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Abstract

A software solution for movie theaters is developed to streamline operations, improve the experience of the user and the customers, and help in the process of making business decisions. The software incorporates logic that enables the creation of schedules, showing the resources available in each theater room and the times they are set to be occupied. The software helps operations by performing sales quickly. It also includes features for user management with role-based access control and theater configuration including room settings. The system keeps track of each ticket sold and prevents double booking of the same seat for the same show. The system also ensures the data integrity is preserved and tracks changes.

Introduction

Movies are a form of entertainment that has existed for many years. People gather at movie theaters to watch them either alone or with friends or family. Many different movies of different genres are available at any time. The demand for each film changes constantly, and the movies that sell more tickets one week might not do so the next. Different factors can be chosen to match the preferences of the public [1][2]. Scheduling correctly is important for ticket sales and mistakes cost a lot. It is possible the time and space reserved for a film could be used better.

Background

A system that performs sales and allows the configuration of the rooms and shows in the theaters was developed. It supports business processes and decisions and making operations more efficient by considering important factors like the user experience, the business value, and the data integrity and security [3][4]. If the program looks useful and looks easy to use, people are more likely to use it. Research on user experience has found things affect what a user thinks of an application [5]. The terms and qualities identified vary. To provide a good experience, the software must be: Easy to learn and understand, Consistent, Visually Attractive, Satisfying. The business value can be an improvement in operations by being flexible, efficient, effective, and reliable [6][7]. Missing one of these qualities can result in having to do manual operations. Data integrity and security is about making sure the information in the database is valid, complete, has not been altered, and has not been accessed or entered by people that should not see it. Additionally, scheduling involves many variables, and a bad schedule can cause extended periods of time with no shows in a room or occupying a room for a show that sells far less than what it costs to run the theater.

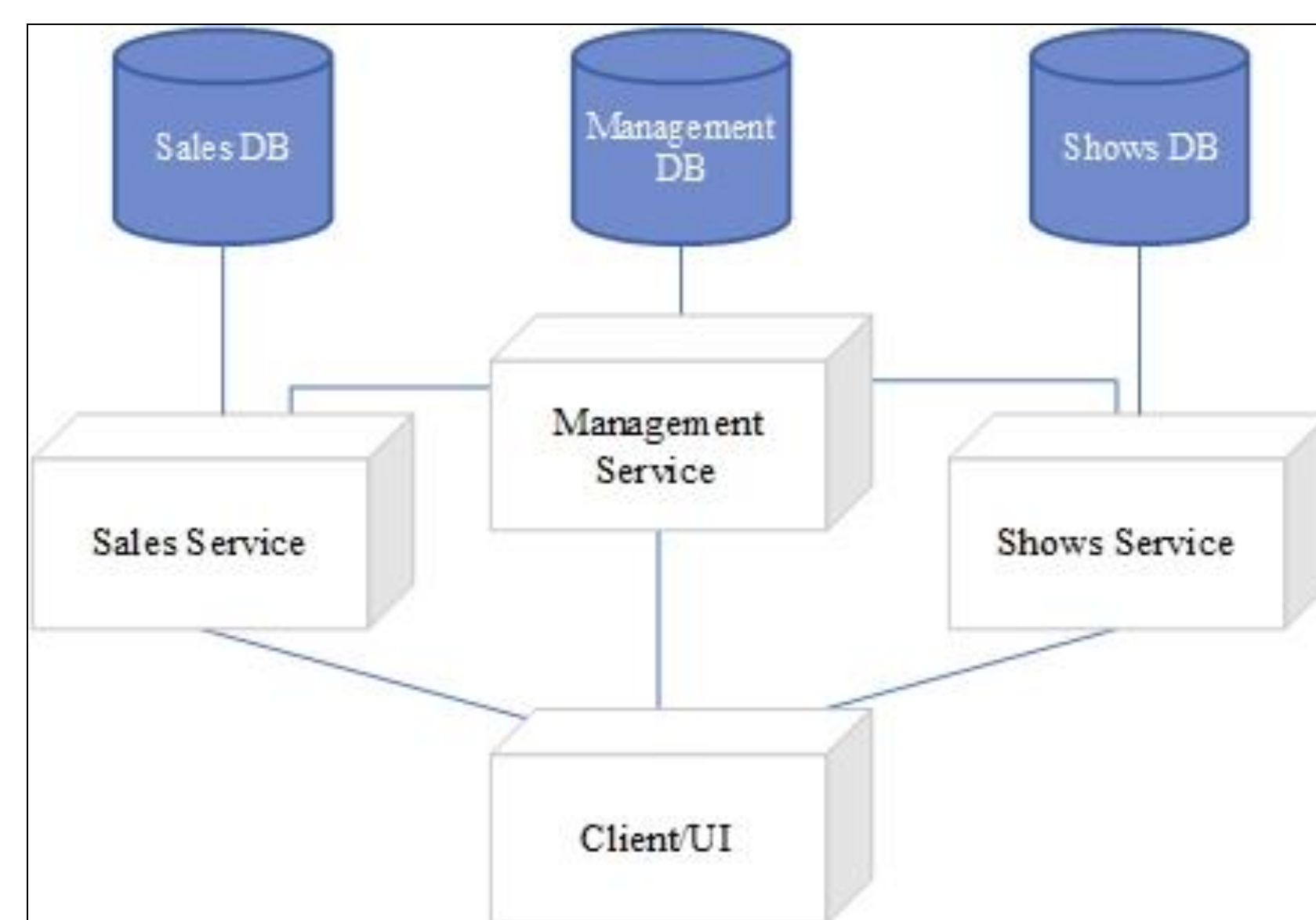
Problem

A movie theater is a business, it needs to be profitable. The software must support operations effectively and efficiently, so it must handle the sale process for tickets for shows and stores information on those sales. It also needs to assist in schedule creation. Some films may have similar demands, but different costs. It is possible the time and space reserved for a film could be used better.

Methodology

DESIGN

1. Databases - 3 SQL databases. They have master tables and transactional tables. System-versioning is enabled for all the transactional tables and use soft deletion to keep changes information.
2. Services - 3 REST microservices. The service receives HTTP requests through the API controller endpoints, performs an authentication check, and then call the service logic to perform the operation. The service calls the database, and any data returned is converted to a DTO. The Service responses are wrapped and then serialized in a JSON format.
3. Client - Runs on the computer. The UI has lists, input form, and detail windows. The user interacts with those to give the application commands. These commands call the business logic and run applicable validations. If logic requires reading or persisting data, it calls the HTTP Clients to consume the services.
4. Visual - Needs to be easy understand and visually consistent. Views of collections like theaters and movies are presented as tables, are shown in the main window and are accessed from the navigation bar. To add or change an entry, a window is provided with the input fields. Data that references other data, like the movie of a show, uses dropdowns to limit the input to valid values. A read-only window is used for viewing. Sometimes, icons are used instead of text because they are more compact and can communicate meaning and capture user attention better.



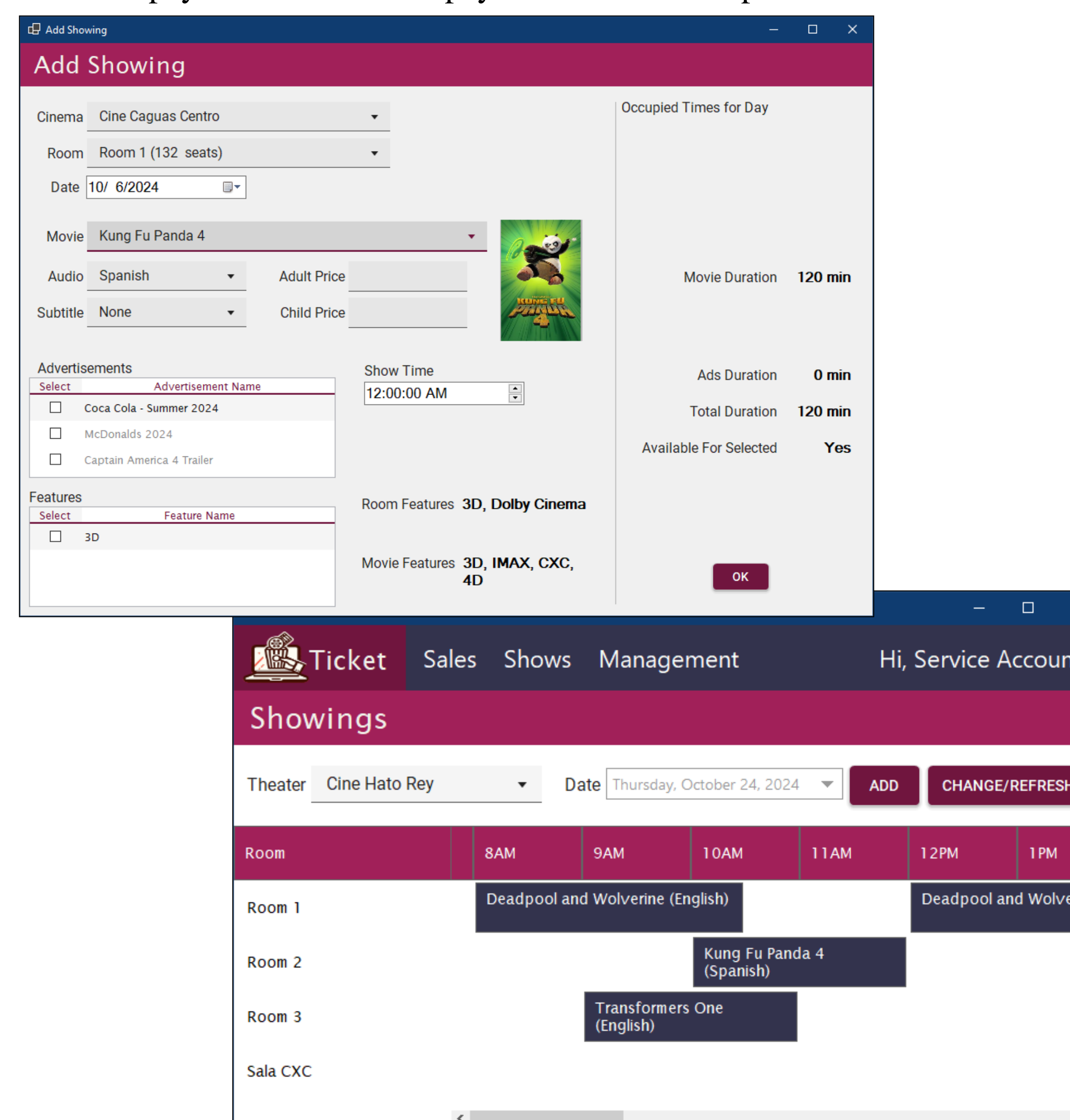
DEVELOPMENT

1. Databases - Created of a database server and a database per domain. Then developed and ran scripts that create Tables and Constraints, create service credentials with minimum needed permissions, and insert Master Data.
2. Services - Created a solution repository per domain and added the projects that compose it. Configured the database and integrated Entity Framework. The database context, added entity classes and data repositories. Then, implemented the helper classes for frequent operations, the business logic, the controllers, and the DTOs. The calls from the business logic to the repositories and conversions between DTOs and entities are added.
3. Client - The following steps are used to create the client. A solution repository is created and the projects that compose it are added. In those projects, the service connections are configured and the http clients with their DTOs are implemented. The helper classes for frequent operations are implemented. The graphical user interface layouts for the main window, lists, views, and form inputs are created and their corresponding events, controllers and model classes are implemented. Validations, calls to the http clients and conversions between DTOs and model classes are added in the controller classes.

Results and Discussion

A system that performs sales and allows the configuration of the rooms and shows in the theaters was developed. It's composed of 8 modules to support the operations of a movie theater, from scheduling to ticket sale. It was designed to be efficient and user friendly. Navigation is done with the navigation bar.

1. User Management - Management of access to the system through user identities. Entries are presented on a table. Users can filter entries and perform add, view, edit, delete, and view history actions. Add and edit are performed in a window form.
2. Role Management - Simplifies the management of access to functions with role-based access control. Entries are presented on a table. Users can filter entries and perform add, view, edit, delete, and view history actions. Add and edit are performed in a window form.
3. Theater Management - Registry of theaters. Entries are presented on a table. Users can filter entries and perform add, view, edit, delete, and view history actions. Add and edit are performed in a window form.
4. Room Management - Registry of rooms, their configuration, and their features. Entries are presented on a table. Users can filter entries and perform add, view, edit, delete, and view history actions. Add and edit are performed in a window form.
5. Movies - Registry of movies. Entries are presented on a table. Users can filter entries and perform add, view, edit, delete, and view history actions. Add and edit are performed in a window form.
6. Advertisements - Registry of advertisements. Entries are presented on a table. Users can filter entries and perform add, view, edit, delete, and view history actions. Add and edit are performed in a window form.
7. Shows - For scheduling the offerings of the theater. Basic show information is presented on a timeline limited to a single day and theater, determined by the input controls above the it. The add and edit functions allow the user to schedule shows and making changes causes dependent information like availability and duration to be recalculated.
8. Sales - Displays the show offerings and allow ticket purchase and cancellation. The shows are grouped by movie and language, limited to future shows for the day and theater selected. Users interact with the listed entries to buy tickets. The purchase window will ask the number of tickets and seats preferred, and sold seats are grayed out. Then ask for a payment method and payment amount and prints the tickets.



Conclusions

This poster presented the design and development of a software solution for movie theaters. It focused on the challenges faced daily on the operations of a movie theater, and the financial risks associated with it. It identified the factors that make users want to use an application and that make it have value for a business. These factors served as a basis for designing an application that can help overcome those challenges. The application helps increase efficiency and effectiveness of operations by helping optimize the use of rooms by showing the existing schedule in a timeline and assist room selection by listing their features on the show scheduling window. This helps improve revenue by enabling show diversity and better use of the facilities. The application is also user-friendly. Users can use the program with ease and navigate through the different functionalities quickly. Mistakes and difficulties in any aspect of the operation can cost a lot to the movie theater. It can be a lack of show diversity, slow service, inconvenient showing times, etc. A happy customer will return, but a dissatisfied customer will not visit again.

Future Work

The system can perform all the basic operations of a movie theater. The data generated can be for:

- Sales reports and dashboard that organize the data available and present it in a way that can be understood. This information has greater business values in industries with high costs, like theaters, to ensure enough profits[8].
- An intelligent schedule assistant. Better schedules result in fewer empty seats and more revenue[9]. When planning for the day, the feature can recommend possible configurations based on specified criteria for each show. The operational data used for the assistant can also be combined with historical public data sets.

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