Movie Theater Ticketing System

Software Requirements Specification

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Group 12

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Prepared for

CS 250- Introduction to Software Systems

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# Revision History

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# Document Approval

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

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# 1. Introduction

The Software Requirements Specification (SRS) for the Movie Theater Ticketing System (MTTS) serves as a comprehensive guide to the development, design, and implementation of a modern ticketing solution tailored specifically for movie theaters. The MTTS aims to streamline the ticketing process, optimize show scheduling, and enhance customer management, ultimately improving operational efficiency and customer satisfaction within the theater industry.

## 1.1 Purpose

The purpose of this SRS is to define the requirements for the Movie Theater Ticketing System (MTTS). It is intended for software engineers and stakeholders involved in the development, design, and maintenance of the system.

## 1.2 Scope

1. The software product to be produced is the Movie Theater Ticketing System (MTTS)

2. The MTTS will:

- Enable customers to book movie tickets online and in-theater.

- Manage movie show schedules and seating arrangements.

- Process payments for tickets and concessions.

- Provide customer account management.

- Generate reports and analytics on sales and customer behavior.

3. The application of the MTTS includes:

- Providing a user-friendly interface for booking tickets, selecting seats, and purchasing concessions.

- Facilitating efficient management of show schedules and seat allocation.

- Enhancing revenue through streamlined sales processes and inventory management.

- Offering comprehensive reporting tools for business analytics and decision-making.

(a) Relevant benefits, objectives, and goals:

- Improved customer satisfaction through easy and quick ticket booking.

- Increased operational efficiency and reduced manual workload for theater staff.

- Enhanced revenue opportunities through efficient sales and inventory management.

- Access to detailed analytics for better business insights and strategic planning.

(b) Consistency with higher-level specifications:

- Aligns with overall business goals of improving customer experience and operational efficiency.

- Supports strategic objectives of increasing revenue and optimizing resource management.

## 1.3 Definitions, Acronyms, and Abbreviations

This subsection provides definitions for terms, acronyms, and abbreviations used throughout the Software Requirements Specification (SRS) to ensure clarity and understanding.

MTTS: Movie Theater Ticketing System

SRS: Software Requirements Specification

UI: User Interface

API: Application Programming Interface

DBMS: Database Management System

POS: Point of Sale

CRM: Customer Relationship Management

KPI: Key Performance Indicator

SLA: Service Level Agreement

## 1.4 References

This subsection provides sources from which the references can be obtained.

Lecture Notes: Lecture-Use-Cases.pdf

Date: 20/5/2024

Source: Provided by the course instructor during lectures.

IEEE Guide to SRS

Date: 27/5/2024

Publishing Organization: IEEE (Institute of Electrical and Electronics Engineers)

Source: Available through IEEE Xplore digital library or IEEE website.

System Requirement Specification Template

Date: 27/5/2024

Publishing Organization: Ben Coon

Source: Provided by the course instructor

## 1.5 Overview

The Software Requirements Specification (SRS) document outlines the requirements for the Movie Theater Ticketing System (MTTS) comprehensively. It is organized into several sections:

1. Introduction: Provides an overview of the document's purpose and scope.
2. General Description: Describes general aspects affecting the MTTS and its functionalities.
3. Specific Requirements: Details specific features, external interfaces, functional requirements, use cases, classes/objects, and non-functional requirements of the MTTS.
4. Analysis Models: Presents analysis diagrams such as sequence diagrams, data flow diagrams, and state-transition diagrams.
5. Change Management Process: Explains the process for managing changes to the requirements outlined in the SRS.
6. Appendices: Contains supplementary information or documentation relevant to the SRS.

# 2. General Description

The "General Description" section of the Software Requirements Specification (SRS) provides an overview of the Movie Theater Ticketing System (MTTS) and describes the general factors that influence the product and its requirements. It is important to note that this section does not contain specific requirements but rather aims to provide context to better understand the subsequent sections.

The general factors influencing the MTTS include:

2.1 Product Perspective

The MTTS is considered a standalone system that integrates with existing payment processing systems and can be deployed across multiple theaters. It aims to replace manual processes and outdated software currently in use.

2.2 Product Functions

The primary functions of the MTTS include ticket booking and sales (both online and at the theater), show schedule management, customer account management, concessions sales and inventory management, and reporting and analytics for theater operations.

2.3 User Characteristics

Users of the MTTS include theater staff (managers, ticket sellers, concession workers), customers, and system administrators. These users vary in technical expertise, necessitating an intuitive and user-friendly system interface. Training will be provided to staff to ensure efficient use of the system.

2.4 General Constraints

The MTTS must comply with local regulations for data protection and financial transactions. Additionally, it should be compatible with existing theater hardware, including POS systems, receipt printers, and barcode scanners.

2.5 Assumptions and Dependencies

Several assumptions and dependencies underpin the development and implementation of the MTTS. These include the availability of an internet connection for online ticket sales, reliance on third-party payment processing services for transactions, and compatibility with existing theater hardware.

## 2.1 Product Perspective

The "Product Perspective" subsection of the Software Requirements Specification (SRS) contextualizes the Movie Theater Ticketing System (MTTS) in relation to other related products or projects. This section provides insight into how the MTTS fits within the broader landscape of ticketing systems and similar software solutions.

2.1.1 Relationship with Existing Systems

The MTTS is designed to replace or augment existing manual processes and outdated ticketing systems used in movie theaters. While traditional ticketing systems rely on physical ticket counters and manual booking processes, the MTTS offers an automated and streamlined approach to ticket sales and management. It integrates seamlessly with existing payment processing systems, ensuring compatibility with established theater operations.

2.1.2 Comparison with Similar Solutions

In comparison to other ticketing systems in the market, the MTTS distinguishes itself through its comprehensive feature set and user-friendly interface. Unlike some legacy systems that may lack online booking capabilities or robust reporting functionalities, the MTTS offers a modern and efficient solution tailored to the needs of movie theaters. By leveraging technology advancements, the MTTS aims to enhance operational efficiency, improve customer satisfaction, and drive revenue growth for theater businesses.

2.1.3 Alignment with Industry Standards

The development of the MTTS aligns with industry standards and best practices for ticketing systems and software solutions. By adhering to established guidelines and protocols, such as those outlined by the Institute of Electrical and Electronics Engineers (IEEE) and relevant regulatory bodies, the MTTS ensures compliance with data security, privacy, and accessibility requirements. Additionally, it embraces interoperability standards to facilitate seamless integration with third-party services and platforms, enhancing its utility and versatility for theater operators.

## 2.2 Product Functions

The Movie Theater Ticketing System (MTTS) will encompass a range of essential functions to facilitate seamless ticket sales, show scheduling, customer management, and reporting within movie theaters. The following is a summary of the key functions that the software will perform:

2.2.1 Ticket Booking and Sales:

1. Enable customers to book tickets both online and at the theater.
2. Process payments securely and efficiently.
3. Allocate seats and generate tickets for customers.

2.2.2 Show Schedule Management:

1. Allow theater managers to create, update, and manage show schedules.
2. Ensure accurate scheduling to avoid conflicts and overbooking.
3. Notify customers of any schedule changes on time.

2.2.3 Customer Account Management:

1. Provide customers with the ability to create and manage their accounts.
2. Store customer information securely for future transactions.
3. Offer personalized experiences based on customer preferences and history.

2.2.4 Concessions Sales and Inventory Management:

1. Facilitate the sale of concessions items during ticket purchases.
2. Manage inventory levels to prevent stockouts and minimize waste.
3. Generate reports on concessions sales and inventory status for analysis.

2.2.5 Reporting and Analytics:

1. Generate comprehensive reports on ticket sales, revenue, and attendance.
2. Provide insights into customer behavior and preferences.
3. Support data-driven decision-making for theater management and marketing efforts.

## 2.3 User Characteristics

The Movie Theater Ticketing System (MTTS) is designed to cater to a diverse range of users, each with its unique characteristics and requirements. Understanding the demographics and preferences of these users is crucial for tailoring the system to meet their needs effectively.

The following are the general characteristics of the eventual users of the MTTS:

2.3.1 Theater Staff: Managers, ticket sellers, and concession workers are among the primary users of the MTTS. Managers are responsible for overseeing theater operations, including scheduling, ticket sales, and staff management. Ticket sellers handle ticket sales both online and at the theater box office, while concession workers manage concessions sales and inventory.

2.3.2 Customers: Movie-goers represent the main customer base of the MTTS. This includes both frequent visitors and casual users. Frequent visitors may benefit from loyalty programs or special offers, while casual users may prefer traditional methods of purchasing tickets at the theater counter. Additionally, there are tech-savvy users comfortable with technology for ticket booking and payments.

2.3.3 System Administrators: IT administrators and database administrators play a vital role in maintaining the MTTS system. IT administrators are responsible for system maintenance and troubleshooting, while database administrators manage the database infrastructure supporting the MTTS.

2.3.4 External Stakeholders: Payment gateway providers and hardware vendors are external stakeholders involved in the MTTS ecosystem. Payment gateway providers are responsible for processing online transactions securely, while hardware vendors supply POS systems, ticket printers, and other hardware used in theaters.

## 2.4 General Constraints

The development of the Movie Theater Ticketing System (MTTS) is subject to various constraints that shape the design and implementation of the system. These constraints encompass a wide range of factors, including technical, regulatory, and operational considerations. Understanding these constraints is essential for guiding the development process and ensuring that the final product meets the required standards and specifications.

The following are some of the general constraints that will impact the design and development of the MTTS:

2.4.1 Regulatory Compliance: The MTTS must comply with local and international regulations governing data protection, privacy, and financial transactions. This includes adhering to standards such as the Payment Card Industry Data Security Standard (PCI DSS) for handling payment information securely.

2.4.2 Compatibility Requirements: The MTTS must be compatible with existing hardware and software infrastructure deployed in movie theaters. This includes POS systems, ticket printers, barcode scanners, and other peripherals used in ticketing and concessions management.

2.4.3 Performance Expectations: The MTTS is expected to meet certain performance standards in terms of response times, throughput, and scalability. This includes ensuring that the system can handle peak loads during periods of high demand, such as blockbuster movie releases or holiday weekends.

2.4.4 Security Considerations: Security is a critical concern for the MTTS, given the sensitive nature of the data involved, including customer information and financial transactions. The system must implement robust security measures to protect against unauthorized access, data breaches, and other security threats.

2.4.5 Resource Limitations: The development of the MTTS is constrained by factors such as budgetary limitations, time constraints, and availability of skilled personnel. These resource limitations may impact the scope, schedule, and complexity of the project.

## 2.5 Assumptions and Dependencies

The development and implementation of the Movie Theater Ticketing System (MTTS) rely on various assumptions and dependencies that can influence the requirements outlined in this Software Requirements Specification (SRS). These assumptions and dependencies encompass factors outside the direct control of the development team but have the potential to impact the project's scope, schedule, and functionality.

The following are the key assumptions and dependencies associated with the MTTS:

2.5.1 Availability of Required Hardware and Software: It is assumed that the hardware and software components necessary for the operation of the MTTS, including servers, databases, networking equipment, and operating systems, will be available and compatible with the system requirements.

2.5.2 Stable Internet Connectivity: The successful operation of the MTTS, particularly for online ticket sales and communications with external services, depends on the availability of a stable and reliable Internet connection. Any disruptions or outages in internet connectivity may affect the system's functionality.

2.5.3 Third-Party Service Integration: The MTTS relies on the integration with third-party services such as payment gateways, email servers, and SMS gateways for various functionalities such as processing transactions, sending notifications, and managing communications. The availability and reliability of these third-party services are critical dependencies for the MTTS.

2.5.4 Compliance with Regulatory Requirements: Assumptions are made regarding the compliance of the MTTS with relevant regulations and standards governing data privacy, security, and financial transactions. Any changes to regulatory requirements may necessitate updates to the system to ensure ongoing compliance.

2.5.5 User Training and Adoption: It is assumed that users of the MTTS, including theater staff and customers, will receive adequate training and support to effectively utilize the system. The successful adoption of the MTTS depends on user acceptance and proficiency, which may require training programs and user documentation.

2.5.6 Vendor Support and Maintenance: Dependencies exist on the availability of vendor support and maintenance for components such as hardware, software frameworks, and third-party libraries used in the MTTS. Timely updates, patches, and technical assistance from vendors are essential for the ongoing operation and security of the system.

2.5.7 Business Continuity Planning: While not directly within the scope of the SRS, assumptions are made regarding the existence of business continuity plans and disaster recovery strategies to mitigate the impact of unforeseen events such as system failures, natural disasters, or cybersecurity incidents.

# 3. Specific Requirements

The Specific Requirements section of the Software Requirements Specification (SRS) outlines the detailed functional and non-functional requirements that will guide the design, implementation, and testing of the Movie Theater Ticketing System (MTTS). These requirements are derived from the customer requirements specified in Section 2 and serve as the basis for the development team to create a software solution that meets the stakeholders' needs.

Each requirement presented in this section adheres to the following principles:

1. Correctness: The requirements accurately reflect the intended functionality and behavior of the MTTS.
2. Traceability: Each requirement is traceable both forward and backward to related artifacts, such as user stories, use cases, and design documents.
3. Unambiguity: The requirements are expressed in clear and concise language, leaving no room for interpretation or misunderstanding.
4. Verifiability: The requirements are testable, allowing for verification through testing processes to ensure they have been implemented correctly.
5. Priority: Requirements are prioritized based on their importance and stability, allowing the development team to focus on the most critical aspects of the system.
6. Completeness: All requirements are included to fully define the functionality and performance of the MTTS.
7. Consistency: Requirements are consistent with each other and do not conflict with previously stated requirements.
8. Uniqueness: Each requirement is uniquely identifiable using a numbering system for easy reference and management.

## 3.1 External Interface Requirements

### 3.1.1 User Interfaces

1. The user interface for the Movie Theater Ticketing System (MTTS) shall be accessible through any modern web browser, including but not limited to Internet Explorer, Mozilla Firefox, Google Chrome, and Safari.
2. The user interface shall be implemented using web development technologies such as HTML5, CSS, and JavaScript to ensure compatibility across different platforms and devices.

### 3.1.2 Hardware Interfaces

1. The MTTS requires hardware components to facilitate internet connectivity, including modems, routers, Ethernet cables, and Wi-Fi adapters.
2. In-theater ticketing kiosks and POS systems will serve as hardware interfaces for customers purchasing tickets on-site*.*

### 3.1.3 Software Interfaces

1. The MTTS shall integrate with a payment gateway system to process online transactions securely and efficiently.
2. Integration with a content management system will provide access to movie details, showtimes, and promotions.
3. Communication with a customer relationship management (CRM) system will enable support services and customer interactions.
4. The MTTS will interface with a ticket management system for order processing and ticket validation.
5. Integration with a shipping system will allow tracking of orders and management of delivery options.
6. The system will communicate with external tax calculation software to determine applicable taxes for ticket purchases.
7. Secure transactions will be facilitated through third-party security protocols such as SSL/TLS encryption.
8. Communication between system components will be conducted using HTTP protocol for internet transactions and TCP/IP for intranet communication.

### 3.1.4 Communications Interfaces

1. The MTTS will utilize HTTP protocol for communication over the internet, ensuring secure and efficient data exchange.
2. Internal communication within the system will be facilitated through the TCP/IP protocol suite, ensuring reliable data transmission between system components*.*

## 3.2 Functional Requirements

This section outlines specific features and functionalities of the Movie Theater Ticketing System (MTTS). Each requirement is described in detail, including its introduction, inputs, processing steps, outputs, and error-handling mechanisms.

### 3.2.1 Ticket Booking and Sales

### 3.2.1.1 Introduction

The MTTS shall facilitate the booking and sales of movie tickets, both online and at the theater.

3.2.1.2 Inputs

1. Customer details (name, contact information)
2. Movie selection (title, showtime)
3. Payment information (credit card details, payment method)

3.2.1.3 Processing

1. Validate customer information and movie availability.
2. Process payment securely through an integrated payment gateway.
3. Reserve selected seats and generate tickets.

3.2.1.4 Outputs

1. Confirmation of booking via email/SMS.
2. Printable tickets for in-theater purchases.

3.2.1.5 Error Handling

1. Notify users of payment failures and provide options for retrying payment.
2. Ensure real-time updates on seat availability to prevent overbooking.

### 3.2.2 Show Schedule Management

### 3.2.2.1 Introduction

The MTTS shall provide functionality for theater managers to create, update, and manage show schedules.

3.2.2.2 Inputs

1. Movie details (title, duration, rating)
2. Theater availability (screens, showtimes)
3. Manager authorization for scheduling changes

3.2.2.3 Processing

1. Validate show timings against the existing schedule to avoid conflicts.
2. Update the schedule database with new or modified show details.

3.2.2.4 Outputs

1. Updated show schedule available to customers and staff.
2. Notifications to customers about schedule changes via email/SMS.

3.2.2.5 Error Handling

1. Notify managers of scheduling conflicts and provide options for resolution.
2. Ensure real-time updates to prevent double-booking and scheduling errors.

## 3.3 Use Cases

### 3.3.1 Customer Use Case 1

Use case: Registration

Brief Description

The Customer registers in the Movie Ticket Booking System.

1. The customer has already connected to the Movie Ticket Booking System.
2. The Customer registers with his/her details in the Movie Ticket Booking System.
3. The System generates and sends an email acknowledgment.

### 3.3.2 Customer Use Case 2

Use case: Sign-In

Brief Description

The Customer accesses the system to sign in to his/her account.

1. The Customer is signed in to his/her account in the Movie Ticket Booking System.
2. The Customer then proceeds to edit his/her profile or book a movie.

### 3.3.3 Customer Use Case 3

Use case: Edit Profile

Brief Description:

The Customer accesses the system to edit his/her profile.

1. The Customer is signed in to his/her account in the Cinema Ticket Booking System.
2. The Customer then proceeds to edit his/her profile.

### 3.3.4 Customer Use Case 4

Use case: Search Movie

Brief Description:

1. The Customer chooses to search by movie name, timing, or date.
2. The system displays the choices to the Customer.
3. The Customer selects the movie desired.
4. The system presents the abstract of the movie to the Customer.
5. The Customer chooses to book the movie.

A Customer selects a movie. The Customer decides the time, seats, offers, and reviews it.

If the ticket is booked, possibly after a revision, the System sends an acknowledgment E-mail

to the Customer. The customer can cancel his/her booking 1 hour before the

movie time.

### 3.3.5 Customer Use Case 5

Use case: Book Movie

Brief Description:

The Customer books a movie.

The author has already connected to the Movie Ticket Booking System and has

searched for a movie.

1. The Author chooses the Book Movie button.
2. The System generates and sends an email acknowledgment

### 3.3.6 Customer Use Case 6

Use case: Make Payment

Brief Description:

The Customer proceeds to pay for his/her booking.

Initial Step-By-Step Description:

Before this use case can be initiated, the Customer has already connected to the Movie

Ticket Booking System.

1. The Customer chooses the Make Payment button.
2. The Customer then is allowed to make his payment via various methods (Net banking, Credit Card, Debit Card)
3. The System generates and sends an email acknowledgment

## 3.4 Classes / Objects

In this section, the classes or objects within the Movie Theater Ticketing System (MTTS) are defined. These classes encapsulate related attributes and functions that represent the entities and behaviors within the system.

### 3.4.1 Ticket

3.4.1.1 Attributes:

1. Ticket ID: Unique identifier for each ticket booking transaction.
2. Movie Title: Title of the movie for which the ticket is booked.
3. Show Time: Date and time of the movie show.
4. Seat Number: Identifier for the booked seat.
5. Customer ID: Unique identifier for the customer who booked the ticket.

3.4.1.2 Functions:

1. BookTicket (): Function to book a ticket for a specific movie show.
2. CancelTicket (): Function to cancel a booked ticket.
3. PrintTicket (): Function to print the ticket for in-theater purchases.

### 3.4.2 Customer

3.4.2.1 Attributes:

1. Customer ID: Unique identifier for each customer.
2. Name: Name of the customer.
3. Email: Email address of the customer.
4. Payment Information: Details of the payment method used by the customer.

3.4.2.2 Functions:

1. Register (): Function to register a new customer account.
2. Login (): Function to authenticate and login an existing customer.
3. UpdateProfile (): Function to update the customer's profile information.

## 3.5 Non-Functional Requirements

Non-functional requirements specify the system's attributes, such as performance, reliability, security, and maintainability, rather than specific behaviors. These requirements are essential for ensuring that the Movie Theater Ticketing System (MTTS) meets the expectations and needs of its users. Below are measurable non-functional requirements for various attributes:

### 3.5.1 Performance

1. Ticket Booking Speed: 95% of ticket booking transactions must be processed in less than 3 seconds to ensure a responsive and efficient booking experience for customers.
2. System Response Time: The system must respond to user actions (e.g., seat selection, payment processing) within 1 second to maintain user engagement and satisfaction.

### 3.5.2 Reliability

1. System Uptime: The system must have an uptime of at least 99.9%, ensuring that it is available to customers and theater staff 24/7 with minimal downtime for maintenance or upgrades.
2. Data Backup Frequency: Customer data and transaction records must be backed up daily to prevent data loss and ensure quick recovery in case of system failures.

### 3.5.3 Availability

1. Online Booking Availability: The online booking system must be available for customers to access and purchase tickets at any time, with scheduled maintenance windows communicated in advance.
2. In-Theater POS Availability: In-theater point-of-sale (POS) systems must be operational during theater opening hours, ensuring that customers can purchase tickets and concessions seamlessly.

### 3.5.4 Security

1. Data Encryption: All customer data, including personal information and payment details, must be encrypted during transmission and storage to protect against unauthorized access or data breaches.
2. Access Control: Role-based access control (RBAC) must be implemented to restrict access to sensitive functionalities (e.g., schedule management, user data) based on user roles and permissions.

### 3.5.5 Maintainability

1. Modular Architecture: The system must be designed with a modular architecture, allowing for easy updates, enhancements, and bug fixes without disrupting overall system functionality.
2. Documentation: Comprehensive documentation, including system architecture, codebase, and user manuals, must be provided to support ongoing maintenance and troubleshooting efforts.

### 3.5.6 Portability

1. Cross-Platform Compatibility: The system must be compatible with various web browsers (e.g., Chrome, Firefox, Safari) and operating systems (e.g., Windows, macOS, Linux), ensuring accessibility across different devices and platforms.
2. Responsive Design: The user interface (UI) must be designed responsively to adapt to different screen sizes and resolutions, providing a consistent user experience across desktops, tablets, and smartphones.

## 3.6 Inverse Requirements

Inverse requirements outline conditions or scenarios that the system should avoid or prevent, rather than achieve. These requirements serve to identify potential pitfalls, risks, or undesired outcomes that need to be mitigated or avoided. Some useful inverse requirements for the Movie Theater Ticketing System (MTTS) include:

Avoid Overbooking: The system must prevent the sale of tickets for seats that are already reserved or unavailable to avoid overbooking and conflicts during screenings.

Prevent Unauthorized Access: The system should deter unauthorized access to sensitive customer information or administrative functionalities by implementing robust authentication and access control measures.

Minimize Downtime: The system should minimize downtime and service interruptions to ensure continuous availability for ticket purchases and customer inquiries.

Prevent Data Loss: The system must safeguard against data loss or corruption by implementing regular backups, redundancy measures, and failover mechanisms.

Avoid Payment Processing Errors: The system should prevent errors or discrepancies in payment processing, such as double charges or failed transactions, to maintain customer trust and satisfaction.

Prevent Unauthorized Modifications: The system should prevent unauthorized modifications to show schedules, ticket prices, or other critical data by enforcing strict authorization and audit trails.

Minimize Customer Wait Times: The system should minimize wait times for ticket purchases, both online and at the theater, to enhance the customer experience and reduce frustration.

## 3.7 Design Constraints

Several design constraints must be considered in the development of the Movie Theater Ticketing System (MTTS) to ensure compatibility, compliance, and optimal performance. These constraints include:

3.7.1 Industry Standards: Adherence to industry standards and best practices, such as those outlined by the International Organization for Standardization (ISO) or the Institute of Electrical and Electronics Engineers (IEEE), to ensure interoperability and quality assurance.

3.7.2 Legal and Regulatory Compliance: Compliance with relevant laws and regulations governing data privacy (e.g., GDPR, CCPA) and financial transactions (e.g., PCI-DSS) to protect customer information and facilitate secure transactions.

3.7.3 Company Policies: Align with company policies and guidelines regarding software development methodologies, security protocols, and user experience standards to maintain consistency and brand integrity.

3.7.4 Hardware Limitations: Consideration of hardware limitations, such as processing power, memory, and storage capacity, to optimize system performance and ensure compatibility with target devices.

3.7.5 Scalability Requirements: Designing the system architecture with scalability in mind to accommodate future growth and increased user demand without requiring significant redesign or infrastructure changes.

3.7.6 Budgetary Constraints: Adherence to budgetary constraints and resource limitations, including time and personnel constraints, to ensure project feasibility and cost-effectiveness.

3.7.7 Third-party Dependencies: Integration with third-party services or APIs may introduce dependencies and constraints related to service availability, version compatibility, and data transfer protocols.

3.7.8 Legacy System Integration: Compatibility with existing legacy systems or software components within the theater environment to facilitate data migration, system integration, and interoperability.

## 3.8 Logical Database Requirements

For the Movie Theater Ticketing System (MTTS), a robust database system will be integral for managing various data aspects, including ticket sales, show schedules, customer details, and more. The following outlines the logical requirements governing the database implementation:

3.8.1 Data Formats: The database structure will prioritize efficiency in data retrieval and manipulation. It will employ standardized formats like JSON or XML for specific data categories, ensuring uniformity and ease of processing.

3.8.2 Storage Capabilities: Scalable storage solutions will be pivotal to accommodate the system's anticipated data volume. The database must offer flexible scaling options to meet evolving storage needs without compromising performance.

3.8.3 Data Retention: Historical data about ticket sales, customer transactions, and show schedules will be retained for analytical purposes. Defined data retention policies will dictate the duration of data storage, with provisions for archiving or deletion as necessary.

3.8.4 Data Integrity: Maintaining data integrity is paramount, necessitating the enforcement of constraints such as primary keys, foreign keys, and uniqueness constraints. Robust data validation mechanisms will be implemented to prevent the insertion of erroneous or inconsistent data.

3.8.5 Security: Access controls will restrict database access to authorized users, safeguarding data confidentiality. Encryption protocols will be employed to protect sensitive information, while regular security audits will help identify and mitigate potential vulnerabilities.

3.8.6 Backup and Recovery: The database system will support regular backup and recovery procedures to mitigate data loss risks. Scheduled backups and retention policies will ensure data resilience in the face of hardware failures or unforeseen incidents.

3.8.7 Performance: Database optimization measures, including indexing, query optimization, and caching strategies, will be employed to enhance system performance. These optimizations aim to streamline data retrieval and processing, ensuring optimal system responsiveness.

## 3.9 Other Requirements

This section encompasses miscellaneous requirements that do not fit neatly into previous categories but are nonetheless essential for the successful implementation and operation of the Movie Theater Ticketing System (MTTS). These requirements may include:

3.9.1 Localization: The system should support multiple languages and currencies to cater to diverse audiences and facilitate international transactions.

3.9.2 Accessibility: Compliance with accessibility standards (e.g., WCAG) to ensure equitable access for users with disabilities, including support for screen readers and keyboard navigation.

3.9.3 Integration with Third-party Services: Seamless integration with external services such as payment gateways, email providers, and SMS gateways to enable enhanced functionality and communication capabilities.

3.9.4 Scalability: The architecture should be designed with scalability in mind, allowing the system to handle increasing loads and accommodate future growth without significant reengineering.

3.9.5 Audit Trail: Logging of user actions and system events for auditing and troubleshooting purposes, ensuring accountability and facilitating error diagnosis.

3.9.6 Regulatory Compliance: Adherence to relevant industry regulations and standards (e.g., GDPR, PCI-DSS) governing data privacy, security, and financial transactions.

3.9.7 User Documentation: Comprehensive user documentation, including user guides, FAQs, and troubleshooting resources, to assist users in navigating and utilizing the system effectively.

3.9.8 Training and Support: Provision of training sessions and ongoing technical support to theater staff and system administrators to facilitate smooth system adoption and operation.

3.9.9 Performance Monitoring: Implementation of performance monitoring tools and metrics to track system performance, identify bottlenecks, and optimize resource utilization.

3.9.10 Feedback Mechanism: Mechanisms for collecting user feedback and suggestions to inform iterative improvements and feature enhancements, fostering continuous system refinement.

# 4. Analysis Models

In developing the specific requirements outlined in this SRS, several analysis models were utilized to provide clarity and aid in the understanding of the system's behavior. Each model offers a unique perspective on the system's functionality and interactions.

## 4.1 Sequence Diagrams

4.1.1 Introduction:

Sequence diagrams depict the interactions between various objects or components in the system over a specific period. They showcase the flow of messages exchanged between these objects, illustrating the sequence of actions and their temporal ordering.

4.1.2 Narrative Description:

For the Movie Theater Ticketing System (MTTS), sequence diagrams were employed to illustrate the flow of interactions between users, the system, and external entities during critical processes such as ticket booking, cancellation, and show scheduling. These diagrams helped in visualizing how different parts of the system collaborate to fulfill user requests and achieve system functionality. Each sequence diagram is directly traceable to specific functional requirements and use cases outlined in the SRS.

## 4.2 Data Flow Diagrams (DFD)

4.3.1 Introduction:

Data Flow Diagrams (DFDs) provide a visual representation of the flow of data within the system. They illustrate how data moves through various processes and stores, highlighting the transformations that occur along the way.

4.3.2 Narrative Description:

In the context of the MTTS, DFDs were utilized to model the flow of data during ticket booking, payment processing, and reporting. These diagrams depicted the movement of information between different components of the system, including user interfaces, databases, and external services. By mapping out data flows, DFDs helped in identifying potential bottlenecks, data dependencies, and opportunities for optimization. Each DFD corresponds to specific functional requirements and interfaces described in the SRS, ensuring alignment with system specifications.

## 4.3 State-Transition Diagrams (STD)

4.3.1 Introduction:

State-transition diagrams (STDs) visualize the behavior of a system in response to external stimuli or events. They represent the various states that a system or component can be in and the transitions between these states triggered by specific events.

4.3.1 Narrative Description:

For the MTTS, STDs were employed to model the lifecycle of different entities within the system, such as tickets, user sessions, and movie schedules. These diagrams illustrated how the system transitions between states based on user interactions, system events, and time-dependent processes. By capturing the system's dynamic behavior, STDs facilitated a deeper understanding of its operational logic and helped in identifying edge cases and exceptional scenarios. Each STD is linked to specific functional requirements and use cases defined in the SRS, ensuring coherence between system behavior and requirements.

# 5. Change Management Process

For the Movie Theater Ticketing System (MTTS) project, changes to the Software Requirements Specification (SRS) follow a clear process. Any stakeholder can submit change requests, which are then reviewed by the project team. After careful assessment, approved changes are incorporated into the SRS document. This ensures that the SRS remains up-to-date and reflective of project scope and requirements. Regular communication keeps all stakeholders informed about changes and their implications.

# A. Appendices

Appendices in the Software Requirements Specification (SRS) for the Movie Theater Ticketing System (MTTS) provide supplementary materials to enhance understanding and support the development process. It should be clarified whether the content within an appendix is considered part of the overall set of requirements for MTTS.

Example Appendices could include initial conceptual documents for the software project, marketing materials, minutes of meetings with stakeholders, and other relevant documentation.

## A.1 Appendix 1: Use Case Diagrams

This appendix contains detailed use case diagrams depicting various interactions between actors and the MTTS system. Use case diagrams provide a visual representation of the system's functionality from the perspective of different user roles.

## A.2 Appendix 2: Database Schema

This appendix presents the logical database schema for the MTTS system. It outlines the structure of the database tables, including relationships between entities and attributes. Developers can refer to this schema during the implementation phase to ensure consistency with the defined data model.

## A.3 Appendix 3: Mockups and Wireframes

Mockups and wireframes illustrating the user interface design for the MTTS system are included in this appendix. These visual representations help stakeholders visualize the look and feel of the software and provide a basis for feedback and iteration during the design process.

## A.4 Appendix 4: Glossary of Terms

The glossary of terms appendix contains definitions for all technical terms, acronyms, and abbreviations used throughout the MTTS SRS. This reference material ensures clarity and consistency in communication among project team members and stakeholders.

## A.5 Appendix 5: Meeting Minutes

Meeting minutes from stakeholder meetings, requirements workshops, and project status updates are documented in this appendix. These records provide a historical record of decisions made, requirements discussed, and action items assigned throughout the software development lifecycle.

## A.6 Appendix 6: Regulatory Compliance Documentation

This appendix includes documentation related to regulatory compliance requirements applicable to the MTTS system. It outlines any legal or industry-specific standards that the software must adhere to, ensuring that the system meets relevant regulations and guidelines.