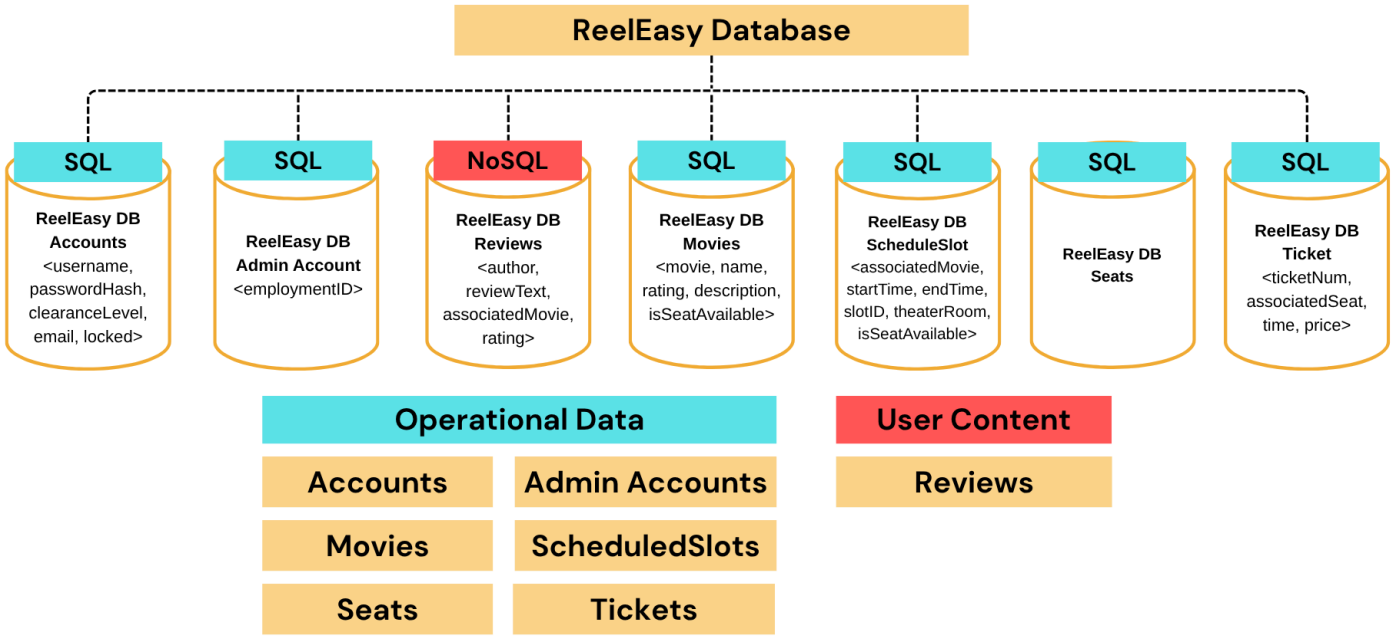
Prevent scheduling conflicts that overlap showtimes in the same facilities

Log changes for audit tracking

3.2.5 ReelEasy Software Architecture



ReelEasy - Software Architecture Diagram V.1.2 (Updated as of 7/29/2025)
(Separate printed handout may be given for the full picture)



ReelEasy - Data Management Diagram V.1 (Updated as of 8/4/2025)
(Separate printed handout may be given for the full picture)

The ReelEasy Software Architecture Diagram (SWA) illustrates how the entire ticketing system's front-end user interfaces, admin tools, and back-end storage work together to deliver all required functionality for SDSU's School of Theatre, Television, and Film.

The diagram encompasses main components, attributes, and its functions in how they interact in tandem with one another through a single centralized database, which contains all the information needed to manage users, movies, show schedules, tickets, and reviews.

There is one centralized database called the "ReelEasy" database which has different subcategories for storing different information. This includes:

- Accounts: Contain the information and functions for a user to have a functional account in the app.

- Admin Account: Contains the information and functions for staffers to operate and edit the app.
- Movies: Contains the information and functions of movie listings and descriptions.
- ScheduleSlot: Contains the information and function for the location and times for the movie.
- Reviews: Contains the information and functions for users to access and write reviews on said movies.
- Ticket: Contains the information and functions for users to get their ticket and theater information.

3.2.5.1 Login / Sign Up

- Users start at the Login Page or Sign-Up Page.
- Credentials are verified with the ReelEasy Accounts DB, which stores usernames, hashed passwords, clearance levels (admin/user) and email addresses.
- Accounts can be locked automatically if multiple failed logins attempts occur

3.2.5.2 Movie Selection / Browsing

- Logged-in users can access the Movie Selection Page where they can browse all available movies.
- When a movie is selected, the system will then load the Movie Details Page, which shows the movie information retrieved from the Movie DB and also pull reviews from the Reviews DB.

3.2.5.3 Reviews

- On the Movie Details Page, users can view all reviews for their selected movie (getReviewDetails()). If logged in, users can submit (submitReview()), edit (editReview()), or delete (deleteReview()) their own reviews.
- The reviewContent() allows the system to validate content to prevent inappropriate submissions.

3.2.5.4 Showtimes / Seat Selection

- After selecting a movie, users may proceed to the Time & Theater page where they will

display available showtimes retrieved from the scheduleSlot DB.

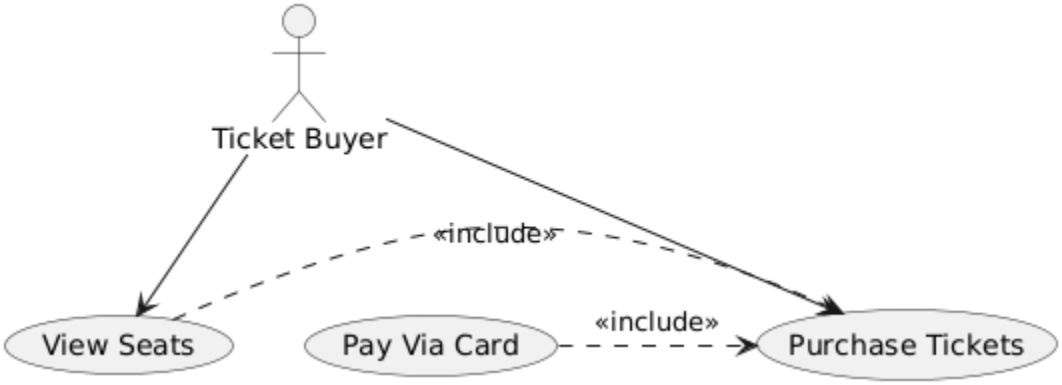
- The select page allows for the user to choose an available seat for their chosen showtime.

3.2.5.5 Reviews

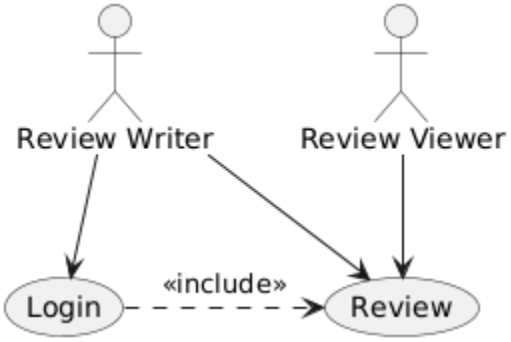
- Pay page verifies payment details and processes the ticket purchase (purchaseTicket())
- The system would generate a ticket number for the user (generateTicketNum()), store it in the tickets table, and create an electronic ticket with the seat, the time, and price information.
- At the confirmation page, it shows the completed transaction, and the Ticket Delivery module sends the ticket details to the user's email or phone.

3.3 Use Cases

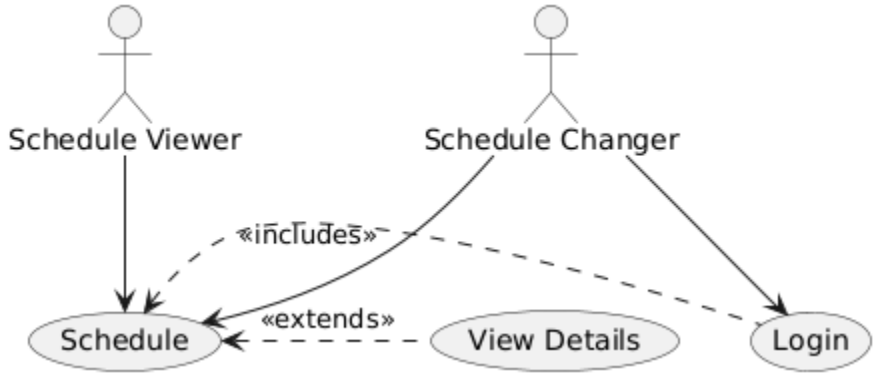
3.3.1 Use Case #1



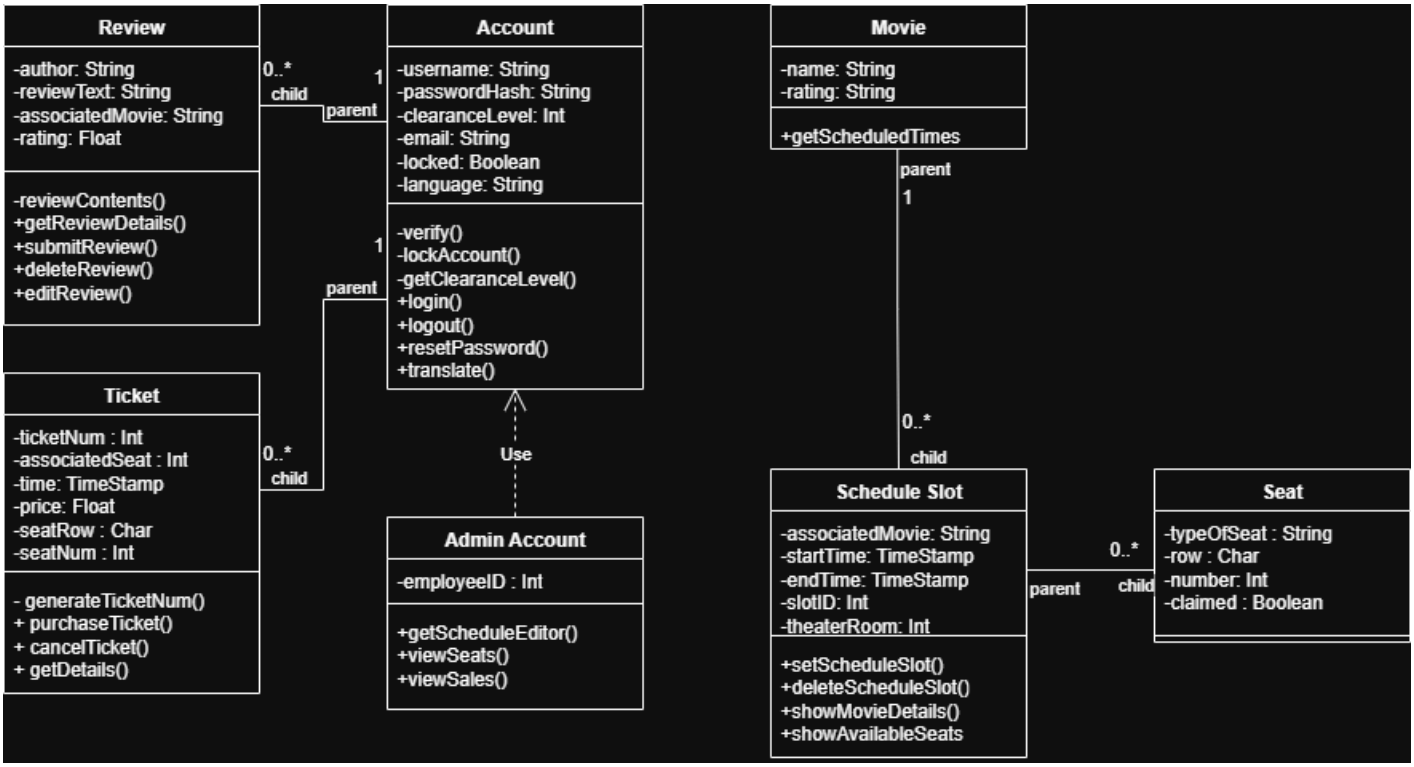
3.3.2 Use Case #2



3.3.2 Use Case #3



3.4 Classes / Objects



3.4.1 Ticket

3.4.1.1 Attributes

- ticketNum : Int
- associatedSeat : Int
- time: TimeStamp
- price: Float

- seatRow: Char
- seatNum: Int

3.4.1.2 Functions

- generateTicketNum()
  A helper function to create a unique ticket ID once the ticket has been purchased.
- purchaseTicket()
  Verifies the payment details and calls the helper function generateTicketNum().
- cancelTicket()
  Refunds the ticket and then deletes it.
- getDetails()
  Shows the ticket's seat, time, and ticketNum in the form of a barcode.

3.4.2 Account

3.4.2.1 Attributes

- username: String
- passwordHash: String
- clearanceLevel: Int
- email: String
- locked: Boolean
- language: String

3.4.2.2 Functions

- verify()
  A helper function that verifies the username and password.
- lockAccount()
  A helper function that locks the account if too many login attempts were made, and sends an email to the account holder's email address to inform them of the account being locked.
- getClearanceLevel()
  A helper function that updates the user interface if the account's clearance level is that of an admin.
- login()
  Gets the user's input username and password attempts, and calls the verify function.
- logout()
  Removes the current connection from the account, returns to the login page.
- resetPassword()
  Sends an email to the account's email address with a link to a page that lets them reset their password.
- translate()
  Translates text on the website based on the user's preferred language.

3.4.3 Admin Account

3.4.3.1 Attributes
- employeeID: int

3.4.3.2 Functions
- getScheduleEditor()
  Opens a user interface for an admin to update the movie schedule, and makes a note on which employee made the change.
- getSeats()
  Shows a visual of all the seats occupied for a specific time slot.
- getSales()
  Shows the number of sales based on the time of day, time of week, and movie.

3.4.4 Review

3.4.4.1 Attributes
- author: String
- reviewText: String
- associatedMovie: String
- rating: Float

3.4.4.2 Functions
- reviewContent()
  A helper function to ensure no inappropriate content was being submitted.
- getReviewDetails()
  Returns the text, author, movie, and rating of the review for an account to see.
- submitReview()
  Takes the user's review and submits it to the website after calling for the reviewContent() function to ensure it is safe to be posted.
- deleteReview()
  Allows an user that matches the author to delete the review.
- editReview()
  Allows a user that matches the author to edit the review. It reopens the user interface used to submit a review with the details previously submitted.

3.4.5 Movie

3.4.5.1 Attributes
- name: String
- rating: String

3.4.5.2 Functions
- getScheduledTimes()
  Returns a list of times the movie has been scheduled for

3.4.6 Schedule Slot

3.4.6.1 Attributes
- associatedMovie: String
- startTime: TimeStamp
- endTime: TimeStamp
- slotID: Int
- theaterRoom: Int

3.4.6.2 Functions
- setScheduleSlot()
  Allows an admin account to edit and submit the times, associated movie, and room for a movie. Generates a slotID so it can be located in a list of schedule slots.
- deleteScheduleSlot()
  Deletes the schedule slot.
- showMovieDetails()
  Allows for the movie class to get information about this particular schedule slot.
- showAvailableSeats()
  Shows a visual of seats for the theater room. Occupied seats will be dim and gray. Dining seats will be outlined in red, disabled seating will be outlined in blue. All other available seats will be outlined in white.

3.4.7 Seat

3.4.7.1 Attributes
- typeOfSeat : String
- row : Char
- number: Int
- claimed : Boolean

3.5 Non-Functional Requirements

3.5.1 Performance
- The system should complete 95% of ticket purchases in under 2 seconds.
- Pages like movie listings, seat selection, and payment should load in less than 2 seconds on a fast internet connection.
- The system should support up to 1,000 users at the same time without slowing down.

3.5.2 Reliability

- The system should work without major problems for at least 30 days at a time.
- If something goes wrong, users should see a helpful message. The system should try to fix the issue automatically or allow the user to send a support ticket with details of the error.
- An error monitoring tool like Sentry may be used to automatically report and track errors for the development team.
- Important actions like payments should have a retry option if they fail the first time.
- The system should prevent duplicate charges by using a temporary hold period on failed or incomplete payment attempts.

3.5.3 Availability

- The system should be up and running at least 99.5% of the time, except for planned maintenance.
- Maintenance times should be announced at least 48 hours in advance.
- Maintenance should be performed during the night time.
- The system should have alerts to let staff know if it goes down unexpectedly.

3.5.4 Security

- All data should be protected using HTTPS encryption.
- Passwords and sensitive information should be securely stored in a data database using encrypting procedures.
- Different users should have different access levels (admins, customers).
- The system should follow SDSU's security rules and privacy laws.

3.5.5 Maintainability

- The system should be built in a clean, organized and modular way to make future updates easier.
- Settings should be kept in the separate database or environmental files so they can be changed without touching the main code.
- There should be tools to track bugs (aka Sentry) and support/feedback systems to request new features.

3.5.6 Portability

- The website should work on major browsers like Chrome and Safari, others are not so important due to very low popularity among users..
- It should look good and work well on phones, tablets, and desktops. The main focus should be on the mobile version, because expected traffic from mobile should be over 60% versus 35% on the desktop.

- The system should be easy to move between different environments using tools like Docker and containerization technologies.

3.6 Inverse Requirements

Non-Applicable

3.7 Design Constraints

3.7.1 Cross-Platform Support (Web & Mobile App)

The system must support a functioning and responsive web interface and dedicated mobile application. Consistent functionally and user experience must be maintained across platforms.

3.7.2 Specific Mobile Platform Limitations

The mobile app must comply with the Apple App Store and Google Play guidelines, which will affect the UI design, login/session handling, and content moderation.

3.7.3 Accessibility Compliance

The application must be able to comply with ADA and WCAG 2.1 accessibility standards. These include support for screen readers, high-contrast displays, and alternative text for all interactive elements.

3.7.4 Email Delivery with Approved Simple Mail Transfer Protocol Provider

Automated email sources (ticket delivery & account recovery) must use the designed SMTP server provided by the hosting environment or institution. These servers must have limits and domain authentication constraints.

3.8 Logical Database Requirements

3.8.1 Accounts

Accounts will use a SQL database since the structure of each account is rigid. Passwords will be hashed using Argon2 before being put into the database. Only one session will be allowed at a time, if log in sessions are detected across multiple devices, the oldest login session will be discarded in favor of the one on the most recently logged in device. Admin accounts will be just another form of account but with a different value for the clearance level, and usage of the employeeID field. Accounts will be indexed on their username, as usernames will need to be unique.

3.8.2 Reviews

Since multiple accounts will exist with multiple reviews, a NoSQL option will be used for reviews. The reviewText can vary greatly depending on the author, and there are no deep connections between the review and account class aside from just connecting the author to the username of the account it belongs to. Sharding may be used for each movieID if review numbers grow significantly. Reviews will be indexed based on the associated movieID.

3.8.3 Tickets

Tickets have a strict structure that will have every field filled out regardless of the type of ticket. There will not be a massive amount of tickets, since movie schedules are only shown a week ahead of time on the website. Tickets will contain foreign keys to Seats, Accounts, and Schedule Slots. Tickets will be indexed on their ticketNum.

3.8.4 Movies

Movies will use a SQL database due to their structure and need for relations to both the schedule and review classes. 1 Movie will have a relation to many Schedule Slots and Reviews. Movies will have references to their schedule slots. Movies will be indexed on their movieID in the database, but with possibilities for indexing based on their name for searching functionality.

3.8.5 Schedule Slots

Schedule slots will use a SQL database since they have a close relationship to the movie class and seat class, relational integrity is needed. Two different employees on admin accounts could be updating the schedule at the same time. Live updates for the updated schedule slot will be made once any of the schedule slots have been edited and the changes applied. A schedule slot will be labeled as occupied if another employee is currently working on a specific schedule slot, that way two employees cannot input contradictory information. Schedule slots will have references to their seats. Schedule slots will be indexed under each movie based on their timestamp.

3.8.6 Seats

Seats will require the most integrity out of all of the previously mentioned classes, and need to have relational logic between itself, schedule slots, accounts trying to purchase them, and tickets. An SQL database method is definitely required for this class due to these considerations. To account for if two or more accounts try to reserve a seat in the ticket purchasing process at the same time, there will be a brief pause and the seat will be reserved for the account with the earliest timestamp for the reservation attempt, other accounts will be given a message stating

they need to select other seats. Seats will be indexed based on a combination of their row and number.

3.9 Other Requirements

Non-applicable

3.10 Development & Timeline

3.10.1 Team Responsibilities

The ReelEasy system is being built by four project teams, each responsible for a major area of the system:

- Front-End Team: Designs and develops all user pages, including login, movie selection, seat selection, payment, and ticket display.
- Back-End Team: Builds server logic and APIs for login, reviews, schedule slots, ticket generation, and database interaction.
- QA Team: Tests each feature (login, movie browsing, payments, etc.), reports bugs, and verifies fixes.
- Project Management: Plans the workflow, monitors deadlines, manages the staging environment, and oversees deployment.

All teams commit to GitHub and coordinate through **weekly development meetings every Monday** to review progress, plan the week's tasks, and address any issues.

3.10.2 Development Timeline

Phase: Planning
Dates: July 28 – August 2
Tasks: Define system goals, assign team roles, create GitHub repo, outline user and admin flows
Teams Involved: Project Management
Note: Weekly development meetings begin Monday, July 29

Phase: Design
Dates: August 3 – August 9
Tasks: Finalize database structure, UML/class diagrams, and wireframes for each page
Teams Involved: Front-End, Back-End

Phase: Development Part 1
Dates: August 10 – August 16
Tasks: Build login/signup pages, account verification, admin dashboard access, movie selection and review pages
Teams Involved: Back-End, Front-End

Phase: Development Part 2
Dates: August 17 – August 23
Tasks: Implement ScheduleSlot logic, Time & Theater page, and seat selection flow
Teams Involved: Back-End, Front-End

Phase: Development Part 3
Dates: August 24 – August 30
Tasks: Integrate payment flow (mock SDSU CASHNET), generate ticket, and implement confirmation and ticket delivery
Teams Involved: Back-End, Front-End

Phase: Staging
Dates: August 31 – September 2
Tasks: Push codebase to a staging server for full-system testing
Teams Involved: QA Team, All Teams

Phase: Testing
Dates: September 3 – September 4
Tasks: Conduct end-to-end testing, fix bugs, review performance and security
Teams Involved: QA Team, Back-End

Phase: Deployment
Dates: September 5 – September 6
Tasks: Final deployment to production environment, documentation finalized, and submission prepared
Teams Involved: Project Management, All

Group 2 - Project Assignments

Name	Role	Projects	Contributions
Bobby Bavongkhoun	Developer / Design	Planning	Project planning
Caleb Wolf	Developer / Design	Implementation	Specifications
Gleb Rodin	Developer / Design	Research	Specifications

3.10.3 Tools and Workflow

- GitHub: Used for version control and collaboration
- Figma or Canva: Used for design mockups and architecture diagrams
- VS Code: Used as the code editor
- Postman: Used for testing API endpoints
- Discord or Zoom: Used for communication and weekly check-ins
- Weekly Development Meeting: Held every Monday to review progress and assign tasks
- Staging Server: Used to test the full system before final deployment
- SDSU Mock CASHNET Portal: Simulated payment system used for the Pay Page

3.11 Test Plan

The test plan outlines verification and validation strategies for the ReelEasy Movie Ticketing System. This portion includes the three granularities for test cases: unit functional, and system. They act in conjunction with one another to reflect the features of the ReelEasy system. This includes user and admin interactions, information correctness, reliability, and proper UI behavior. They will directly align with the system architecture defined in UML Class Diagram and follow the validation and verification components of logging in, seat selection, ticketing, scheduling, payment, authentication, and review processing.

The testing objectives for ReelEasy is to ensure the following:

- Verification: Ensure each component performs its intended function as designed.

- Validation: Confirm that the system fulfills user expectations through end-to-end scenarios.
- Coverage: Provide coverage for different scenarios across the three granularities with its inputs, expected outcomes, and failure handling.

3.11.1 Unit Testing

Case Type	Unit
Test CaseID	Seating_2
Component	Seat_Availability
Executed By	Bobby Bavongkhoun
Target Feature	Testing isSeatAvailable() method In Seat Class to see if a seat is already booked.
Test Set/Vectors	Test to see if a seat is already booked. A seat marked as “booked” should return the boolean value of “false” and a seat marked as available should be returned true.
Feature Coverage	If the method returns true for a booked seat then it could lead to overbooking and therefore critical failure in the reservation system.

Case Type	Unit
Test CaseID	User_Reviews_1
Component	Review_Content
Executed By	Bobby Bavongkhoun
Target Feature	Testing to see the review validation system flagging invalid inputs.
Test Set/Vectors	Tests to the review validation system only allow valid review strings and flag those that are empty strings, and strings containing inappropriate words.
Feature Coverage	Prevents blank or inappropriate reviews from being submitted to the database and displayed to the public.

3.11.2 Functional Test

Case Type	Functional
Test CaseID	Select_Seat_1
Component	Seat_Request
Executed By	Caleb Wolf
Target Feature	Seat selection updates seat status after user interaction
Test Set/Vectors	Test to see if selecting a specific seat that is available and attempt payment with valid credentials.
Feature Coverage	Ensures that selected seats become “claimed” are excluded from future availability. Failure would lead to double-booking or abandoned seats.

Case Type	Functional
Test CaseID	Select_Time_1
Component	Schedule_Selection
Executed By	Bobby Bavongkhoun
Target Feature	Seat selection updates the seat status after a user’s interaction.
Test Set/Vectors	Test to see if the selected specific seat is available, attempted payment with valid credentials, and after transaction would update seating and ticketing interface for that showing.
Feature Coverage	To prevent incorrect mapping between schedule and UI would result in users buying tickets for the wrong time or seeing empty/no seats.

Case Type	Functional
Test CaseID	User_Login_1
Component	User_Account
Executed By	Bobby Bavongkhoun
Target Feature	Login function validating username/password combinations for the user.
Test Set/Vectors	Testing to look for invalid username and/or password which would then display an error login for the incorrect or invalid credentials given.
Feature Coverage	Detects login logic that doesn't properly enforce security to ensure that no access is given with incorrect credentials into the application.

3.11.3 System Testing

Case Type	System
Test CaseID	Seating_1
Component	Seating_Display
Executed By	Caleb Wolf
Target Feature	Full seating display UI that shows availability for each seat.
Test Set/Vectors	Testing to target the integration of movie selection, schedule management, and seat availability display. Which allows for the user to view and select movies on its corresponding time. This displays standard, dining, and disability seats.
Feature Coverage	Test covers a critical user-facing feature where correctness directly impacts user trust, transaction, and operations of the movie ticketing system.

Case Type	System
Test CaseID	Ticket_1
Component	Receive_Ticket
Executed By	Caleb Wolf
Targeted Feature	Emailing ticket delivery after purchase
Test Set/Vectors	A test to see a complete purchase would trigger an email generation and ticket delivery.
Feature Coverage	Ensure a seamless transaction whereas the user is able to receive their ticket alongside their seat selection. Failure to do so would lead to critical error in the movie ticketing system and lead to mistrust and disrupting system operations.

Case Type	System
Test CaseID	Ticket_2
Component	Refund_Ticket
Executed By	Caleb Wolf
Targeted Feature	Refund processes after a user initiates a refund through a link.
Test Set/Vectors	Test to see if a user can refund a ticket that they already purchased by checking if they already have a valid ticket with their payment details.
Feature Coverage	Verify data consistency between ticketing system, seating logic, and payment transaction. This is to maintain the integrity of the entire movie booking system. Furthermore validates the email link to be functional and correctly tied.

Case Type	System
Test CaseID	Schedule_Editor

Component	View_Editor
Executed By	Caleb Wolf
Targeted Feature	Admin-only schedule editing interface
Test Set/Vectors	Test confirms that an admin user can access and view the schedule editor interface, which displays upcoming showtimes and associated details such as the movies, rooms, start/end times and listing of movies shown to the public for the next 7 days.
Feature Coverage	Contributes to reliability of the system's operational and planning function which affect all downstream features.

Case Type	System
Test CaseID	User_Reviews_Submission
Component	UserReview_UI
Executed By	Bobby Bavongkhoun
Targeted Feature	Submission-to-display review workflow
Test Set/Vectors	Test for valid review from a logged-in user.
Feature Coverage	Ensures that reviews accurately display and updates in real time. Failure in this feature can lead to missed feedback or trust.

3.11.4 Test Cases

Hyperlink:
https://docs.google.com/spreadsheets/d/19kab3_LXUiEz3XX7epdp0MZYU3IMgKmoa8QkHjrzJk8/edit?usp=sharing

(Separate printed handout may be given for the full picture)

Features below have NOT yet been covered, to be updated.

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.

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

Gleb Rodin

Dr. Gus Hanna

CS 250 - Introduction to Software Systems

11 August 2025

Final Project Report - ReelEasy

Table of Contents

User Manual

About ReelEasy

ReelEasy is a web-based movie ticket booking system for SDSU theaters. It supports desktop and mobile devices, multiple languages, secure payments, and accessibility features.

System Requirements

Hardware:

- Desktop, laptop, tablet, or smartphone
- Screen resolution 1024 × 768 or higher
- Internet connection (5 Mbps or faster recommended)

Software:

- Modern browser: Chrome, Safari, Edge, Firefox
- JavaScript and cookies enabled

Main Features

- Search and browse movies
- View details, reviews, and showtimes
- Select seats (dining and accessibility included)

- Pay securely via credit/debit card or SDSU CASHNET
- Ticket delivery by email or SMS
- Multi-language support

Steps to Use ReelEasy

1. Login or Sign Up – Enter username/password or create a new account.
2. Search for a Movie – Use the search bar or browse the list; filter by genre/date/time.
3. View Details & Select Showtime – Check description, reviews, and choose showtime.
4. Select Seats – Choose available seats from the seat map.
5. Pay for Tickets – Select payment method, confirm payment.
6. Get Ticket – View confirmation with QR code, receive by email/SMS, or print at box office.

Tips: Keep browser updated, book early for popular shows, save ticket confirmation.

Design Documents

Requirements & Validation

- Browse/Search Movies – Tested with keyword/filters.
- Seat Reservation – Verified with live seat map updates.
- Payment – Tested with SDSU CASHNET mock transactions.
- Accessibility & Languages – Verified in UI.

Design & Verification

- Front-End: Web UI for customers/admin.
- Back-End: APIs for accounts, movies, seating, payments.
- Database: SQL for structured data (accounts, seats, tickets) and NoSQL for reviews.
- Testing: Unit + integration tests.

Planned Future Features

- Loyalty rewards & discount codes
- Food ordering in-app
- Mobile app with push notifications
- More payment options

Security – CIA Model

- Confidentiality Threat: Data theft → HTTPS, password hashing, role-based access.
- Integrity Threat: Unauthorized ticket changes → Admin-only edits, audit logs.
- Availability Threat: Downtime → Uptime monitoring, backups, DDoS protection.

Life-Cycle Model

We used Incremental Development:

- Planning: Goals, roles, repo setup.
- Design: Database models, wireframes, diagrams.
- Development: Features built in stages – login, browsing, seating, payment.
- Testing: Checked features after each stage.
- Deployment: Final system pushed to production.

Why it worked: Early testing reduced risks, progress was steady.

Challenges: Integrating multiple developers' code, keeping UI consistent.

Improvements: Use Agile sprints, start security testing earlier.

Summary

ReelEasy is a complete online movie ticket booking platform created for SDSU's School of Theatre, Television, and Film. The system is designed to provide an easy and convenient way for users to search for movies, view details, reserve seats, and make secure payments from any device. Its focus is on a smooth customer experience and reliable, secure operations for theater administrators.

The customer-facing side offers features like advanced search, detailed movie information, customizable seat selection with accessibility options, and secure checkout using multiple payment methods including SDSU CASHNET. Tickets are delivered electronically through email or SMS and can also be printed at the theater. The interface is responsive, making it work equally well on desktops, tablets, and smartphones.

The admin side of the system allows theater staff to add or remove movies, update schedules, manage seating availability in real time, and track sales data. Role-based access ensures that only authorized personnel can make system changes. All sensitive data is protected using encryption, and communications between users and the server are secured with HTTPS.

From a development perspective, ReelEasy was built using an incremental approach, allowing the team to deliver functional parts of the system early and build on them in manageable steps. This process supported continuous testing, faster bug detection, and flexibility to adapt features based on feedback.

The system meets the functional requirements set by the client and follows accessibility guidelines to ensure inclusivity. Looking forward, ReelEasy can be expanded with loyalty programs, food ordering integration, mobile push notifications, and deeper reporting tools for management.

Conclusion

The ReelEasy project successfully delivers a functional and user-friendly movie ticket booking platform that meets the requirements outlined at the beginning of the semester. By focusing on both the customer and administrative experience, the system provides real value to its intended audience. Customers can quickly find and book tickets, while theater staff benefit from a straightforward management interface.

The choice of incremental development was effective for this project. Building in small, functional increments allowed the team to test features thoroughly before moving forward, which reduced integration issues. However, one challenge was ensuring consistency in user interface design across different increments, especially when multiple developers worked on separate features.

Overall, ReelEasy demonstrates solid software engineering principles, effective teamwork, and practical application of course concepts. It is a foundation that can be built upon to create a more advanced, commercially viable ticket booking system.

TA Feedback Implementation

Feedback: “Clear writing, but ethical analysis more thorough for one case than the other. Audience coverage is present but lacks detail.”

Changes Made:

- Balanced ethical analysis between both cases.
- Expanded audience details for customers, staff, and critics.
- Clarified missing use cases.
- Improved diagrams for clarity.
- Added input/output examples to the test plan.