

Ticket Sales Anywhere

Software Requirements Specification

v1.0.1

6/3/2024

Group 3

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CS 250- Introduction to Software Systems

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Revision History

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5/26/2024	V1.0.0	Lexa, James, Eli	Included basic tickets sales functionality, advisement capability, and, simple UI.
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Document Approval

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

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	Dr. Gus Hanna	Instructor, CS 250	

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1. Introduction

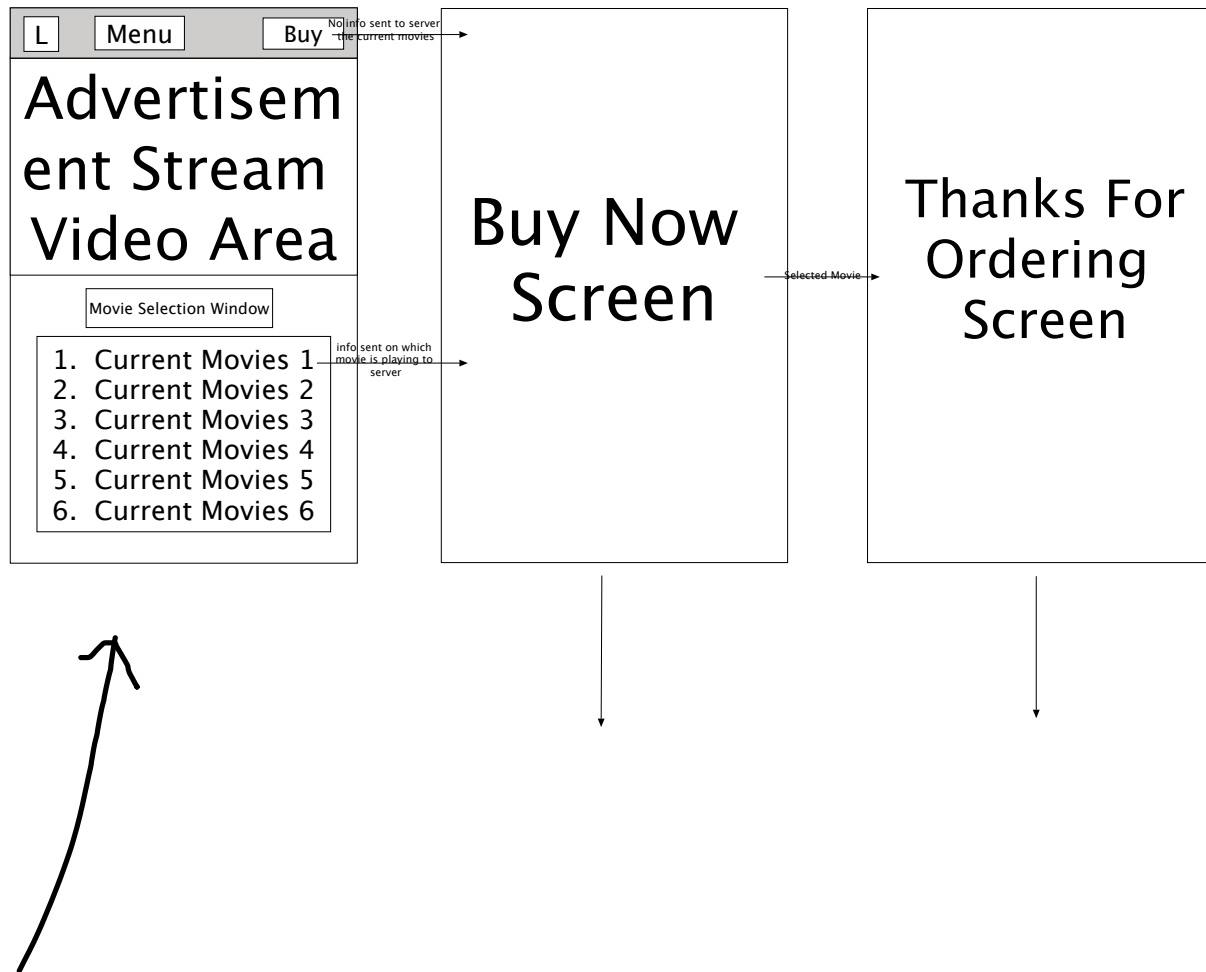
1.1 Purpose

The purpose of this document is to document the ways that the Movie Theater ticketing system functions. It will document both the back and front end of the ticketing system and analyze the ways the user interacts with these components. It is intended to be used by us when creating the specifications from the information our contractor gave us. We will be using the Waterfall Method for the Development of the program.

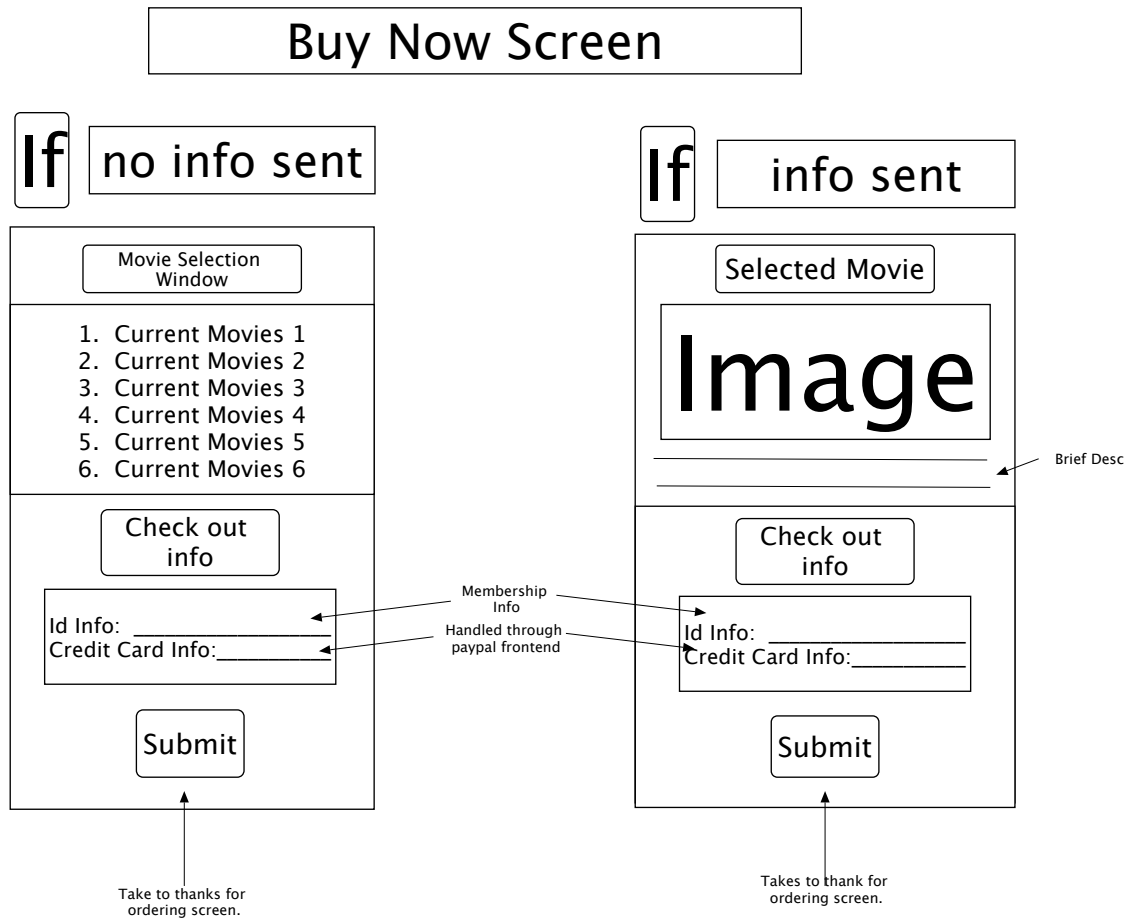
1.2 Scope

This project uses a client-server model to allow users to buy tickets from the vendor. To do this three separate software's will be designed that will work together to allow users to interact with the ticket vendor both in person and online. Ticket Server will be the software that runs on the server end. It will be responsible for a few different tasks that are split into subprograms. One task is indexing past and currently available movies including their descriptions. This means that it will add movie/movie descriptions to its currently playing library at the admin's request or allow for an admin to upload a new movie/movie description to it. No movies that are uploaded will be deleted by default when new movie/movie descriptions are uploaded. A second task the servers will be responsible for is loading randomized clips of trailers that will be accessible to the client with a URL. The server will have a timer set for the length of the video and rotate the videos it is serving to the client every time this timer ends. A second URL will display the timer value in plain text. Both will be used by the clients to display the trailers to the user. A third functionality will be that the server will provide information about any movie currently playing to the client when it is requested. This will be searched either by the current playing index or the name of the movie.

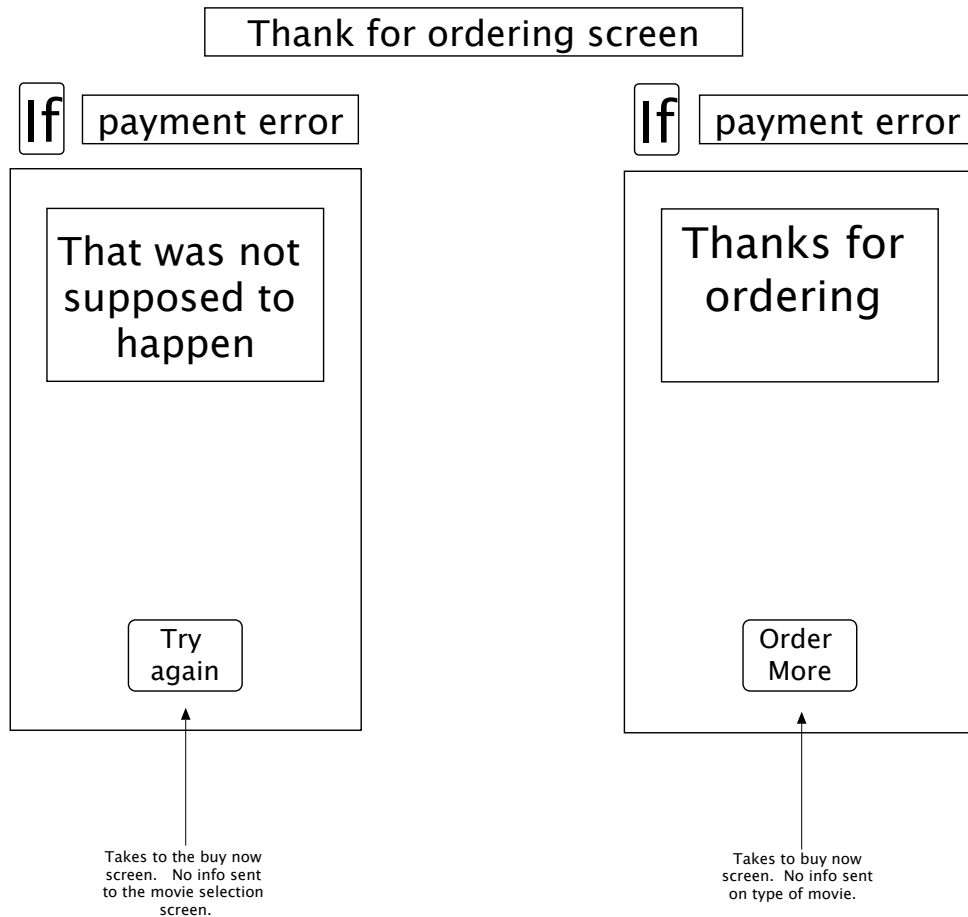
The first of the two clients will be called Ticket Sales Anywhere. It will allow users to buy tickets from anywhere based on their requested order.



This page allows people to see movies currently playing. It will display a current stream of movie trailers that the theatre is currently playing or movies that have been played in the past. It will also allow users to select from one of the current movies that are playing in theaters. Hovering over a title will bring up a trailer and description of the movie. If the user clicks buy then they will get sent to the buy now screen without any info about the current movie they have selected in the website catch if not they will click on the movie they want and then get set to the buy now screen with the movie they wanted loaded into the website catch.



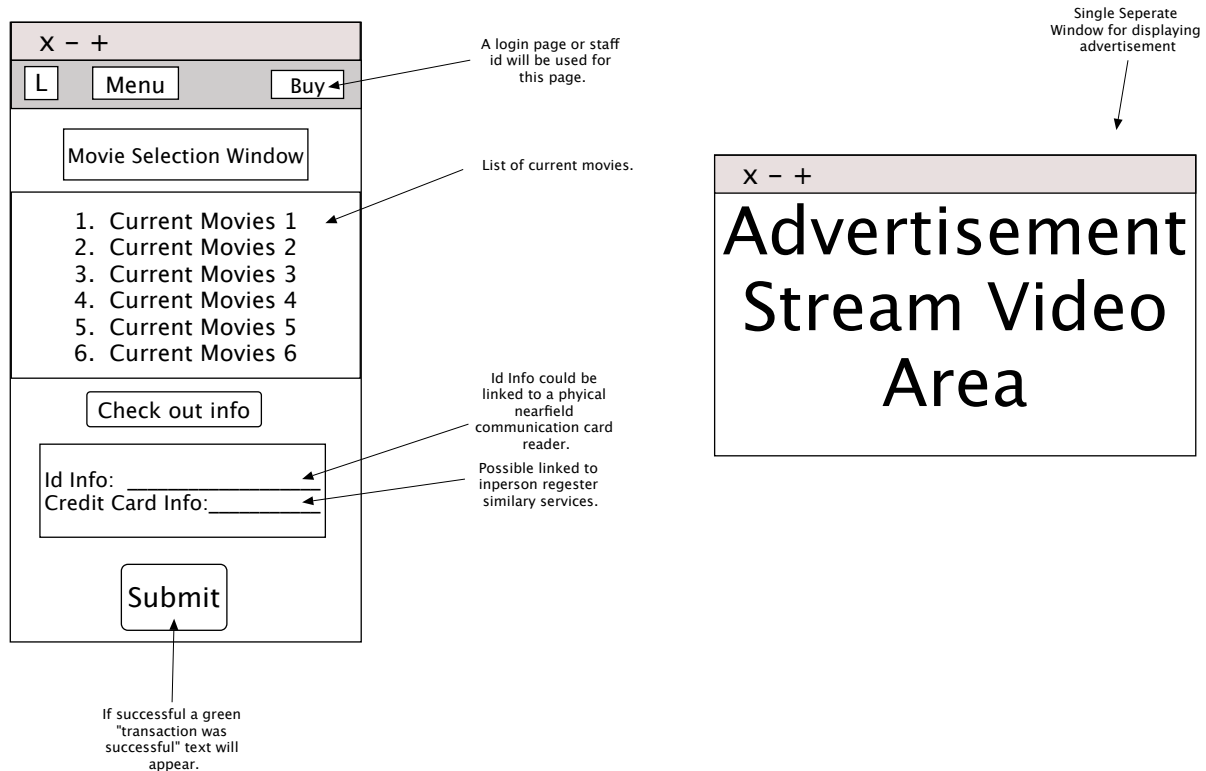
This screen is responsible for letting a user pick out a ticket or tickets if they have not already. It then takes their membership ID for identification purposes and their credit card info using PayPal. When the submit button is hit the system will place this information from the form into the website catch and then go to the URL of the “thanks for ordering screen”.



This screen is responsible for displaying a loading screen and then posting information about the chosen movie, identification information, and PayPal / Payment information to the Ticket Server. This will then process the information. When done it will modify the html page so that it displays one of the two screens above. If successful it will then display an image with a caption over it saying thanks for ordering. It will then wipe the information from the local browser cache. If not, it will display an image with a caption over it saying that was not supposed to happen. In both situations, there will be a button at the bottom that redirects back to the Buy Now Screen. However, the text in the button may be different as you can see.

The second of the two clients will be a simple client made for staff members. The name of the program will be Ticket Sales Assistant. The web app will be written within JS nodes so it can run as an HTML and JavaScript-based app. It will have the following layout.

Movie Theater v1.0.1



The figure to the left is the staff portal screen. It will have a way for staff members to identify themselves. Login info will be provided with a popup page. The simple web-based app will display a list of current movies that are being played. Then a dialog box on the bottom will show the customer info entry screen. The two boxes for input which are respectively the ID info followed by a line and credit card info followed by a line will be represented in a form that will allow people to enter more info into it. Both could be linked to external services or peripherals such as a NEF communication card reader or a cash register. The submit button will upload the information to the Ticket Server. During the post and processing time, a small loading wheel will appear. After success, the server will change the HTML page so that a "success" text will be displayed, and if failed a small "failed, please try again" text will appear. If the logo is pressed a separate dialog page will appear that allows for the staff to input new movie information and trailers to the server.

The figure to the right is a small separate dialog box that will appear having an advertisement stream of movies that have been played in the past and are currently playing. These will be taken from the video and time stamp function on the Ticket Server. The time stamp at the opening of the window will be used to tell how far into the video to play and when the video is complete so the page can reload without showing the user or view and fetch the next video from the URL described above.

1.3 Definitions, Acronyms, and Abbreviations

ID Info:

Information is relevant to a current user or customer that is unique enough to differentiate from other customers.

Credit Card Info:

The information needed for a financial transaction between the theater and customer.

NEF Communication:

Near-field communication is used to transfer information over short distances.

Ticket Server:

Used for processing transactions, loading content about the movies, and managing user data.

Ticket Sales Anywhere:

Website for customers to order tickets from the theater online. The transactions are handled by the backend Ticket Server.

Ticket Sales Assistant:

Web app for displaying movie information and helping users to order tickets. Can interface with peripherals like a cash registrar and NEF communication reader to get information relevant to the transactions. The transactions are handled by the backend Ticket Server.

Advertisement Stream Video Area:

An area where past and present trailers and movies are played. This may be played in the background and is useful for keeping the customer engaged.

1.4 References

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 - Date: N/A

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1.5 Overview

The rest of this document will be responsible for documenting information about the product. This could include information such as what systems the product runs on, how the program integrates with other systems at a lower level, and how will be using it. As well as other user interfaces not documented in the screen above. As well as documenting any software-based dependencies our program will have. It will also include the hardware, software, and communication interfaces, as well as the functional and non-functional requirements.

The second section will give a general description of the product. This will include the information on what the system is as mentioned above. The third section will go into the specification requirements of the program. As mentioned above it will split these requirements into several sections.

2. General Description

2.1 Product Perspective

This application is designed to operate within a cloud-based infrastructure of the Amazon Web Services (AWS) platform. Our decision to host most of the server-side content on AWS containers is driven by the need for scalability, reliability, and security AWS offers. Consequently, the application's performance and availability are linked to AWS's operational status and uptime.

We also are reliant upon the uptime and performance of credit card payment processing companies such as Visa and Mastercard. Downtime on the company's end would cause issues with our software.

We are also dependent on the uptime of the bitcoin network, which is a decentralized system that processes payments. Bitcoin payment processing times can vary wildly depending on the time of day as well as the volume of transactions at any given time.

2.2 Product Functions

This product has 4 main functions:

- 1) The user's ability to purchase tickets.
- 2) The client ability to enter an admin mode and perform various customer service actions.
- 3) The application will register and save user info either for customer use or for client purposes.
- 4) The application will use a queue system to handle influxes of users and limit purchases.

2.3 User Characteristics

There are two main user groups: customers and theater workers.

Theater workers can be given higher levels of access to the software, since they will need to access customer information to perform customer service work. It can be assumed that the theater will have done background checks on workers before allowing them to access this information.

Customers should be given a much more restrictive version of the software, since it is a public facing application on the open internet. We should take steps to ensure that the software is highly accessible and has minimal ambiguity. Accessibility for customers with disabilities such as vision or hearing impairment should be considered too.

2.4 General Constraints

Regulatory: Since this software accepts credit cards and bitcoin, we must adopt an appropriate logging policy to comply with local and federal laws. Bitcoin related purchases should be especially focused on due to the often-rapid changing legal status of cryptocurrencies. Additionally, we must handle sensitive user data appropriately and comply with state and federal data privacy laws, such as California's data privacy acts.

Reliability: The client has requested that the software handles at most 1000 people and has a queue system to control purchasing. We must ensure that we utilize appropriate load-balancing methods to manage this.

Audits: Similar to the above policy with CC and bitcoin we must provide appropriate logging for tax purposes in line with federal and state codes.

Safety: While not entirely in our control, we must be mindful of age-rating requirements for movies as well as content moderation for reviews. Another concern may be logging all chats with customer service representatives to document any inappropriate interactions.

2.5 Assumptions and Dependencies

This software is a web-based application designed to function on modern browsers. We assume that modern browsers such as Chrome/Firefox/Safari will support this software without significant issues. Our development team will conduct tests to ensure compatibility with the latest stable versions of these browsers.

Web browsers are updated frequently, and we will update this SRS accordingly. One major change that will occur later this year is Chrome manifest V3. This could impact performance and security. We should be researching how these changes will affect our software and any fixes that may be needed.

Additionally portions of this application rely on external dependencies including backend services, libraries and various APIs. Changes in any of these could result in security or performance issues to the application.

We can mitigate the effect of these changes by regularly monitoring for any major changes from these systems and by also implementing automated testing to detect issues when

dependencies are updated. Creating fallback mechanisms may also be a viable solution for these issues as well.

3. Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

Do:

- Short error messages for easy customer support
- Visible purchasing UI, all buttons should be easy to find on their page
- Language selection should be offered upon first accessing the site and should be logged to users' account
- Splash page should have users account info easily readable upon login ie points, past purchases etc.

3.1.2 Hardware Interfaces

We should always ensure that our designed system does not pull too many resources from the clients' AWS instances. We should implement rate-limiting to prevent accidental DOS from users attempting to purchase tickets.

3.1.3 Software Interfaces

As of v1.0.0 we will require the following software:

- AWS
- JS Nodes (Server Application)
- Electron JS (Client Application)
- Paypal Client and Server API
- RPC API (Bitcoin)

3.1.4 Communications Interfaces

AWS staff handle most sever side communications interfaces, but we should still focus on ensuring that customers information is always transmitted between components in a secure manner with HTTPS and properly configured certifications.

3.2 Functional Requirements

3.2.1 User Handling

3.2.1.1 Introduction:

- The system will handle concurrent access by at least 1000 users.

3.2.1.2 Inputs:

- User requests for browsing, purchasing tickets, or accessing account information.

3.2.1.3 Processing:

- Implement load balancing and optimized database to deal with high traffic.

3.2.1.4 Outputs:

- Correct responses to different user interactions
- Queued responses when there are excess users.

3.2.1.5 Error Handling:

- Display error messages if the system is overloaded.
- Implement a queue system to manage excess users smoothly.

3.2.2 Web Browser Operation

3.2.2.1 Introduction:

- The system will entirely operate within a web browser environment,

3.2.2.2 Inputs:

- URL requests from user's web browsers.

3.2.2.3 Processing:

- Create the UI
- Make sure the system is compatible with modern browsers (Chrome, Firefox, Safari, Edge).

3.2.2.4 Outputs:

- Interactive web pages for browsing, purchasing, and managing tickets.

3.2.2.5 Error Handling:

- If the user's browser is not compatible display error message

3.2.3 Bot Prevention

3.2.3.1 Introduction:

- The system will block bots attempting to buy tickets.

3.2.3.2 Inputs:

- Ticket purchase requests from users.

3.2.3.3 Processing:

- Implement a verification system
- Monitor and analyze request patterns to identify and block bots.

3.2.3.4 Outputs:

- Blocked transaction attempts from identified bots.
- Successful transactions from legitimate users.

3.2.3.5 Error Handling:

- Message for users when verification system interaction is required.
- Log and alert administrators of suspected bot activity.

3.2.4 Database Interface

3.2.4.1 Introduction:

- The system will interface with the database of showtimes and available tickets.

3.2.4.2 Inputs:

- Requests for showtimes, ticket availability, and user transactions.

3.2.4.3 Processing:

- Perform CRUD operations on the database.

3.2.4.4 Outputs:

- Updated info on showtimes and ticket availability.
- Confirmation of successful transactions.

3.2.4.5 Error Handling:

- Show error messages for issues when interacting with database.
- Log database errors for admin.

3.2.5 Ticket Purchase Limitations

3.2.5.1 Introduction:

- The system will enforce ticket purchase limitations.

3.2.5.2 Inputs:

- User selected showtimes and ticket quantities.

3.2.5.3 Processing:

- Validate the max ticket quatinty of 20
- Confirm that purchase is 2 weeks prior to showtime or 10 minutes after showtime.

3.2.5.4 Outputs:

- Confirmation of ticket purchase.
- Error messages for exceeding ticket quantity limits or outside purchase times.

3.2.5.5 Error Handling:

- Notify users if they attempt to buy more than 20 tickets or purchase outside the allowed timeframe.

3.2.6 Administrative Mode

3.2.6.1 Introduction:

- Admins will have more access than customers. In admin mode they will be able to modify movie information.

3.2.6.2 Inputs:

- Movie details such as descriptions or movie names.

3.2.6.3 Processing:

- Add new movies to the database and update the existing database.
- Validate input details

3.2.6.4 Outputs:

- Confirmation message for successful description update or movie addition.
- The movie will show the added movie or changed description.

3.2.6.5 Error Handling:

- Show error message for invalid inputs.
- Handle database issues

3.2.7 Customer Feedback System

3.2.7.1 Introduction:

- The system will include a customer feedback system.

3.2.7.2 Inputs:

- Customer feedback submissions.

3.2.7.3 Processing:

- Store feedback in the database.
- Alert admin to new feedback entries.

3.2.7.4 Outputs:

- Confirmation messages for customers.
- Feedback reports for administrators.

3.2.7.5 Error Handling:

- Error messages for failed feedback submissions.

3.2.8 Discount Ticket Support

3.2.8.1 Introduction:

- The system will support various discount ticket types.

3.2.8.2 Inputs:

- Discount codes

3.2.8.3 Processing:

- Validate discount eligibility.
- Apply discounts to ticket purchases.

3.2.8.4 Outputs:

- Updated ticket pricing based on discounts.
- Confirmation of discounted purchases.

3.2.8.5 Error Handling:

- Notify users of invalid discount codes.

3.2.9 Online Review Scraping

3.2.9.1 Introduction:

- The system will scrape online review sites to display reviews and critic quotes of movies.

3.2.9.2 Inputs:

- URLs of review sites and movie identifiers.

3.2.9.3 Processing:

- Extract review data.
- Update the database with new reviews and critic quotes.

3.2.9.4 Outputs:

- Display reviews and critic quotes on the movie detail pages.

3.2.9.5 Error Handling:

- Handle failures in scraping by notifying administrators.
- Show placeholder content if reviews cannot be fetched.

3.3 Use Cases:

3.3.1 Use Case #1

Name: Purchase Movie Tickets

Actor: Customer

Flow of Events:

The customer accesses the movie theatre's website. The customer navigates to the main menu section to browse currently available movies. The customer selects a movie they wish to watch. The system displays movie details such as showtimes, available seats, and ticket prices. The customer selects the desired showtime and number of tickets. The system validates the ticket quantity and showtime eligibility. The customer proceeds to checkout. The system prompts the customer to log in or create an account if not already logged in. The customer enters payment information and completes the transaction. The system confirms the ticket purchase and provides a confirmation number.

Assumptions about Entry Conditions: The customer has access to a compatible web browser and an internet connection. The customer has selected a movie from the available options and has valid payment information.

3.3.2 Use Case #2

Name: Admin Modify Movie Information

Actor: Admin

Flow of Events:

The admin accesses the admin portal of the movie theatre's website. The admin logs in using their credentials. The system presents a list of currently available movies. The admin selects the movie they want to modify. The system displays options to edit movie details such as descriptions, showtimes, or trailers. The admin makes the desired modifications. The system validates the changes and updates the database accordingly. The admin receives a confirmation message of successful modification.

Assumptions about Entry Conditions: The admin has appropriate permissions to access the admin portal. The admin is logged in and authenticated. The movie selected by the admin exists in the database.

3.3.3 Use Case #3

Name: Submit Customer Feedback

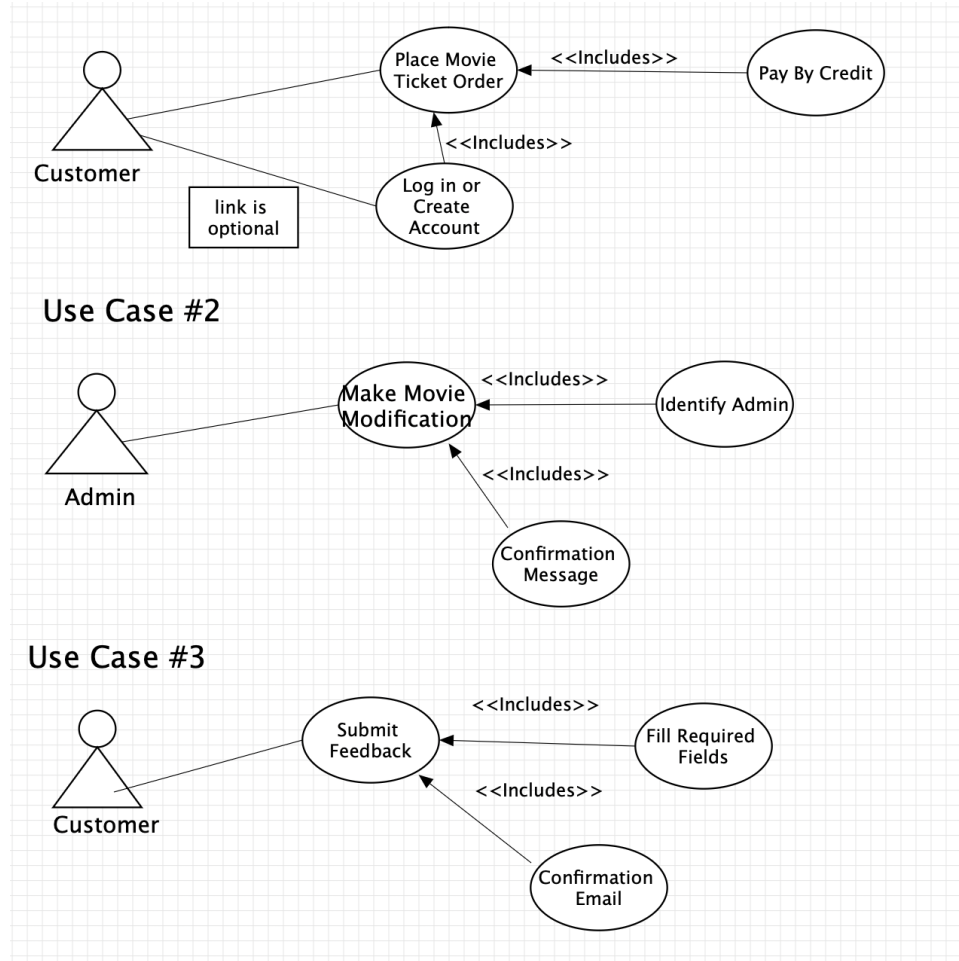
Actor: Customer

Flow of Events:

The customer accesses the movie theatre's website. The customer navigates to the "Feedback" section. The system provides a form for the customer to submit feedback. The customer fills in the required fields such as name, email, and feedback message. The customer submits the feedback. The system validates the input and stores the feedback in the database. The system sends a confirmation email to the customer acknowledging receipt of feedback.

Assumptions about Entry Conditions: The customer has access to a compatible web browser and an internet connection. The feedback form is accessible and functional. The customer provides valid account information.

Use Case Diagrams:



3.5 Non-Functional Requirements

3.5.1 UI:

- The user interface will be designed to be intuitive and user-friendly to make website navigation easier for inexperienced users.
- Response times for user interactions will be optimized for minimal wait times.

3.5.2 Security:

- The system will implement security measures to safeguard user data, payment information, and system integrity.
- User authentication will be enforced for all user interactions, with secure password storage in the database.
- Access controls will be implemented to ensure that only authorized users have access to sensitive functions.
- Payment transactions will comply with industry standards.
- Regular security audits and vulnerability audits will be conducted to identify and address potential security threats.

3.5.3 Performance

- The system should have a response time of less than 2 seconds for 95% of user interactions.
- The system must handle up to 10,000 concurrent users without performance issues.

3.5.4 Reliability

- The system must gracefully handle errors and provide meaningful feedback to users without crashing.
- Regular backups must be performed, and a recovery plan will be in place to restore operations quickly.

3.5.5 Availability

- The system must be accessible to users 24 hours a day 7 days a week.
- Scheduled maintenance should be minimized and people informed in advance.

3.5.6 Maintainability

- The system should follow coding standards and best practices to ensure code quality and readability.
- Comprehensive documentation must be provided for system architecture, design, and code.

3.5.7 Portability

- The system should be capable of running on various operating systems (Windows, macOS...).
- The system should support all major web browsers (Chrome, Firefox, Safari...).

4. System Description

This software system will be used as both a ticketing and customer service application for a movie theater. The client has requested that this software is a web-based application, that will accept both credit cards as well as bitcoin. The client has additionally requested that the customer side of the software features a queue system for crowd control as well as a customer reward

system. Focusing on the queue system, it should manage in demand movies and block detected bots from purchasing tickets to these movies.

The customer-service side of the application should be able to accept customer feedback in the form of a 5-star style system. The clients' workers should be able to enter an “admin” mode that allows for them to perform customer service actions such as refunds or account support.

Since this software has two parts, we will be using a hybrid architecture pattern. This is because we must combine the event driven pattern and the microservice pattern. The event driven pattern will be used for the front-end website features like previews and the rating system. The microservice pattern will be used for the payment processing systems and well as anti-bot measures.

5. Software Architecture Overview

5.1 Architectural diagram

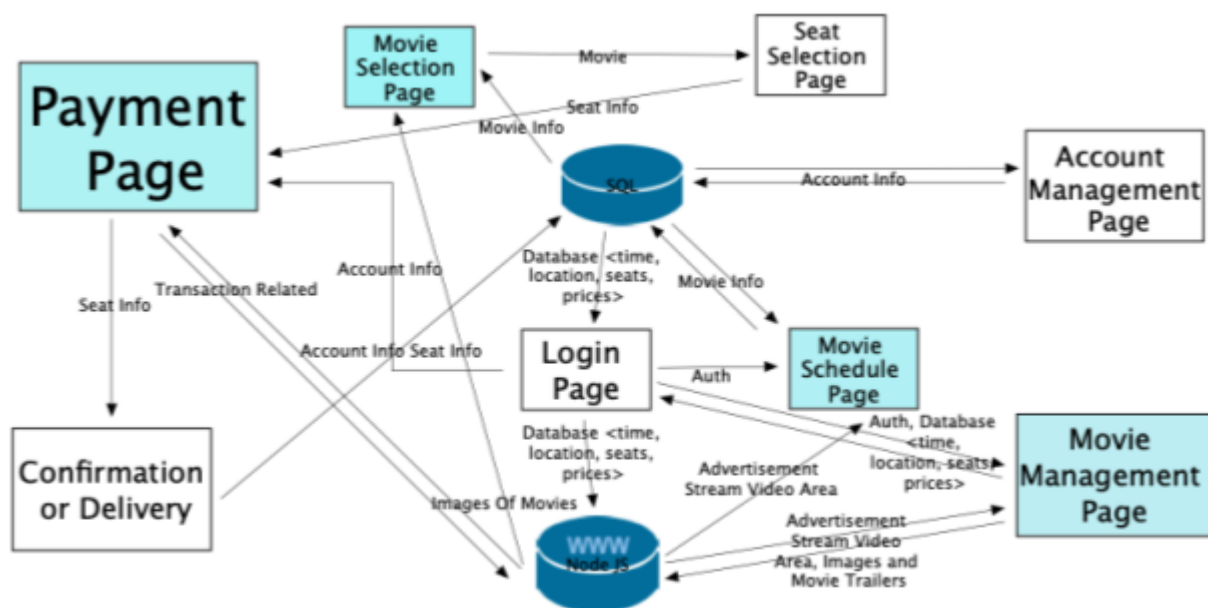


Diagram of the Architecture for Ticket Sales Anywhere and Ticket Sales Assistant

This is a diagram of what the Ticket Sales Anywhere and Ticket Sales Assistant client's architecture should look like. The diagram has the SQL servers which are responsible for storing information about the Time, location, seats, and movie prices. The Node JS server is responsible for serving movie images of movies currently playing to the movie selection screen, and clips to the user on the movie selection page which could be seen as the greeting or welcome screen that also displays a list of currently playing movies within it. The Payment Page has information being sent to it from the Node JS server because PayPal and Bitcoin transactions

require a server to be used while making payments and keeping track of them. All three of these screens have blue boxes to show they are using information from the Node JS server is being used in them. The movie management page is only logged into when an administrator logs in and displays the Ticket Sales Assistant UI which is what allows administrators to manage movies. It also uses the Node JS backend so it can change data in it and manage available movies.

Login Page:

Displays login information for users when they get to the website.

Movie Schedule Page:

A page that displays options for current movies that are playing as well to schedule the movie at a specific theater and date.

Account Management Page:

A separate page a user can get to when pressing a button somewhere on the top of the UI. It allows users to configure their accounts and manage their information.

Seat Selection Page:

A page that allows the user to select which seat they are currently sitting at. It displays the row of seats available.

Movie Selection Page:

Displays information about the current movies available and allows you to select the one you are choosing to watch within the theater.

Payment Page:

Allows you to select a payment option. It will include a PayPal payment and a Bitcoin Payment area.

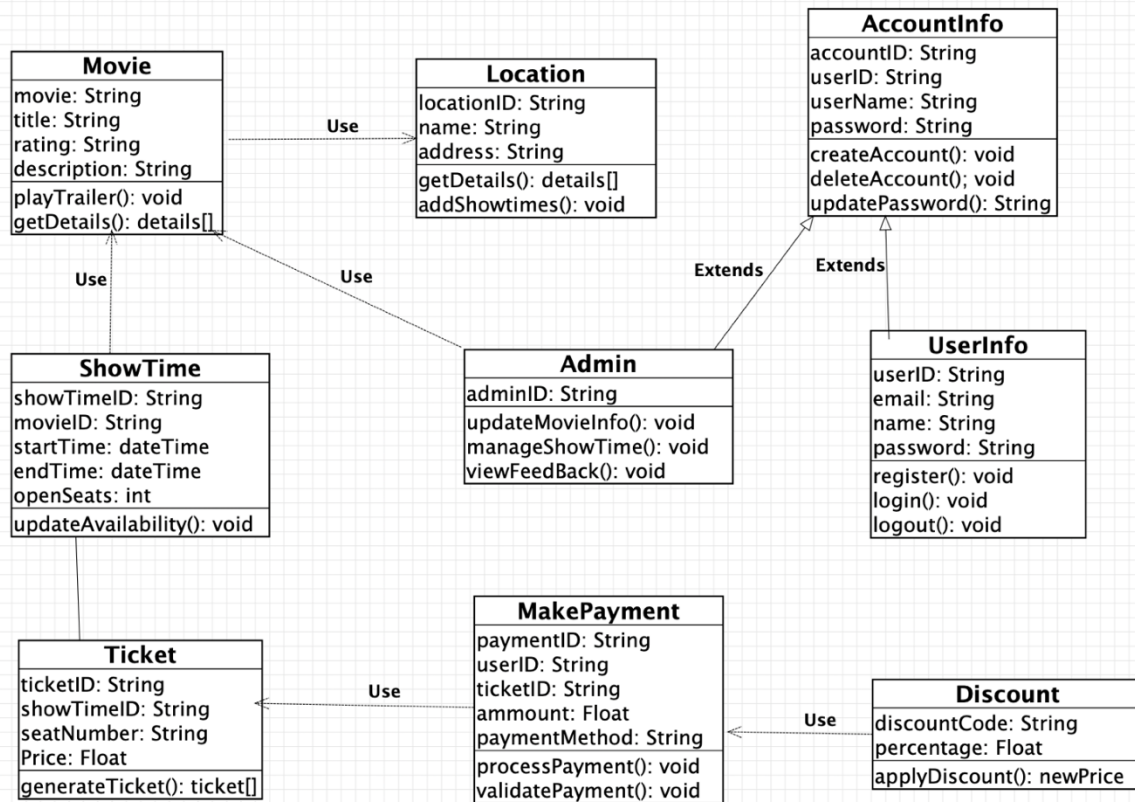
Confirmation and Delivery Page:

A ticket will be emailed to the user that will have more information on the ticket they just purchased.

Movie Management Page:

Uses the Ticket Sales Assistant UI and is responsible for managing movies currently playing. It allows them the upload new movies and delete old ones from the currently playing list when they are no longer playing. It also has a pop-up website that can be maximized and displays the Advertisement Stream Video Area.

5.2 UML Class Diagram



Explanations of UML Diagram: The UML Class Diagram represents a movie ticket booking system where movies are associated with locations and showtimes. Users can register and manage their accounts, purchase tickets, make payments, and apply discounts. Admins have special privileges to manage movie information and showtimes.

Overview of Classes: The classes in the UML Diagram are Movie, Location, AccountInfo, Admin, UserInfo, ShowTime, Ticket, MakePayment, and Discount.

Class Descriptions

Movie:

Attributes:

movie: String
 title: String
 rating: String
 description: String

Operations:

playTrailer(): void - Plays the trailer of the movie.

getDetails(): details[] - Retrieves the details of the movie.

Location:

Attributes:

locationID: String

name: String

address: String

Operations:

getDetails(): details[] - Retrieves the details of the location.

addShowtimes(): void - Adds showtimes to the location.

AccountInfo:

Attributes:

accountID: String

userID: String

userName: String

password: String

Operations:

createAccount(): void - Creates a new account.

deleteAccount(): void - Deletes an account.

updatePassword(): String - Updates the password for the account.

Admin (Extends AccountInfo):

Attributes:

adminID: String

Operations:

updateMovieInfo(): void - Updates information about movies.

manageShowTime(): void - Manages showtimes for movies.

viewFeedBack(): void - Views feedback from customers.

UserInfo (Extends AccountInfo):

Attributes:

userID: String

email: String

name: String

password: String

Operations:

register(): void - Registers a new user.

login(): void - Logs in an existing user.

logout(): void - Logs out the user.

ShowTime:

Attributes:

showTimeID: String

movieID: String

startTime: dateTime

endTime: dateTime

openSeats: int

Operations:

updateAvailability(): void - Updates the availability of seats for the showtime.

Ticket:

Attributes:

ticketID: String

showTimeID: String

seatNumber: String

Price: Float

Operations:

generateTicket(): ticket[] - Generates a ticket for the showtime.

MakePayment:

Attributes:

paymentID: String

userID: String

ticketID: String

amount: Float

paymentMethod: String

Operations:

processPayment(): void - Processes the payment for the ticket.

validatePayment(): void - Validates the payment information.

Discount:

Attributes:

discountCode: String

percentage: Float

Operations:

applyDiscount(): newPrice - Applies a discount to the ticket price.

Explanation of Relationships:

Use Relationships:

Movie uses Location.

Movie uses ShowTime.

Ticket uses MakePayment.

MakePayment uses Discount.

Associations:

ShowTime associated with Ticket.

Generalization Relationships:

Admin extends AccountInfo.

UserInfo extends AccountInfo.

6. Development Plan and Timeline

6.1 Partitioning of Tasks

Account Management

Payment System/Payment Processing

Ticketing

Movie Management

Security/Queue System

Verification/Inspection

6.2 Estimated Timeline of Tasks

Based on the client budget of 500k and our current team size of 3 people, we estimate a total development time of about 7 months for the project. This timeline includes the build time, the time for verification of the application, and post launch feedback.

Estimated time for each of the above tasks is approximately 1 month for each task with an additional month and a half for quality control and for client feedback.

Below is a high-level overview of the development timeline. For now, this timeline is monthly and can be changed based on team feedback.

Month 1: Initial Planning and Requirements Gathering

Month 2: Dev Team Design Period

Month 3: Development – Front End

Month 4: Development – Back End

Month 5: Testing and QA

Month 6: Bug Fixing and Product Launch

Month 7: Post-Launch and Maintenance

6.3 Team Member Responsibilities

James - Verification/Inspection, Security

Lexa - Author – Account Management, Payment Processing

Eli - Author – Security, Ticketing, Movie Management System