Movie Ticketing System

Software Requirements Specification

1.00
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Prepared for
CS 250- Introduction to Software Systems
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Revision History

Date	Description	Author	Comments
05/26/24	1.00	Brandon M. Justin N. Riley M.	Initial Revision
06/03/24	2.00	Brandon M. Justin N.	Added UML Diagram and Software Architectural Diagram.
06/10/2024	3.00	Justin N. Brandon M. Riley M.	Revised the software architectural diagram section and added test cases.

Document Approval

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

Signature	Printed Name	Title	Date
	Dr. Gus Hanna	Instructor, CS 250	05/27/24
Riley Mathews	Riley Mathews	Software Eng.	05/27/24
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1. Introduction

This Software Requirement Specification (SRS) document will be going over the requirements that are necessary for developing a Movie Theater Ticketing System.

1.1 Purpose

The purpose of this document is to outline the requirements for the development of a movie theater ticketing system. This system aims to provide an efficient and user-friendly platform for customers to browse movie listings, purchase tickets, and reserve seats for shows at a movie theater. It will help the software and project management teams understand the functional and non-functional requirements, various use cases, and the overall system architecture. The document aims to ensure the system meets the needs of theater administrators and customers, enhancing the efficiency of theater operations and improving the customer experience.

1.2 Scope

The software is designed for ROKU Theater to create a streamlined process for selling movie theater tickets. The developers of the system, (The Numba One Developers), are designing the next innovative Movie Ticketing System designed to allow users to purchase movie tickets both online and in person. The application will be web-based and accessible through a browser, with an initial deployment focused on theaters in the San Diego area. The system will also include administrative functions for managing showtimes and resolving customer issues.

The movie theater ticketing system will encompass both customer-facing and administrative functionalities. It will allow users to view available movies, showtimes, and seating options, as well as enable theater staff to manage movie schedules, ticket sales, and seating arrangements.

1.3 Definitions, Acronyms, and Abbreviations

SRS: (Software Requirement Specification)- is a detailed document that outlines what a software system should do, how it should behave, and its constraints and interfaces. It serves as a blueprint for software development, guiding the design, implementation, and testing processes.

API: (Application Programming Interface)-is a set of rules, protocols, and tools that allow different software applications to communicate and interact with each other.

UI: (User Interface)- user interacts with a computer system or software application, encompassing graphical elements, input controls, and navigational components.

DBMS: (Database Management System)- software that enables users to efficiently store, retrieve, and manage data in a structured format, providing functionalities for data manipulation, querying, and security.

CLI: (Command Line interface)- a text-based user interface that allows users to interact with a computer program by entering commands into a terminal or console, typically used for system administration, automation, and development tasks.

GUI: (Graphical user interface)- a visual interface that enables users to interact with electronic devices or software applications through graphical elements such as icons, windows, menus, and buttons, facilitating intuitive and user-friendly interactions.

1.4 References

References Included:

1. IEEE Computer Society. “IEEE Recommended Practice for Software Requirements Specifications.” Approved 25 June 1998, reaffirmed 9 December 2009, Software Engineering Standards Committee, IEEE-SA Standards Board.
2. “Theater Ticketing System Qs.rtf” Canvas, San Diego State University.
3. “Theater Ticketing Requirements.rtf” Canvas, San Diego State University.
4. “Theater Ticketing Questions.rtf” Canvas, San Diego State University.

1.5 Overview

The movie theater ticketing system will consist of the following key components:

- User Interface (UI): A web-based/mobile application interface for customers to interact with the system.
- Database Management System (DBMS): Storage of movies, their showtimes, customer information, and transaction records.
- Backend Server: Process user requests, implement logic towards business standards, and third-party services (payment portals)
- Admin Control: An interface for the theater manager or owner to manage movie showings, seating arrangements, and to view sales reports for analytical data.

2. General Description

The theater ticketing system is a web-based consumer-friendly software that will allow consumers to purchase tickets online or in person at the theater using a digital kiosk. The web browser will be designed to incorporate a user-friendly interface, which will allow for easy access for both the consumer, and administrator mode.

2.1 Product Perspective

The ticketing system will be a standalone application designed to seamlessly integrate with the theater's existing software ecosystem. This integration encompasses various systems, including but not limited to, Inventory Management, Point of Sale (PoS), and Media Player software. By interfacing with these systems, the ticketing application ensures real-time synchronization of data such as inventory levels, sales transactions, and media scheduling. This interconnected approach enhances operational efficiency, providing a cohesive experience for theater administrators and

staff. The integration allows for streamlined processes, such as automatic inventory updates when tickets are sold, synchronized media playback with showtimes, and consolidated financial reporting through the PoS system. Overall, this integrated ticketing solution aims to optimize theater operations and deliver a superior customer experience.

2.2 Product Functions

The product will allow customers to view showtimes for movies, select and purchase tickets based on seating. Seating arrangements will be live to reflect current availability. The product will support both online and in person sales. Discounts for supported groups will be available at checkout. There will also be administrative functions to manage showtimes, ticket prices, and customer feedback.

2.3 User Characteristics

System users will be movie-watchers, employees, and system administrators. Movie-watchers will use the system to purchase tickets and provide feedback. Employees will use the system to assist in purchases and customer service related activities. System administrators will handle management of listings, issues, and other related tasks.

2.4 General Constraints

- System must be able to handle 10 million concurrent users
- Login information must be secure
- Feedback system must be bot proof
- Discounts must be verified in person to be used online

2.5 Assumptions and Dependencies

The system will be able to integrate with existing management systems for data synchronization. The ticketing system will be deployed on a server. Users will have access to web browsers to use the software. In person software will be deployed on a touch screen kiosk. System will be able to handle concurrent users attempting to check out for the same ticket.

3. Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

Customer UI: Provides an intuitive interface for customers to browse movies, select seats, make payments, and receive tickets.
Administrator UI: Offers theater administrators tools to manage movies, showtimes, seating arrangements, and monitor sales and system performance.

3.1.2 Hardware Interfaces

Touch Screen:Facilitates user interaction with the ticketing system through an intuitive and responsive interface.

POS systems: Integrate with existing PoS systems to process ticket sales and generate receipts.
Printer: Facilitate the printing of physical tickets and receipts.

3.1.3 Software Interfaces

POS software: Synchronize sales data and financial transactions, providing comprehensive reporting and analytics.
Windows Operating System: Ensures robust security, compatibility, and ease of use, integrating seamlessly with existing IT infrastructure.
Ticketing Distribution Program: Manages the allocation and distribution of tickets across various sales channels, updating availability in real-time.
Firewall Software: Monitors and controls network traffic to protect against cyber threats and unauthorized access.

3.1.4 Communications Interfaces

LAN Card: Enables wired network connectivity for stable and high-speed communication between the ticketing system and other network resources.
WiFi Card: Provides wireless network connectivity, allowing flexible and convenient access to the ticketing system across the theater premises.
Bluetooth Card: Facilitates short-range wireless communication with compatible devices, supporting functionalities like ticket validation and mobile payments.

3.2 Functional Requirements

3.2.1 Customer Functionality

3.2.1.1 Customer UI

3.2.1.2 Inputs

User Registration and Authentication:
  Users can create accounts and log in securely.
  Password reset functionality is available.

Browse movies and showtimes:
  Display a list of currently playing movies and upcoming movies.
  Show available showtimes for each movie.

Seat Selection and Reservations:
  Allow users to select seats for their desired showtimes.
  Reserve selected seats for a limited time during the checkout process.

3.2.1.3 Processing
Ticket Purchase:
  Enable users to purchase tickets securely.
  Provide various payment options (credit or debit, apple/samsung/google pay, cryptocurrency)

3.2.1.4 Outputs
Ticket Confirmation:
Issue electronic tickets with QR codes for validation at the theater.

3.2.1.5 Error Handling
View and Modify Bookings:
Users can view past and upcoming bookings.
Option to modify or cancel bookings within a specific time frame.

3.2.2 Administrator Functionality

3.2.2.1 Administrator UI

3.2.2.2 Input
Movie Management:
Add, edit, or remove movie listings.
Set showtimes and allocate screening rooms.
Seating Arrangement:
Define seating layout for each screening room.
Manage seat availability and reservations.

3.2.2.3 Output
Sales and Reporting:
View ticket sale reports by movie, date, and time.
Export sales data for accounting purposes.

3.3 Use Cases

3.3.1 Use Case #1

Use Case 1: Purchase Movie Tickets

Actor: Customer

Description: This use case describes the process of a customer purchasing movie tickets through the ticketing system.

Preconditions:

- Customers are logged into their account.
- Customer has selected a movie and showtime.

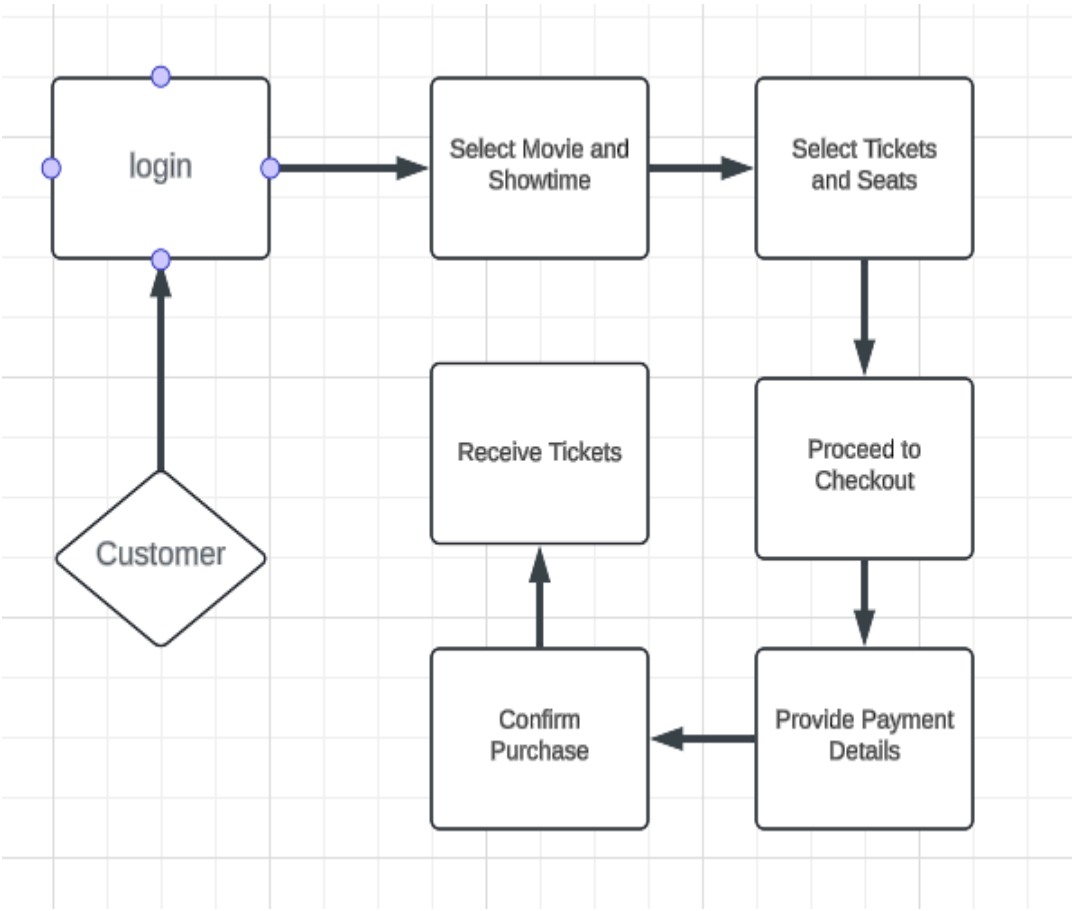
Main Flow:

1. Customer selects the desired movie and showtime from the list of available options.

2. Customers select the number of tickets and choose their preferred seats.
3. Customer proceeds to the checkout page.
4. Customer provides payment details and confirms the purchase.
5. System generates electronic tickets with QR codes.
6. Customers receive the tickets via email or within the app.

Postconditions:

- Tickets are reserved for the selected showtime.
- Payment is processed successfully.
- Customer receives confirmation of the purchase.



3.3.2 Use Case #2

Use Case #2: Manage Movie Listings

Actor: Administrator

Description: This use case describes the process of an administrator managing movie listings in the ticketing system.

Preconditions:

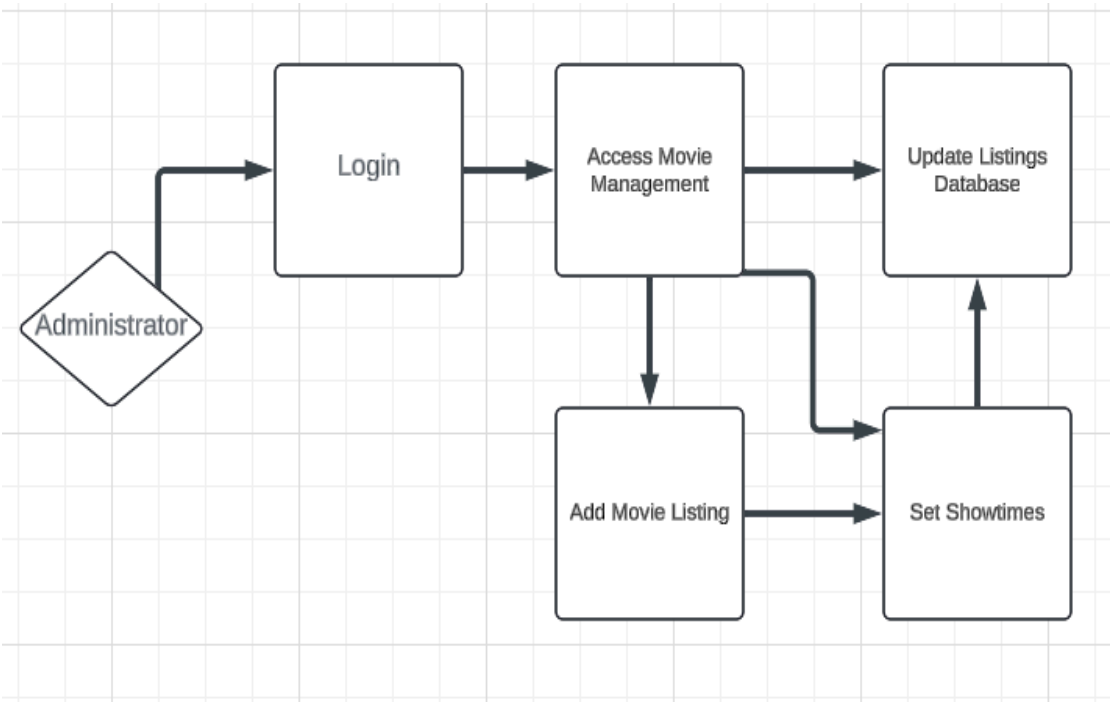
- Administrator is logged into the admin panel.

Main Flow:

1. Administrator accesses the movie management section of the admin panel.
2. Administrator adds a new movie listing by providing details such as title, description, genre, and poster image.
3. Administrator sets showtimes for the movie, specifying date, time, and screening room.
4. System updates the movie listings database with the new entry.

Postconditions:

- New movie listing is added to the system.
- Showtimes for the movie are scheduled and visible to customers.



3.3.3 Use Case #3

Use Case 3: View Sales Report

Actor: Administrator

Description: This use case describes the process of an administrator viewing sales reports in the ticketing system.

Preconditions:

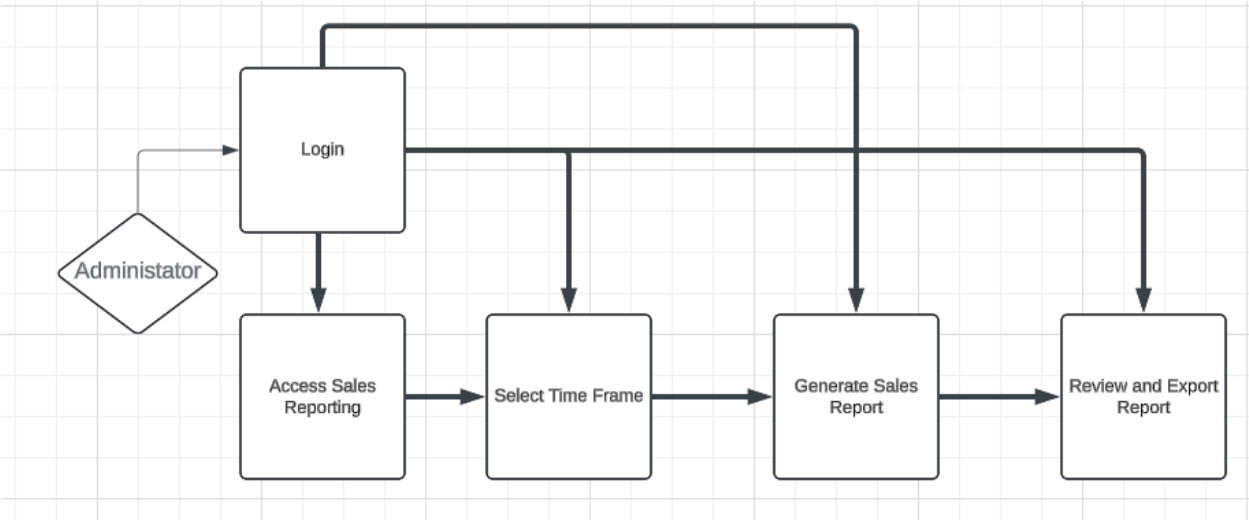
- Administrator is logged into the admin panel.

Main Flow:

1. Administrator navigates to the sales reporting section of the admin panel.
2. Administrator selects the desired time frame for the report (e.g., daily, weekly, monthly).
3. System generates a sales report, including total revenue, number of tickets sold, and breakdown by movie and showtime.
4. Administrator reviews the report and can export it for further analysis if needed.

Postconditions:

- Administrator gains insights into ticket sales performance within the selected time frame.
- Sales report data is available for analysis and decision-making purposes.



3.4 Classes / Objects

3.4.1 Get Available Tickets

3.4.1.1 Attributes
user, showtime, seats, booking date/time

3.4.1.2 Functions
Get which theaters are showing that movie and at what times.
confirmBooking(), cancelBooking()

3.4.2 Purchase Ticket

3.4.2.1 Attributes
user, showtime, seat, booking date/time, QR code

3.4.2.2 Functions
Purchase Selected ticket with movie, seat assignment, theater number, and time slot information.
generateQRCode(), validateTicket()

3.4.3 Get Sales

3.4.3.1 Attributes
username, password (encrypted)

3.4.3.2 Functions
Retrieve Sales Data from Database when called by the Administrator
login(), addMovie(), updateShowtime(), viewSalesReport()

3.5 Non-Functional Requirements

3.5.1 Performance

System should handle concurrent user traffic efficiently.
Response time for user interactions should be minimal.

3.5.2 Reliability

Error handling and feedback should be informative for users. The system will be backed up frequently so as to not lose any reservations or accounting information.

3.5.3 Availability

UI should be intuitive and accessible across different devices.

3.5.4 Security

Use encryption for sensitive data transmission.
Implement secure authentication and authorization mechanisms.

3.5.5 Maintainability

The systems will be maintained by IT techs on site that are not part of the regular movie theater staff.

3.5.6 Portability

The system will be able to be used and perform on anyone’s phone, computer, and kiosks
Install script that lets you install the software on any model of ticketing system

3.6 Inverse Requirements

*State any *useful* inverse requirements.*

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

A database will be used to store what movies are showing at what times as well as how many seats are available in that theater.

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

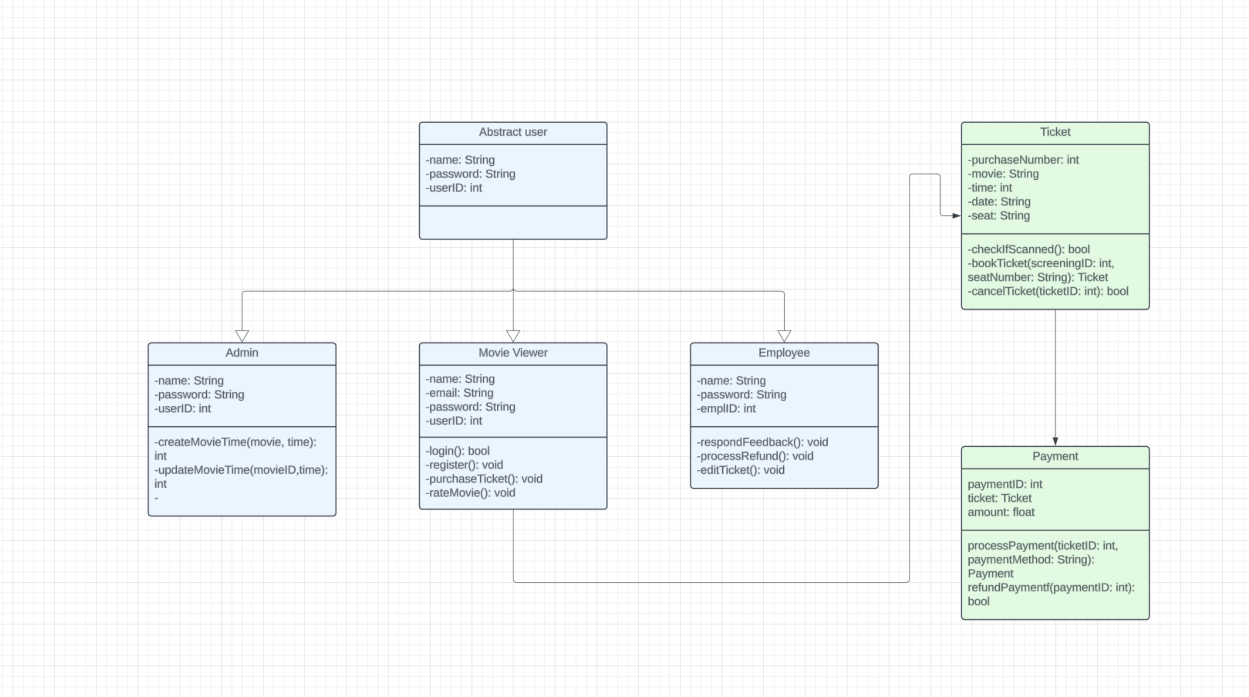
3.9 Other Requirements

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 UML Diagram



4.1.1 UML Class Diagram Diagram

Class name:
Abstract User
Purpose:
Serves as the base class for different types of users within the system, defining common attributes and methods tha tall users share
Attributes:

- name: String
- password: String
- userID: int

Methods/Operations:
None specified, but might include basic user operations
Description:
Abstract user provides a blueprint for other user types. it contains common attributes like name, password, id, which are useful for identifying and authentication.

Class name:
Admin
Purpose:
Manage administrative tasks such as creating and updating movie times.
Attributes:

- name: String
- password: String
- userID: int

Methods/Operations:

- createMovieTime(movie, time): int
- updateMovieTime(movieID, time): int

Description:
The admin class extends AbstractUser and includes additional functionality such as managing movies.

Class name:
Movie Viewer
Purpose:
Represents a user who can view movies, register, login, and purchase tickets.
Attributes:

- name: String
- email: String
- password: String
- userID: int

Methods/Operations:

- login(): bool
- register(): void
- rateMovie(): void
- purchaseTicket(): void

Description:
The class extends the AbstractUser, and extends functionality by allowing Viewers to purchase tickets, login, and rate movies.

Class name:
Employee
Purpose:
Represents an employee within the theater who can perform specific tasks related to ticket management.
Attributes:

- name: String
- empID: int
- password: String

Methods/Operations:

- respondFeedback(): void
- processRefund(): void
- editTicket(): void

Description:
The class extends the AbstractUser, and provides additional functionality related to employees such as responding to feedback left by users, processing refunds, and editing tickets to assist viewers.

Class name: Ticket
Purpose:
To have a ticket object that can be purchased by a user.
Attributes:

- purchaseNumber: int
- movie: String
- time: int
- date: String
- seat: String

Methods/Operations:

- checkIfScanned(): bool
- bookTicket(screeningID: int, seatNumber: String): Ticket
- cancelTicket(ticketID: int): bool

Description:
The ticket class contains details about a movie ticket, including movie, time, date, and seat. It provides methods for checking if a ticket is scanned, to book a ticket, and to cancel a ticket (making it available for purchase again).

Class name: Payment
Purpose:
Handles payment transactions for purchasing tickets
Attributes:

- paymentID: int
- ticket: Ticket
- amount: float

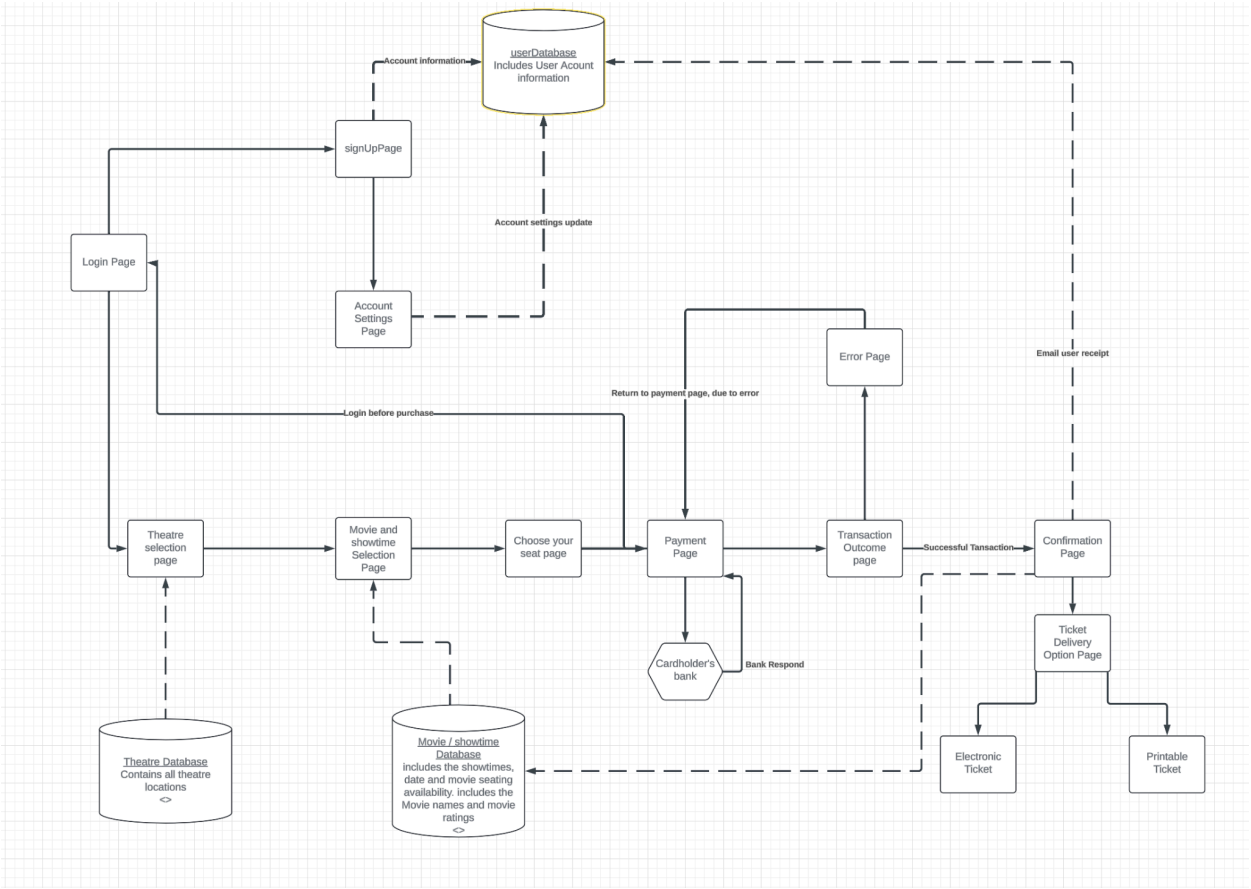
Methods/Operations:

- processPayment(ticketID: int, paymentMethod: String): Payment
- refundPayment(paymentID: int): bool

Description:

The Payment class manages payment transactions associated with ticket purchases. It includes attributes for payment ID, ticket, and amount, and methods for processing refunding payments.

4.2 Software Architecture Diagram



4.2.1 Architecture Diagram Description

The Architecture Diagram is a detailed representation outlining the Theater Ticketing System's main components and their interconnections. Each step is illustrated in this diagram, providing a visual representation of the operational flow that this website will incorporate. Additionally, the diagram includes the databases that will be utilized and describes their responsibilities.

The system begins with the "Login Page," where users can log in or navigate to the "Sign Up Page" to create a new account. From the "Sign Up Page," users can proceed to the "Account Settings Page" to update their account information. All account-related information is managed by the "User Database."

Once logged in, users are directed to the "Theatre Selection Page," where they can select a theater location. The information about theater locations is managed by the "Theatre Database." After selecting a theater, users proceed to the "Movie and Showtime Selection Page," where they can choose a movie and showtime. This page is connected to the "Movie/Showtime Database," which contains information about movie showtimes, dates, seating availability, movie names, and ratings.

Next, users navigate to the "Choose Your Seat Page" to select an available seat for the chosen showtime. After selecting a seat, users proceed to the "Payment Page" to make the ticket purchase. The system communicates with the "Cardholder's Bank" to process the payment. Depending on the bank's response, users are directed to the "Transaction Outcome Page," where they can see whether the transaction was successful or unsuccessful. If an error occurs, users are redirected to the "Error Page" and then given the option to return to the "Payment Page" to retry the transaction.

If the transaction is successful, users proceed to the "Confirmation Page" and then to the "Ticket Delivery Option Page," where they can choose between receiving an electronic ticket or a printable ticket. Upon successful transaction completion, an email receipt is sent to the user.

4.3 Development Plan

Brandon Mahdavi: Screening and Ticket Management Services

- Description: Develop services for managing screenings, booking tickets, and processing payments.

Riley Matthews: User and Movie Management Services

- Description: Implement services for user registration, login, and movie details retrieval.

Justin Nam: User Interface for Browsing Movies/Booking and Payment

- Description: Design and implement the interface for users to browse movies and view details, as well as, for users to select seats, book tickets, and make payments.

4.4 Timeline:

- Week 1-2**:**

    - Frontend: Initial design and setup of user interfaces (.
    - Backend: Setup of database and basic user and movie management services.
- Week 3-4**:**
    - Frontend: Development of ticket booking and payment interfaces.
    - Backend: Implementation of screening management and ticket booking services.
- Week 5-6**:**
    - Frontend: Integration testing of user interfaces.
    - Backend: Testing and refinement of backend services.
- Week 7-8**:**
    - Final integration and system testing.
    - Deployment and preparation for presentation.

5. Test Plans

5.1 Test Plan Introduction

This test plan ensures the movie theater ticketing system meets all specified requirements through comprehensive verification and validation. Each test is detailed to identify the features being tested, the test sets/vectors used, and how these tests cover the targeted features. The plan covers various scenarios, including normal operations, edge cases, and potential failure points, to ensure the system handles real-world usage effectively. This ensures that the system is functional, secure, and user-friendly before deployment.

5.2 Test Scope

The test scope encompasses functional requirements, unit tests, and system tests for the movie theater ticketing system. It includes thorough testing of user interfaces, ensuring that login, sign-up, movie browsing, seat selection, payment pages, and ticket confirmation interfaces are user-friendly and functional. The ticket booking process is rigorously tested to ensure that the entire workflow, from movie selection to seat reservation and ticket issuance, operates seamlessly. Payment processing is verified to ensure the secure handling of payment information, proper integration with the external payment service (cardholderBank), and accurate transaction validation. Backend functionalities are tested to ensure correct database interactions for user accounts, movie details, seat availability, and sales reporting, maintaining data accuracy and integrity. Sales reporting is tested by generating and validating reports for various time frames, ensuring data accuracy and comprehensive financial reporting. Additionally, non-functional aspects such as performance (handling peak loads), security (protecting sensitive data), usability (providing user-friendly interfaces), reliability (maintaining system uptime), and scalability (supporting growth) are thoroughly tested to ensure the system is robust, secure, and user-friendly.

5.3 Test Objectives

- Ensure all functional requirements are met.
- Verify the integration of different modules
- Validate the user experience
- Ensure data integrity and security
- Ensure the system's performance and scalability.

5.4 Test Strategy

The test strategy includes both verification and validation processes:

Verification involves:

- Reviews and inspections of requirements, design, and code.
- Static analysis and walkthroughs.

Validation involves:

- Dynamic testing including functional, unit, integration, system, and acceptance testing.
- Performance and load testing.

5.5 Test Environment

- **Hardware:** Standard user devices (PCs, smartphones, tablets), servers for backend processing.
- **Software:** Operating systems (Windows, macOS, iOS, Android), web browsers (Chrome, Firefox, Safari), testing tools (JUnit, Selenium, LoadRunner).

5.6 Functional Requirements

Functional requirements to be tested include:

- User Registration and Login.
- Movie Listing.
- Seat Selection.
- Ticket Booking.
- Payment Processing.
- Confirmation and Notification

5.7 Test Cases

5.7.1 Functional Test Cases

User Registration and Login

- TC03: Verify user registration with valid data.
- TC07: Verify user registration with invalid data.

Movie Listing

- TC05: Verify displaying of all available movies.

Seat Selection

- TC09: Verify availability of seats.

Ticket Booking

- TC01: Verify booking of selected seats.

Payment Processing

- TC02: Verify successful payment processing.

5.7.2 Unit Test Cases

- TC04: Verify function for handling payment gateway responses
- TC10: Verify function for generating booking reference number.

5.7.3 System Test Cases

- TC06: Verify handling of simultaneous ticket bookings.
- TC08: Verify load handling for concurrent users.

5.8 Verification and Validation Processes

- **Verification:** Conduct code reviews, walkthroughs, and inspections regularly during the development process.
- **Validation:** Perform functional, integration, system, and acceptance testing to validate the system against requirements.

5.9 Entry and Exit Criteria

Entry Criteria:

- All requirements are documented and approved.

- The test environment is set up.
- Test data is prepared.
- Test cases are reviewed and approved.

Exit Criteria:

- All planned test cases are executed.
- All critical and high priority defects are resolved.
- Test summary report is prepared.
- Acceptance criteria are met.

5.10 Deliverables

- Test plan document.
- Test cases.
- Test Scripts.
- Test execution reports.
- Defect reports.
- Test summary report.

5.11 Testing Schedule

- Test planning: 1 week.
- Test case development: 2 weeks.
- Test environment setup: 1 week.
- Test execution: 4 weeks.
- Defect fixing and retesting: 2 weeks.
- Test closure: 1 week.

5.12 Testing Responsibilities

- **Test Manager:** Overall test planning and coordination.
- **Test Engineers:** Test case design, execution, and defect reporting.
- **Developers:** Fixing reported defects.
- **Business Analysts:** Reviewing test cases and ensuring requirements are met.

5.13 Risk Management

- **Risk:** Delays in environment setup.
    - **Mitigation:** Plan in advance and allocate buffer time.
- **Risk:** Incomplete requirements.
    - **Mitigation:** Continuous communication with stakeholders for clarification.
- **Risk:** High defect rates.
    - **Mitigation:** Regular code reviews and early testing.

5.14 Approval

This test plan is approved by the project stakeholders, including the project manager, test manager, and business analysts.

5.15 Github Repository:

Github

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