

Online Drive-in Cinema Booking System

Project Report

Zene Ashour, Zouheir El Jamal and Anthony El Khoury

Abstract

This document serves as the final report for the project that will be submitted for the Software Engineering course. The project will contain a website and a database of movies that the drive-in cinema will display along with food options from the food court, and the services provided by the website will allow the access and process of information found in that database.



CONTENTS

1	Introduction	1
2	Background	2
3	Proposal	3
4	Experimental Evaluation	14
5	Conclusion	16
References		16

1 INTRODUCTION

Due to the presence of the COVID-19 pandemic, most of our regular loved activities are suspended. Therefore, a group of university students launched “Drive-in Lebanon” the first drive in cinema in Lebanon where all of its return will be donated to a Non-governmental organization called “NUSANED”. Our project comes in to provide a database and related software applications to handle the services that the customer needs to book movie tickets and have food delivered to their cars.

1.1 Subject

A cinema booking service usually has a database containing details regarding the movies, as well as information about parking spots, show times, food options, reservations, and so on. Customers will be able to find, reserve, and book a movie ticket based on movie titles, show time, and parking spot. There will also be a data mining process which will recommend certain movies to specific users based on their preferred movie genre, show time. Also, a food ordering system will be added where customers can order food that will be delivered to their cars using their parking spot numbers.

1.2 Objective

The aim of the project is to exactly simulate the cinema experience while maintaining the least possible human contact. The Application is designed to be used by clients and vending truck owners. The project will have a database containing details regarding displayed movies, available vending truck options along with their food menus, as well as, personal information of the clients, their cars, reservations and so on. The Web application will be accessible by the Administrators and clients. It will first ask the user to log-in, and according to the type of the account a list of functionalities will become accessible to that particular user. There will be a computerized index that allows clients to find and reserve movie tickets based on their titles, type, or show times. Also, the drive-in cinema website provides several functionalities to its clients. So, the main objectives of the project are:

1. Having a database containing details regarding movie names, Genre, showtimes, as well as information about the client, their cars, reservation and vending trucks available.
2. Allow clients to find and reserve any movie of their choice based on parking spot availability and showtime.
3. Ordering food, beverages and snacks from the food court to their cars
4. Donates extra funds to the NGO “NUSAND” if desired.

1.3 Definitions, acronyms, and abbreviations

1.3.1 Acronyms:

1. UML – Unified Modeling Language
2. HTTP – Hyper-Text Transfer Protocol
3. SQL – Structured Query Language
4. PHP – Hypertext Preprocessor
5. CSS - Cascading Style Sheets

2 BACKGROUND

2.1 Context

The traditional cinema experience is very close to the hearts of many people. But due to COVID-19, just like many other industries the cinema industry took a huge hit, specially that the movie theaters seats are assembled close to each other in closed rooms. Therefore, a Drive-In cinema is the best safe alternative where clients sit in their own cars with minimal to zero interaction with other people.

Our project, the Online Drive-In Cinema Booking System, is another tool that elevates the levels of safety and measurements during this enjoyable cinema experience. The developed product includes a website which provides movie management capabilities to administrators, and user-friendly interface for the clients to search, reserve, and book parking spots online, in an efficient manner.

2.2 Existing Solutions

Regarding existing solutions, there are numerous websites and applications that allow users to search and book movie seats in cinema theaters. However, since the Drive-In Cinema is the first car cinema in Lebanon, we made some changes differing from any typical cinema booking websites:

1. Instead of booking a seat, now the client will be booking a parking spot.
2. Extra information about a car type and model will be required to assure the every car will be able to watch the movie clearly
3. Since the event is working alongside an NGO, a donation option will also be added to the website.

The Drive-In Cinema booking System project aims to asset the Drive-In Cinema in following health rules and regulation while providing an easy, and time efficient platform using user friendly interface and management databases.

3 PROPOSAL

3.1 Overall Description

3.1.1 Overall Architecture

This section gives an overview of the whole system. The system will be explained in its context to show the interaction of the system with other systems.

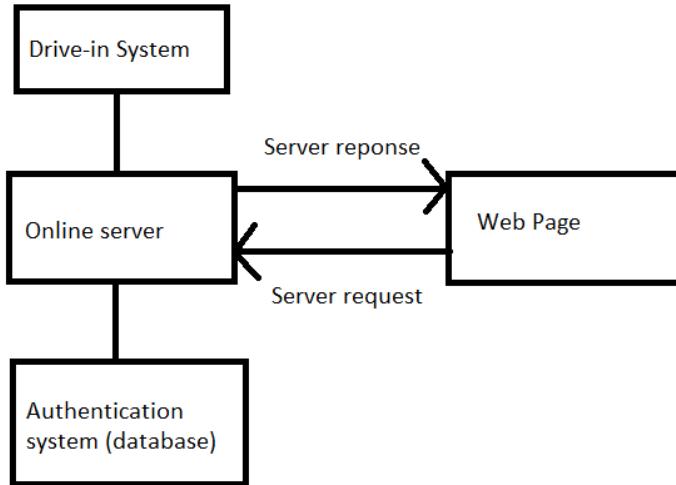


Fig. 1. General Architecture

Since this is a data-centric product, the Online Server needs a database to store data. The website communicates with the database in order to read, modify, and add data. All of the database communication goes over the Internet. The Online server uses the Authentication System to validate user sign-in information, the database to display all movies live, and a number of js scripts to perform certain tasks which will be described in the upcoming sections.

On one hand, the website is specifically designed to be used by movie watchers. It provides a wide majority of vending trucks with all required details, while also displaying all today's movies with its details. It sends server requests to the database, which in return sends more data back to the webpage.

On the other hand, one of its special options which lets the user hover over the spots for the drive-in while displaying the type of car required for each spot. Also, it would not allow the user to select a spot that was already booked for the movie by changing its color and making it unselectable.

3.1.2 User Characteristics

The users of the system are the clients, and the administrators. For administrators, it is recommended that they have high knowledge of the data and performance in order to be able to effectively solve the problems that may occur due to any malfunctioning of the system. However, for the clients, no training or additional knowledge is required. Only, basic knowledge of Internet browsing and computer systems is recommended for clients to order a ticket. With the help of the presence of a user-friendly graphical interface, clients will be able to navigate in ease.

3.1.3 Database

3.1.3.1 Conceptual Data Model:

The conceptual data model (Fig. 1) shows the existence of the following entity types:

1. Client: having ClientID to make it unique. It contains the first and last name of the client, also having his phone number and his address, while also having the email and password which will protect his account.

2. Car: the primary key is the carID, then it contains plateNb which represents the plate number of the car to confirm that its his car with its symbol, while also having the type and model which points to the car model and type so that it has a specific location depending on the car type.

3. Donations: The attribute donationID is the primary key, the clientID, then followed by amount which is the amount donated to the website which will be donated to a charity.

4. Ticket: The attribute ticketNb is the primary key, then followed by price and parkingCoord which represents the price of the ticket and the parking coordination of the car which the client reserved.

5. Movie: The attribute movieID is used as the primary key of Movie, whereas the attribute movie name, movie genre and movie year released represents the description of the movie such as the name, description, languages, its genre(comedy, action, thriller) and its year released. The attribute times represents the hours which the drive-in cinema will be displaying the movie, and the attribute movie showtime represents the days in which this movie will be shown.

6. Food: The attribute receiptNb is the primary key, then there is totalPrice which is the total price of the food ordered followed by the order which represents the full order of the client to be delivered.

7. Vending Truck: The attribute truckID is the primary key, then we have the name of the vending truck since there exists many vending trucks, also containing the menu of the vending truck.

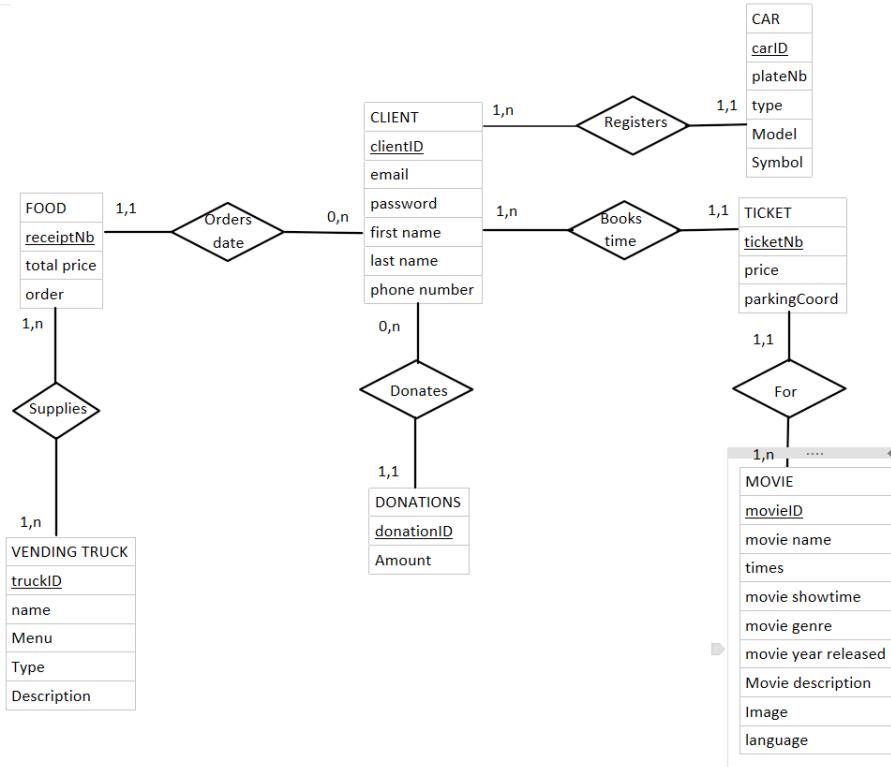


Fig. 2. Conceptual Data Model

3.1.3.2 Logical Data Model:

The logical data model was obtained by simply converting the conceptual data model to a logical data model. One to note is that the client can register multiple cars in case he could not use his main car instead of deleting his main car info and registering a new car, and after the client could choose which car he will be driving to the drive-in cinema.

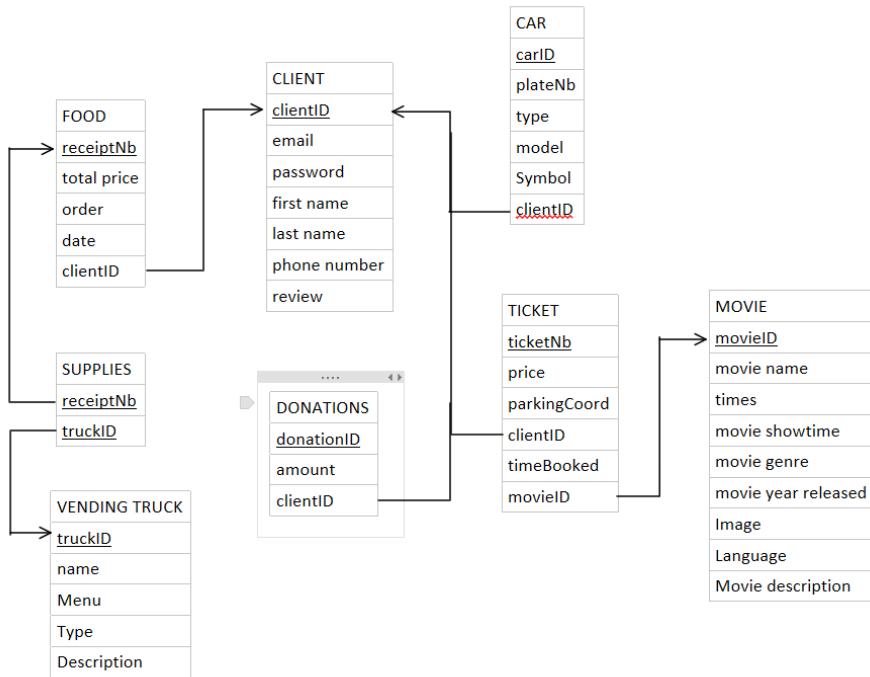


Fig. 3. Logical Data Model

3.2 Requirements Specification

3.2.1 Functional Requirements

3.2.1.1 Client Viewpoint:

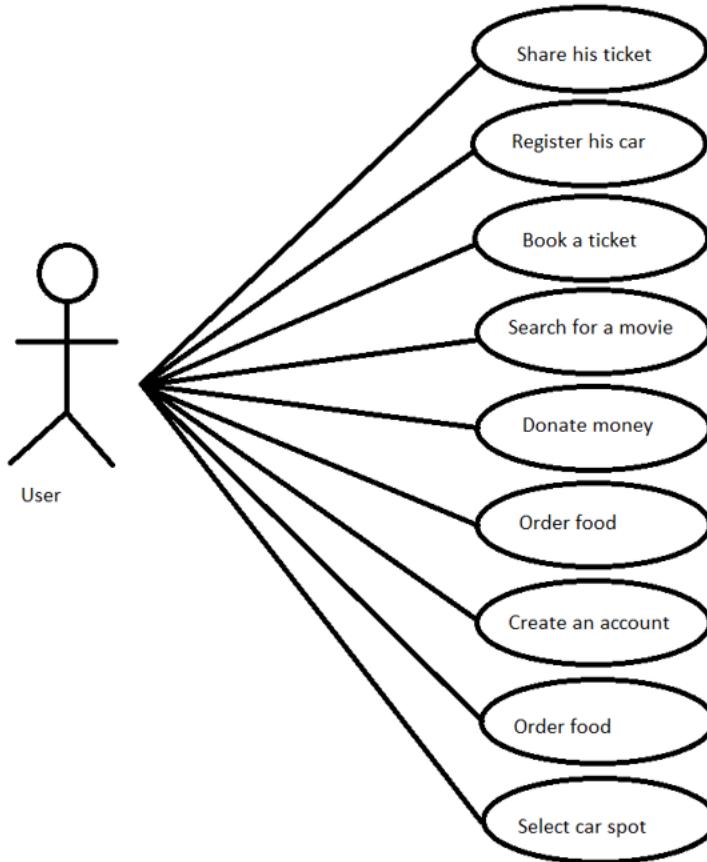


Fig. 4. Drive-in user use case diagram

The clients represent the only category of users. They have all the privileges given in the website. The user has the decision to choose whether to first sign-up, browse the weekly movies that will be displayed, or even check all the available vending trucks with their menu. After signing up, the user is now able to book a ticket for a movie and select the car spot in which he has added his car credentials to recognize his car for the drive-in. Also, the user could donate to an organization or order food from one of the vending trucks after booking for a ticket. These options can be viewed in the drive-in user use case diagram in Fig 4

The functional requirements within the client's viewpoint are:

1. The system shall allow users, who have existing accounts, to log in using their credentials (See table 1).

Table 1

Structured specification of the client functional requirement #1

Purpose	The client logs into the system using an existing account.
User	A client with an existing profile in the database.
Input	Account username and password.
Output	Redirecting to the corresponding page.
Pre-conditions	The account exists in the database / User password matches profile.
Post-Conditions	Movies display page
Basic flow	Webpage looks up account data and returns the matching cookie. Afterwards, the webpage is updated to display the movies
Alternative flows	Error message is produced because of: invalid password, invalid username, or mismatched username and password.

2. In the case of clients who do not have an existing account, the system shall allow them to create one following certain account rules and regulations (See description below).

The rules regarding how new accounts are created are the following:

2.1. Username, password, first name, and last name fields shall not be left empty.

2.2. The provided username must not be a username currently used by another account in the data-base.

2.3. Both the username and the password must contain numbers and letters.

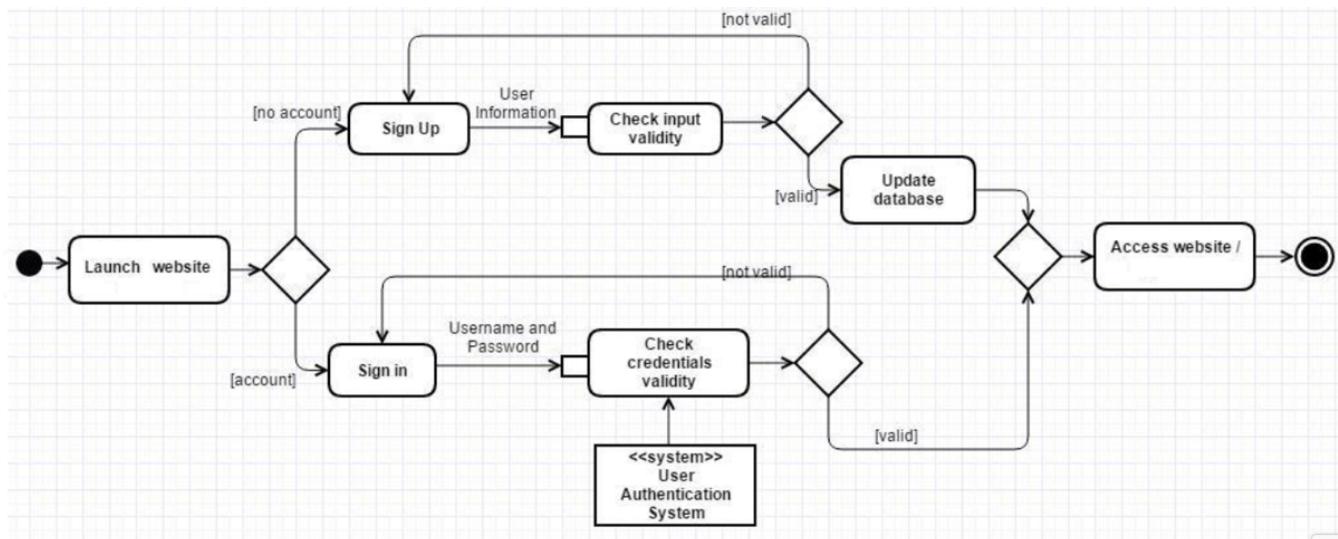


Fig. 5. Activity diagram describing sign-in and sign-up activities

1. The application shall allow users to specify car technicalities.
2. The application shall allow users to search for previously used cars on prior reservations.
3. The application shall allow users to share the reservation w/ a friend.
4. The application shall allow users to save the reservation's invoice.
5. The application shall allow users to export the displayed document view to PDF.
6. The application shall display the movies in a selected manner: Scroll.
7. The application shall display a pop-up window when title is hovered over OR clicked, containing the following elements: Poster, Name, Description, Movie People, Links, and a separate column for reservation.
8. The application shall allow users to change the calendar's date for different movie showings.
9. If the movie has available seats, the system shall place the requesting a new data writing (See Fig. 6).

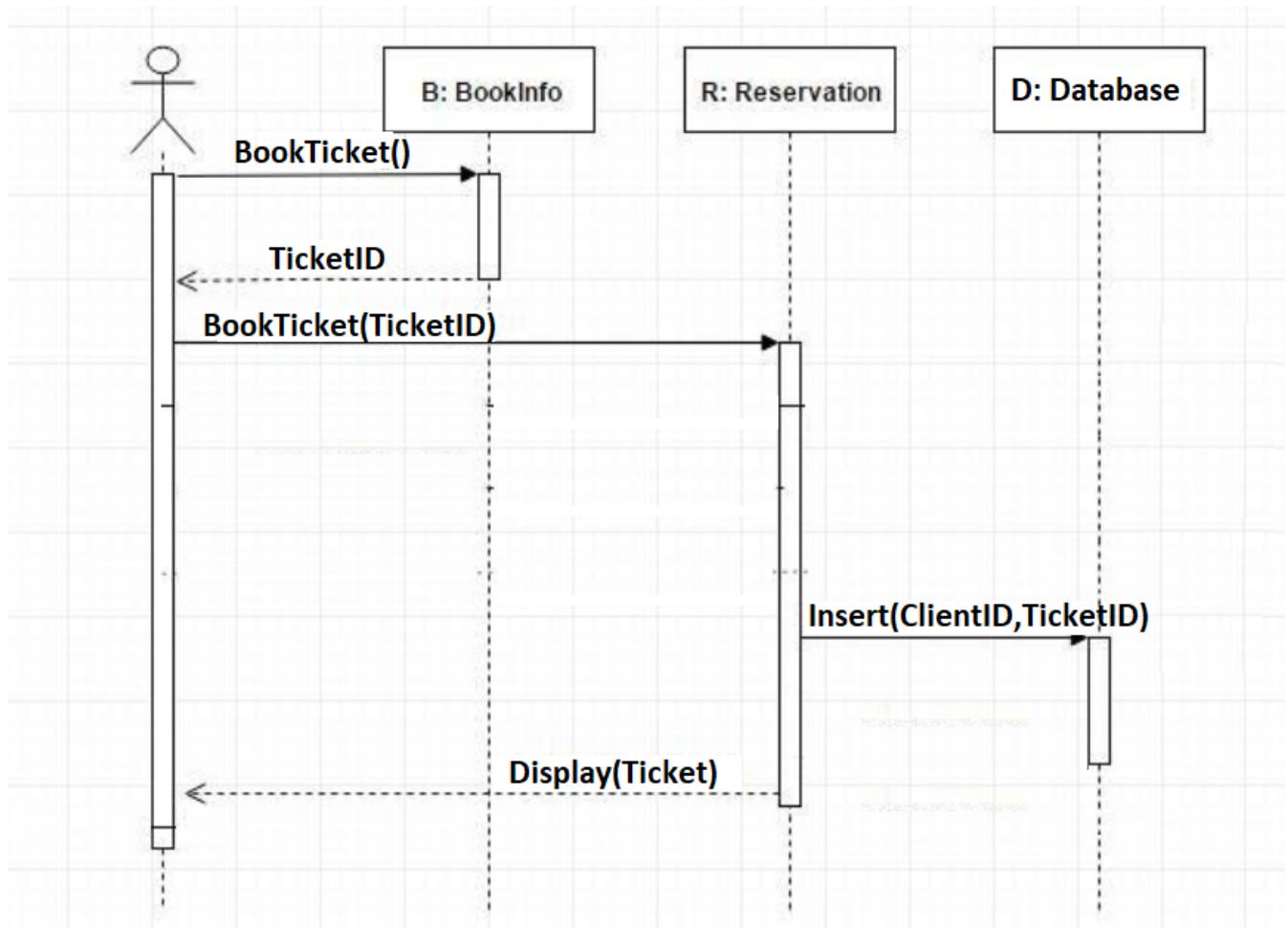


Fig. 6. Sequence diagram describing the ticket reservation

10. The system shall enable the client to donate using his/her credit card. (see table 2)

Table 2

Condition-action rules for client functional requirement #10

Condition	Action
Credit card ID entered incorrectly	ERROR: No such credit card account
Credit card password entered incorrectly	ERROR: Password does not match ID
Credit card balance < donation amount	ERROR: Insufficient balance
(Credit card ID and password match) ^ (balance > price)	Donation is completed

3.2.1.2 Administrator Viewpoint:

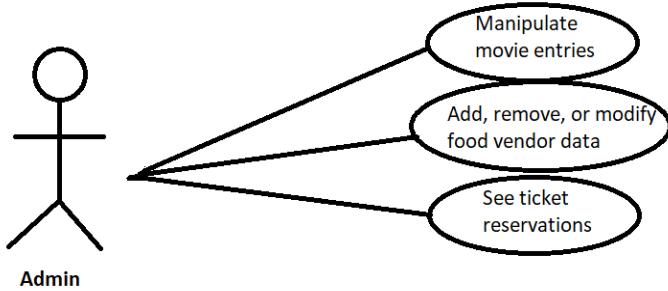


Fig. 7. Administrator use case diagram

The main task of the administrator is general maintenance of the system and the database. However, what the administrator account can perform on the website is adding and deleting food vending truck data,, in addition to modifying the displayed movies on the page.

The functional requirements within the administrator viewpoint are:

1. The system shall enable the administrator to log in with his/her credentials.
2. The system shall allow the administrator to delete, add, or modify food vending truck information.
3. The system shall allow the administrator to know how many tickets were ordered for each movie.
4. The system shall allow the administrator to manipulate any entity from the movie selection found in the database.

3.2.2 Non-functional Requirements

Availability:

The Drive-in Cinema database system shall be available 24 hours a day. In case of a failure or database corruption, the daily backups of the entire system and the database shall be available instantly.

Usability:

Users shall be able to use all the system functions without any training because it is user friendly, similar to commercial applications and online reservation systems.

Maintainability:

The application shall be easily extended. The code should be written in a way that new functions and updates can be easily added afterwards.

Portability:

The website shall be accessible by any web browser of any computer machine (the end-user part shall be fully portable)

Security:

The log-in communication messages shall be encrypted, so others cannot obtain username and password from these messages. Also, clients personal information are confidential and shall not be accessed without consent

Performance:

Any search operation shall take no more than 2-3 seconds. The system shall be able to support at least 100 concurrent users.

3.3 Underlying Concepts

3.3.1 Better user experience

The Drive system uses a recommendation system in order to generate recommendations at different levels. To be able to generate them it is first necessary to adopt an optimal way of storing the user's car credentials that will facilitate future computations on them. Moreover, this information should not be at the level of one feature, but rather a combination of the different features that describe a movie ticketing.

3.3.1.1 Car Type Specification:

The car type specification is an option added in the entity car which differentiate a user's sedan car from another user's truck, since each will be having a special place in the booking GUI to enhance the view of the screen for all users while distributing their spot in an equally manner

3.4 Building Blocks

3.4.1 Car spot booking GUI

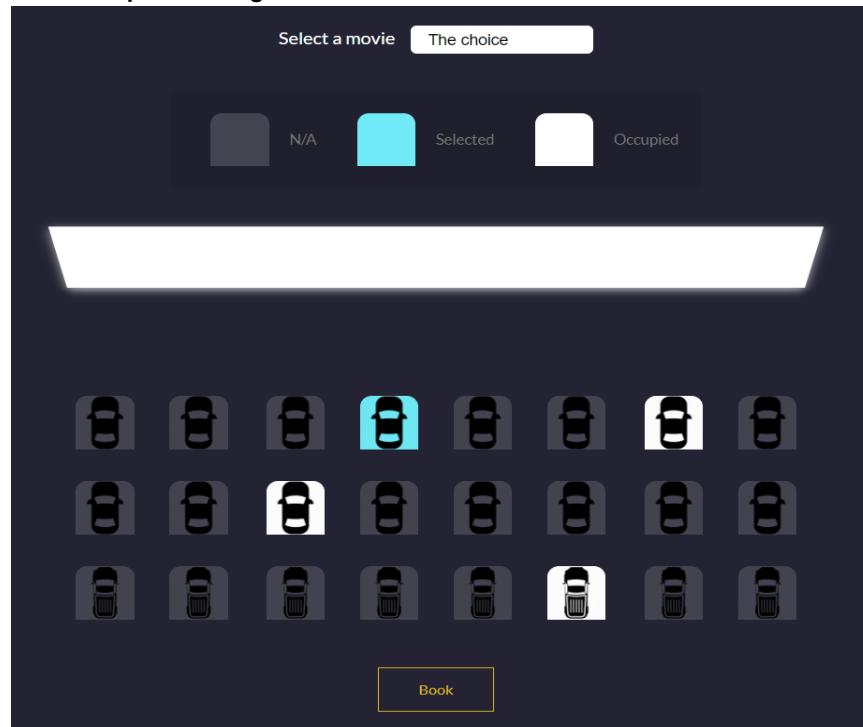


Fig. 8 Car spot booking GUI

The car spot booking GUI is one of the main enhancements for a better user experience since the client could see how the car will be aligned the day of the movie, while displaying the available and reserved seats. Also, depending on what type of car the user has, he could choose a spot which is either a sedan car or a truck. At the top of the page displays a set of option that the user can choose which movie he wants to see, resulting in different spot occupations

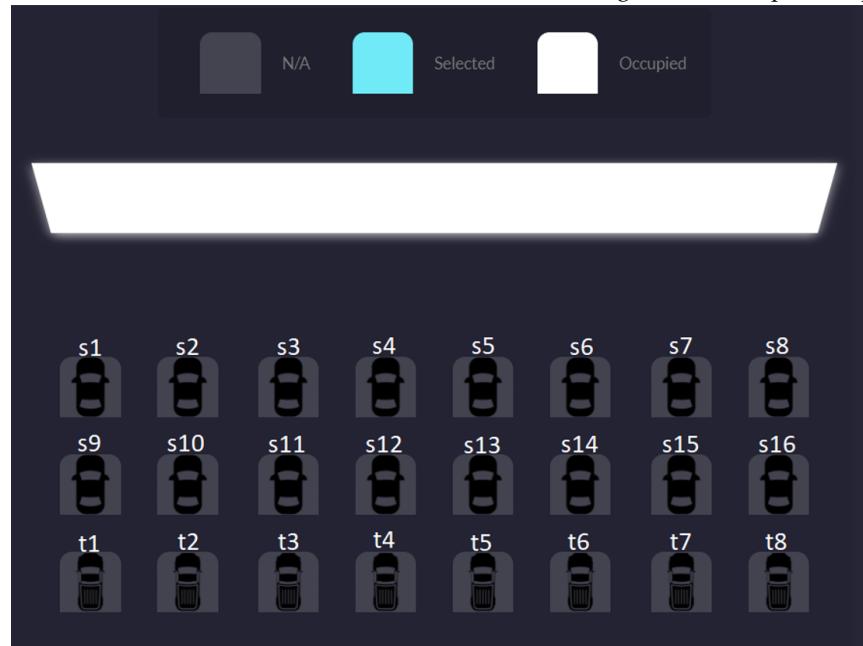


Fig. 9 Car spot coordinates

3.4.2 Ticket sharing

In order to increase sharing on social media, the user has the ability to share his ticket with a friend which will be in form of a PDF that could be downloaded or even printed to be used on the day of the movie

3.5 Implementation

3.5.1 User Interfaces

3.5.1.1 Website:

The website provides a very intuitive and simple interface to Home, Reservation, Foodcourt and the Donation page.

The main info is displayed at first, where then he will need to sign-up to book a ticket or order food After successful logon, the website user is redirected to a page that contains the list of movies that he can book a ticket and register his car.



Fig. 12. Graphical User Interface of the website.

The website starts with the home page where the user signs-up by entering his credentials and his car credentials for it to be registered in his account, then switches to the movies page in which he will booking a movie while selecting the car spot for the movie. In addition, a drive-in cinema booking system was made which will ease the user with selecting the optimal spot.

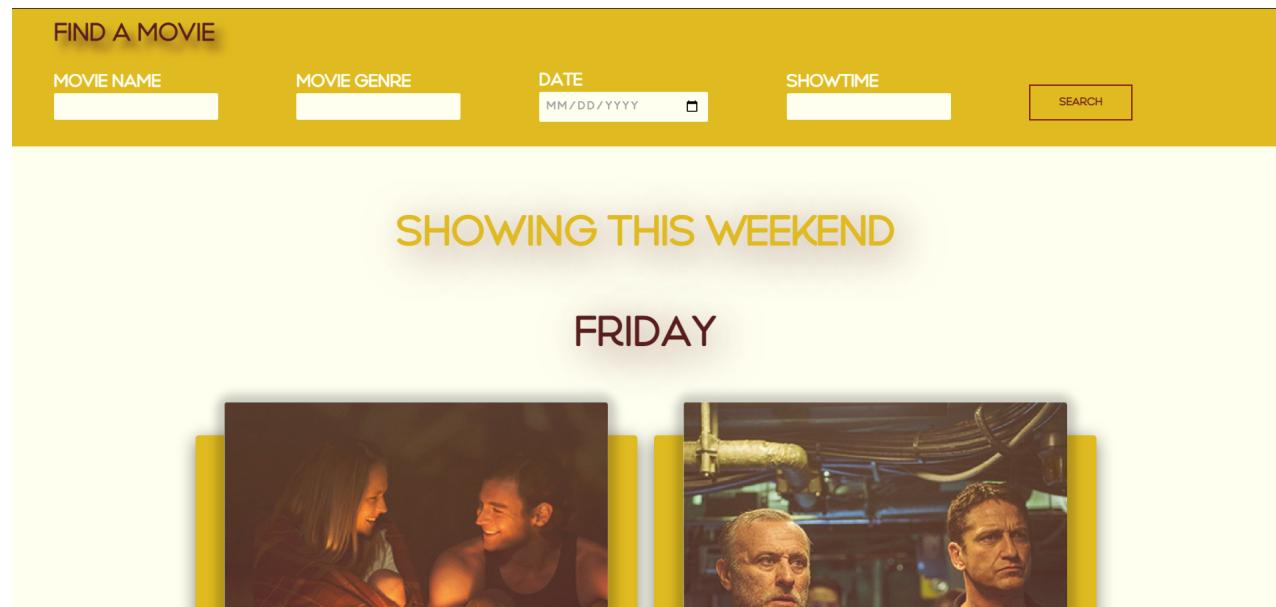


Fig. 13. Graphical User Interface of the movies

In addition, after booking for a ticket, the user can now order food from any vending trucks which will be directed to his car when he has filled the order, his name, the vending truck name and his parkingSpot. Hence, the user should have filled a matching parkingSpot with his name which will be checked.



Fig. 14. Graphical User Interface of the food vending trucks

Also when booking for a ticket, the user will be directed to a page in which he can select the preferred parking spot that suits also his type of car, which will be important since all trucks should be placed in the back while sedans are in the front to ease the user experience and give a better view of the movie without being annoyed by other people.

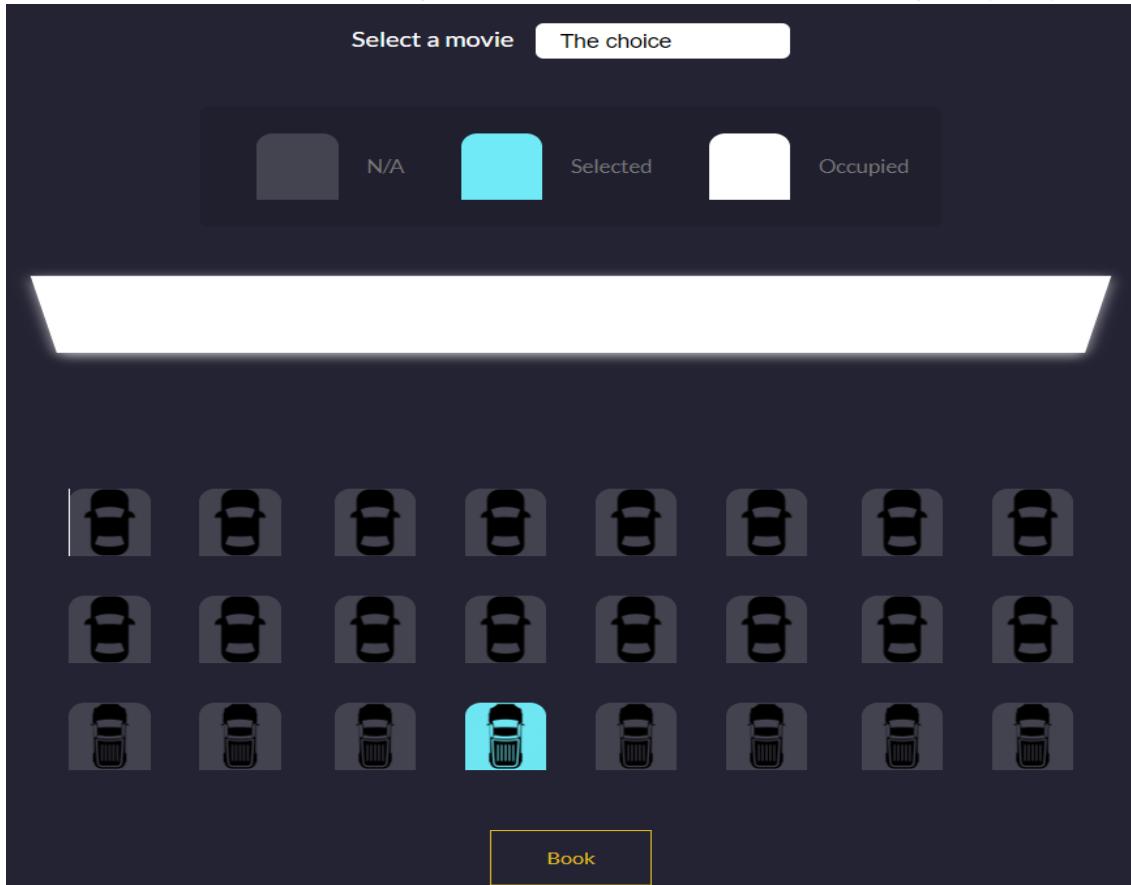


Fig. 15. Graphical User Interface of the parking spot booking

3.5.2 Hardware Interfaces

3.5.2.1 Server side:

The web application is hosted on a web server which will be listening on the Server at localhost Port 80.

3.5.2.2 Client side:

The website can be accessed through a client machine such as a personal computer, smartphone, or any other device that has a web browser.

3.5.3 Software Interfaces

3.5.3.1. Server Side:

An Apache web server accepts and processes all requests and database queries from the website. The database is hosted centrally using MYSQL.

3.5.3.2 Client Side:

Website: The website was developed using HTML, CSS, JavaScript and PHP. The website works on any web browser that supports HTML 5. It connects to the database by sending MySQL request queries through PHP functions.

4 EXPERIMENTAL EVALUATION

4.1 Test Cases

In order to test the APIs of our software, multiple test cases were developed and then tested using all kinds of inputs, starting from normal cases, to the worst cases. We developed test cases to cover all aspects of the software, some of which are displayed below:

Table 5
Test case #1: Booking a movie

Input parameters: movie name

Test	Expected Output
Invalid movie	ERROR: No such movie found
No seats available for the movie	No available seats for the selected movie
Booking a movie that has available seats	Success: Request Granted

Table 6
Test case #2: Ordering food

Input parameters: clientID, ParkingSpot

Test	Expected Output
Invalid Truck name	ERROR: No such vending truck found
Invalid parkingSpot for clientID	ERROR: No such parking spot found for user
Valid truck name and parking spot that matches clientID	Success : Food is ordered

Table 7
Test case #3: Signing in

Input parameters: username, password	
Test	Expected Output
Invalid username	ERROR: invalid username
Wrong password	ERROR: incorrect password
Valid username with a matching password	Success: Signed in

Table 8
Test case #4: Registering a user

Input parameters: username, password, firstName, lastName, email.	
Test	Expected Output
Inserting a username that is already in use	ERROR: Username is already in use
Username that starts with a number	ERROR: Username cannot start with a number
Password length < 3 or > 15	ERROR: password too short
Inserting an email that does not have the form “email@host.com”	ERROR: invalid email format
All parameters provided correctly with a non-existing username	Success: account created

5 CONCLUSION

Throughout the report we have introduced to you our project, Drive-in Cinema system, that eradicates the need of booking a ticket for a specific movie, and offers an easy-to-use digital environment that provides the option to order food delivered to his car. The elements and building blocks described earlier were used thoroughly in order to get an optimal solution for an easy user experience, and moreover introducing an easy access to movies and vending trucks seems to be the emerging trend.

Developing the website was quite a challenging feat to perform. The challenges we faced helped us gain great experience in terms of not only technical skills, but also teamwork skills.

As a future improvement to our project, we suggest making a mobile application which will make the drive-in cinema a multi-platform system, that can run not only on Android-based phones, but also on phones that use iOS and Windows as their operating systems. Also, the recommendation system can be improved to include friends that have watched the movie and what food is mostly ordered which will give the user more experience regarding the vending trucks and movies.

REFERENCES

- [1] W3schools. (2021). W3schools. <https://www.w3schools.com/>.
- [2] Ian Somerville, Software Engineering, 9th Edition, Pearson, 2011.
- [3] Davis M A, "Just Enough Requirements Management: Where Software Development Meets Marketing", New York, Dorset House Publishing, 2005.