Case Study 2: Sound & Stage Entertainment

Sound & Stage Entertainment was founded in 1995. It started as an event management company but later acquired land and developed 15 world class movie theaters across the United States. Each of these theaters is a multiplex that shows two to four movies at a time. The company generates considerable revenue from these theaters.

The Current System

Sound & Stage Entertainment manages 15 movie theaters. Each theater has a booking counter where people can buy tickets for the current and upcoming shows. In addition, people can enquire about seat availability for a particular show over the phone.

In the last board meeting, the CEO of Sound & Stage Entertainment, Roger Hanks, pointed out the following problems in the existing system:

- People need to stand in long queues to buy their tickets.
- People need to visit the theater to book tickets for upcoming shows.
- Advance ticket booking is permitted only during the theater's working hours.
- People find phone lines busy most of the times whenever they want to enquire about seat availability for a particular show. As a result, they have to visit the theater personally to check the seat availability for a particular show.
- People need to visit the theater or read the newspapers to know about the new releases.

Roger Hanks has observed that the number of people visiting the theaters has rapidly increased. The theaters have a good seating capacity, and the shows are running house full. At the same time, many people are not able to get tickets for the current shows after spending a lot of time in the queue.

The Envisioned System

Sound & Stage Entertainment wants to set up and use an automated system to facilitate across the counter and online booking. The online option will enable users to book their tickets in advance, select preferred seats, and place an order for snacks.

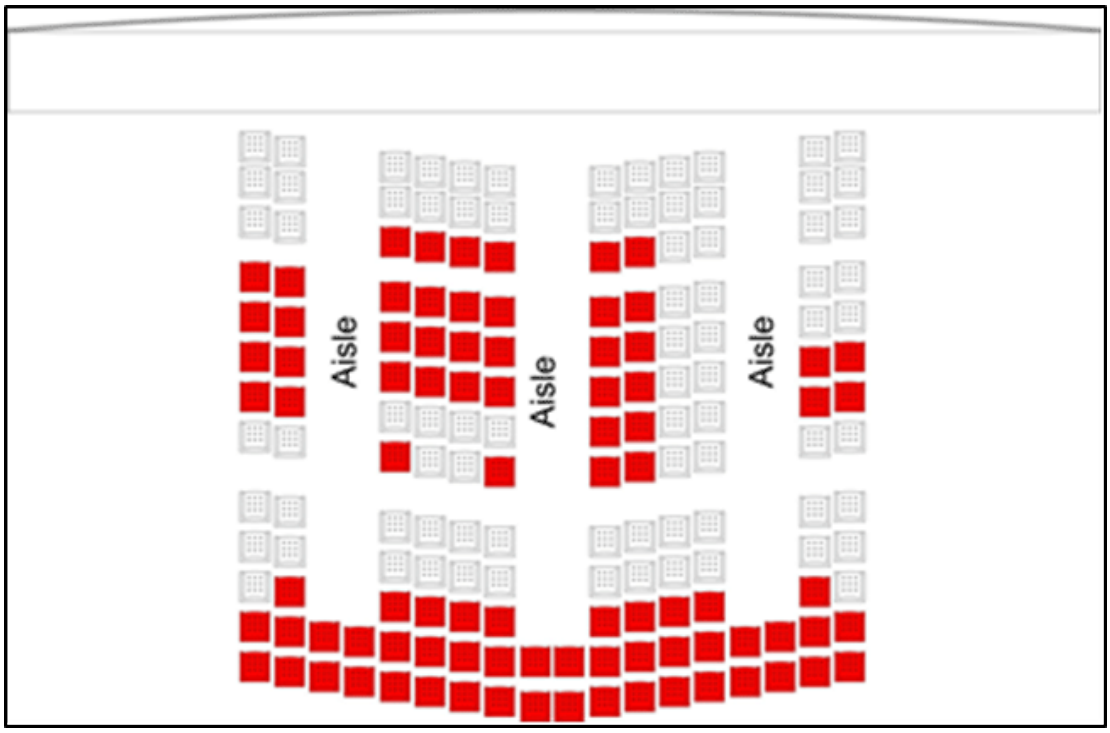
Each theater consists of four halls. Sound & Stage Entertainment wants to use the new system for all its 60 halls. In addition, the new system should be scalable.

In an attempt to unify all its systems, the company proposes to create and use the following components:

- An Internet-enabled application will be created.
- A central repository that will store all information.
- An online website that can provide real-time information about the availability of seats and enable users to book movie tickets. This website will connect to the central repository to fetch and store all data. Users who book tickets online will be assigned a unique code. They need to provide this unique code at the theater in order to collect the tickets. This online system should provide a real-time view of the availability and status of tickets.
- A real-time Web-based interface that can be used for making bookings at the ticket counters. This Web interface will connect to the central repository to fetch and store data. This ticketing system should be able to generate tickets at a considerable rate to cope up with the heavy footfall at the theaters.

The central repository will contain all master data, including the data captured during the ticket booking procedure. It should be able to generate seating plans dynamically for each hall. The technical team needs to consider the following facts:

- Each theater consists of four halls.
- Each hall has a different seating plan, which needs to be digitally stored in the repository such that:
  - Each seat can be uniquely identified.
  - The complete seating plan can be displayed to assist online users as well as point-of-sales (POS) officers to pick and choose seats during a ticket sale.
  - Booking a seat should mark it as reserved, and it cannot be booked again unless the ticket is cancelled. Seats marked as red in the seating arrangement figure are deemed as booked.
  - The seats that have not been booked are shown in the grey color. The seats that fall at invalid locations (such as the aisles, or halls with curved seating arrangements) cannot be booked. The following figure shows a sample of the seating arrangement.



The Seating Arrangement Sample

- Each hall has multiple shows in a day, specified by a show start time and a show end time.
- There should be a list of snacks in the repository such that users and POS officers can select items when booking a ticket.

The ticketing counter application will be a Web-based interface to be used at the ticket counters at the 15 theaters. This system will be used only by POS officers. It will have the following features:

- The system will be Internet enabled and will run as a website.
- The POS officers will be able to see the status of each seat for a show and then book or cancel tickets.
- All POS officers will be given a username and a password.
- The POS officers should be able to print a ticket by entering the unique code provided by the customers who have booked tickets online.
- The POS officers will be given the option to log on, log off, and change their password.

Similar to the ticketing counter application, the online ticket purchase system will be connected to the central repository. The online system will have the following features:

- Users will be able to select their movie, preferred seats, and the show timing.
- Users will be provided with a seating plan for the theater they've chosen along with a suggested seating pattern based on the availability of seats.
- Users will be able to select an available seat by clicking the seat shown in the map.
- Users will be able to select snacks and specify the quantity.
- After selecting the seats and snacks, users will proceed to the checkout section to pay the total amount by using a credit card.
- After the payment transaction is complete, users will be provided with a unique code that they need to specify for collecting the tickets at the theater.

System Architecture

The system follows a three-tier approach along with the MVC - 1 design pattern.

The new system will be designed by using the three-tier architecture, which consists of the following tiers:

- **Presentation tier**: This layer consists of Web pages. The pages can be used to accept data and display the final results to the users. In addition, these pages can be used to view data such as statement and account summary.
- **Business logic layer tier**: This layer contains the code required to manage the data.
- **Data tier**: This layer consists of the SQL Server 2005 database used to store the relevant data.

The following pages are quintessential in the system:

- Log on Page
- Administration Pages
- Operational Pages

Log on Page

login

- **Description**: Allows users to log on to the system. This page is used only by the ticketing counter (POS) officers.
- **Information Available/Required**

- **Username**: Logon name of the user.
- **Password**: Password for the user.

- **Functions Available**
  - **Logon**: Fires the Logon routine with the username and password, assigns the required rights, and updates the relevant session variables.
  - **Exit**: Closes the Web page.

Administration Pages

sites

- **Description**: Displays a list of sites in the system. Each site has multiple theaters in it.
- **Information Available/Required**
  - **Site Code**: A unique code for each site.
  - **Site Location**: Geographical location of the site.
- **Functions Available**
  - **List All**: Lists all sites.
  - **Add a Theatre**: Allows addition of a site.
  - **Delete a Site**: Deletes a site.
  - **Edit Site Details**: Edits a site.

movietheaters

- **Description**: Displays the list of movie theaters in the system and allows addition/updation/deletion of movie theaters. Only the administrator will be able to update the details of the movie theater.
- **Information Available/Required**
  - **Hall Code**: A unique code for a movie hall.
  - **Hall Plan**: The plan layout of the hall.
  - **Site**: The site to which this theater belongs.
- **Functions Available**
  - **List All**: Lists all movie theaters.
  - **Add a Theatre**: Allows addition of a theater.
  - **Delete a Theatre**: Deletes a theater from the system.

- **Edit Theater Details**: Edits a theater.

plan_layout

- **Description**: Allows creation/updation/deletion of the movie theater plans. Each plan is made up of rows and columns. The final image on the screen is rendered as an m x n matrix where m is the number of rows and n is the number of columns. Administrators can design the plan by marking seats as valid/invalid. All valid seats can be booked whereas; invalid seats are not rendered on the screen.
- **Information Available/Required**
  - **Plan Code**: A unique code for the plan.
  - **Design Matrix**: The design matrix is an m x n matrix that shows the seats in the plan. Administrators can design the plan by marking seats as valid/invalid. All valid seats can be booked whereas invalid seats are not rendered on the screen. Administrator will be able to flag a seat valid/invalid by clicking/checking on them.
- **Functions Available**
  - **List All**: Lists all plans.
  - **Add a Plan**: Allows addition of a new plan. The system takes as input the number of rows and columns in the layout plan and generates a matrix.
  - **Delete a Layout Plan**: Deletes a layout plan.
  - **Edit Layout Plan**: Edits a layout plan.

seats_mapping

- **Description**: Allows linking seats to a particular movie theater. After a plan layout is applied to a theater, the physical seats should be mapped to a unique code for every seat. This unique code will be used by the POS officers while booking the ticket.
- **Information Available/Required**
  - **Plan**: The plan for which the seat mapping is defined.
  - **Movie Theater**: The movie theater for which this mapping is applicable.
  - **Mapping Matrix**: The mapping matrix shows a matrix that can be used to assign the mapping between the unique code of the seat and the physical name of the seat in the theater.

- **Functions Available**
    - **Show Seat Mapping by Theater**: Shows the seat map after selecting a theater name from a drop-down list.
    - **Create Seat Mapping**: Generates a mapping for a plan.
    - **Delete Seat Mapping**: Deletes all seat mappings for a plan code.
    - **Edit a Seat Mapping**: Edits an existing seat mapping.

movies

- **Description**: Allows creation/updation/deletion of movies in the system.
- **Information Available/Required**
    - **Movie Name**: Name of the movie.
    - **Movie Intro**: An introduction of the movie.
    - **Genre**: Genre of the movie.
    - **Cast Of Characters**: Cast of the movie.
- **Functions Available**
    - **List All Playing Movies**: Lists all movies that are playing.
    - **Add New Movie**: Adds a new movie to the system.
    - **Delete a Movie**: Deletes a movie from the system.
    - **Edit a Movie**: Edits details of a movie in the system.

shows

- **Description**: Allows creating multiple shows for a movie.
- **Information Available/Required**
    - **Movie Name**: Name of the movie.
    - **Show Start Timings**: The start time of the movie.
    - **Show End Time**: The end time of the movie.
    - **Movie Hall**: The hall in which the movie will be screened.
    - **Price**: The price of the ticket for the particular show.
- **Functions Available**
    - **List all Shows by Movie**: Lists all the shows by movie name.
    - **Add a New Show**: Adds a new show.
    - **Delete a Show**: Deletes a show for a movie.
    - **Edit Show**: Edits details of the show.

snack

- **Description**: Maintains a master list of the snacks according to a theater.
- **Information Available/Required**
  - **Snack Name**: Name of the snack.
  - **Price**: Price of the snack.
- **Functions Available**
  - **List All Snacks**: Lists all snacks in the system.
  - **Add a New Snack**: Adds a new snack to the system.
  - **Delete a Snack**: Deletes the details of a snack from the system.
  - **Edit a Snack**: Edits details for a snack in the system.

Operational Pages

onlineticket

- **Description**: Allows online booking a ticket for a movie show.
- **Information Available/Required**
  - **Movie Name**: The name of the movie for which the ticket is to be booked. This is selected from a drop-down list.
  - **Location**: The location of the theater where the user wants to watch the movie.
  - **Show Timings**: The timing of the show for which the ticket is desired.
  - **Price of the Ticket**: The total amount payable.
  - **Snack List**: A list of snacks that the user can select from. The price of a snack will be automatically added to the total amount.
  - **Layout Plan**: Shows the plan of the theater and from which the user can select the required seats by clicking on them.
- **Functions Available**
  - **Hold Seat**: Reserves a seat when the user clicks on any seat. The seat is tentatively marked as booked. However, a seat held for more than five minutes will be reset.
  - **Buy Tickets**: Generates a collection code after the payment is realized. The collection code is given to the user and the payment is processed at the payment gateway.

- **Refresh Availability Status**: Refreshes the page and allows the user to see the availability of seats.

pos

- **Description**: This page is used to create the Web interface to be used at a ticketing counter. The POS Officer can select the movie, the show time, and the location. A matrix showing each seat as a hyperlink is displayed.

  Clicking on the hyperlink will allow the POS officer to book the ticket. Additionally, there are messages displaying the total availability status.
- **Information Available/Required**
  - **Movie Name**: The name of the movie for which the ticket is to be booked. This is selected from a drop-down list.
  - **Show Timings**: The timing of the show for which the ticket is required.
  - **Price of the Ticket**: The total amount payable.
  - **Snack List**: A list of snacks that the user can select from. Price is automatically added to the total amount.
  - **Layout Plan**: This plan shows the plan of the theater and the user can select the required seats by clicking on them.
- **Functions Available**
  - **Print Ticket by Code**: Allows the system to print a ticket with the collection code.
  - **Generate Ticket**: Generates the ticket based on the options specified by a user. A ticket code is generated and printed on the ticket.
  - **Refresh Availability Status**: Refreshes the page and allows the user to see the availability of seats.
  - **Cancel Ticket**: Cancels the ticket by using the ticket code.

checkout

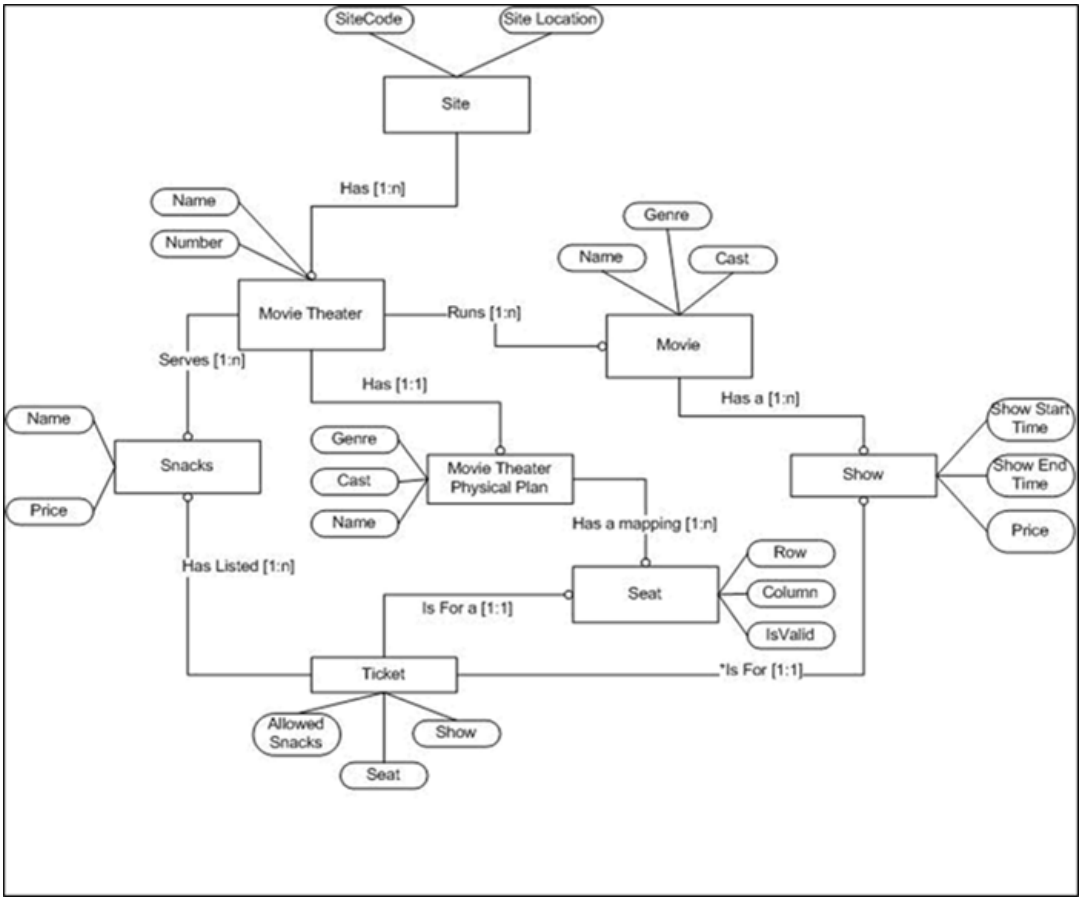
- **Description**: Handles activities related to bill payment and payment gateway.

logs

- **Description**: Displays a log of all the activities in the system within a specified time frame. Will be used by administrators only.
- **Information Available/Required**

- A grid consisting of the following columns:
  - - Timestamp of an activity
  - - Activity description
  - - User who has carried out the activity

The following figure shows the ER diagram for the Sound & Stage Entertainment solution.



ER Diagram for the Sound & Stage Entertainment Solution

Create an application to demonstrate the skills you have acquired by developing the described solution.