University of Michigan - Dearborn
CIS 435 - Web Technology
Term Project

Hotel 435

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Project Description

Goals:

The goal of this project is to create a hotel management system centered around a single arbitrary hotel. The site will allow users to check out the features that the hotel has, services that it provides, and what kinds of boarding it offers.

Users will be able to book rooms based on their preferences and current availability. They can tailor the parameters such as pricing to find rooms that fit their needs. Users can browse various rooms and explore detailed information about the various rooms to find one that they like. The system will keep the current reservations up to date so that users receive the most accurate information about the status of the hotel and the various rooms. Users will also be able to manage their reservations through the site once they have booked a room.

Why Are We Doing It?

This application is a great way to exercise our understanding of each primary component of web development, a UI, a backend, database storage, and even deployment. There is enough involved with making this application where it could become fit for an entire team to work on it. In addition, a hotel management is modular meaning the components can be built semi-independently and the use cases can be changed (added or removed) in the future to fit the scope of the project, making it a good choice.

It also is an example of something that has real-world significance as hotel management via websites or apps is now the standard and is essential for any hotel business and adds to the overall user experience.

Link to Site:

http://hotel435.s3-website-us-east-1.amazonaws.com/ (client facing web app)

https://hotel435-client.azurewebsites.net (manager facing web app)
Demo Credentials -
Email: cis435hotel435@gmail.com
Password: Cis435Hotel435!

Description of System Design and Implementation

Usage Scenarios:

Home Page Browsing:
1. User navigates to site.
2. User is met with a welcome screen that couples as home screen
3. The screen provides highlights of the hotel (such as services and features offered by hotel)
4. User can navigate to another page to browse available rooms through a navigation bar at the top of the page

Room Browsing:
1. User navigates to room browsing page
2. User is prompted to enter the start and end date for reservation
3. User can specify certain preferences for available hotel rooms based on a predefined selection of parameters such as:
    a. Price
    b. Number of guests
    c. Number of beds
    d. Type of rooms
4. The system will filter available rooms based on user parameters and return the ones that meet the user's criteria
5. The system will alert the user if no rooms matched their search.
6. User can select from available rooms to a details page for a specific room

Room Details and Checkout
1. User can check out the details screen for a room with detailed information
2. User can book a reservation for a specified room for a specific date range
3. User will be prompted to check out screen and book a room
4. User will receive an email verification for the reservation
5. The email will contain the necessary information for the reservation including information to check back in the website to manage the reservation.

Reservation Management
1. User enters reservation number in prompt
2. Details of reservation pops up
3. Status of reservation
   a. Preventing early check-ins or late

4. Reservation Cancellation

Internal Management
1. Manager confirms check-ins
2. Manager confirms check-outs

User Profiles:

Actor Name	Description
Customer (User)	A customer uses the sites and can book/manage reservations on the site.
Hotel Manager/Hotel(Internal)	Internal user that deals with reservation management, and check ins/check outs
Identity Provider(Internal)	A third party system that verifies user credentials for hotel managers

Use Case Diagram
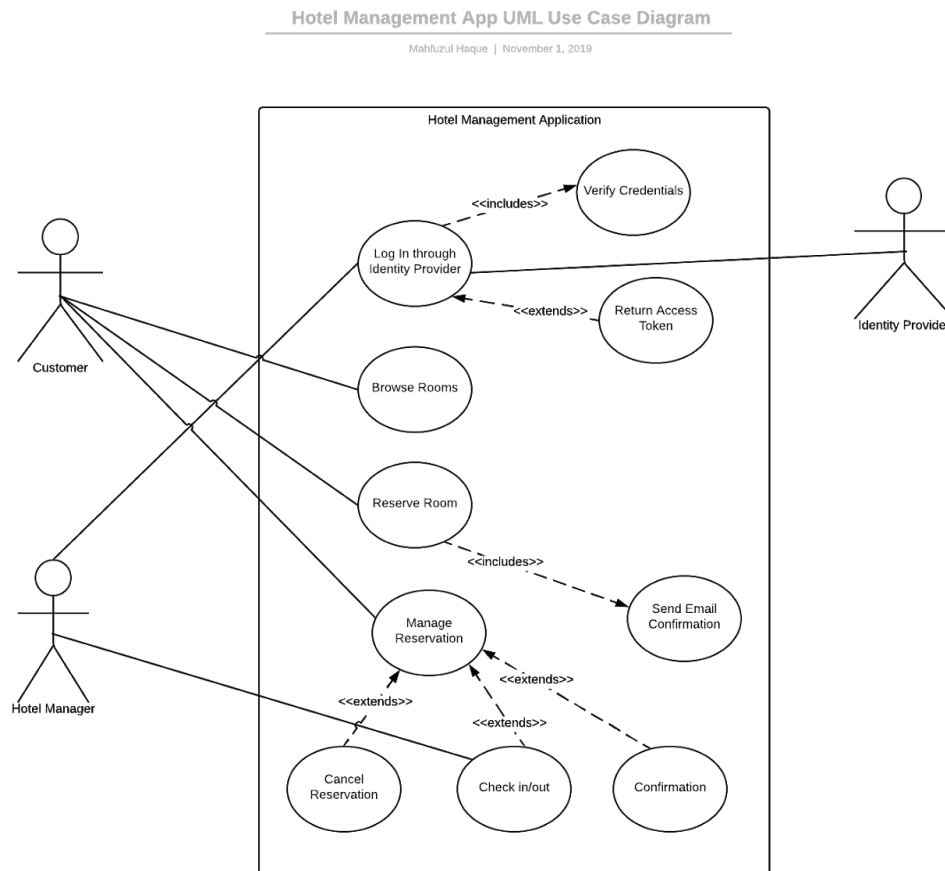
Components to Build
- Front-end UI for user to browse and books rooms
  - Home page
  - Search functionality for rooms
  - Checkout screen
  - Reservation management screen
    - Cancellation
  - Management Screen (Hotel Managers)
    - Check-in, Check-out
- Back-end APIs for handling data acquisition and linking to data storage
  - API endpoints for http request response and data acquisition from database
    - Information on available rooms
    - Reservation Information
  - Identity Provider to verify login credentials
  - Data access layer where queries will be composed and sent
  - Email Confirmation
  - Validation of input and requests
- Data Layer
  - Database and associated relations designed to handle all data needed by UI
    - Reservation information
    - Room availability
    - Room details

Tasks Performed:
- Design UI
- Build UI
- Test UI
- Design back-end API structure and responsibilities
- Implement and test back-end API and Identity Server
- Design Entity Relationship and Relational/Data Model for database
- Build out database for use
- Integrate various components and perform integration and user acceptance testing
- Compile documentation into progress and final report
- Deploy fully built application

Intermediate Milestones:
- UI prototype for basic user interaction, using mock data to perform all functionality not reliant on server side components
- Built out back-end API and integrated with UI for additional functionality, representing a fully functioning program that still uses mock data
- Database built and integrated with the rest of the application, finalizing the product and allowing the user to use the application with dynamic real-time data. Ready for deployment

Infrastructure:

This will highlight the primary technologies used by our team in developing this application.

Front-end UI:
- React (HTML, CSS, Javascript encapsulated)

Back-end APIs:
- ASP.NET Core (C#, .NET)

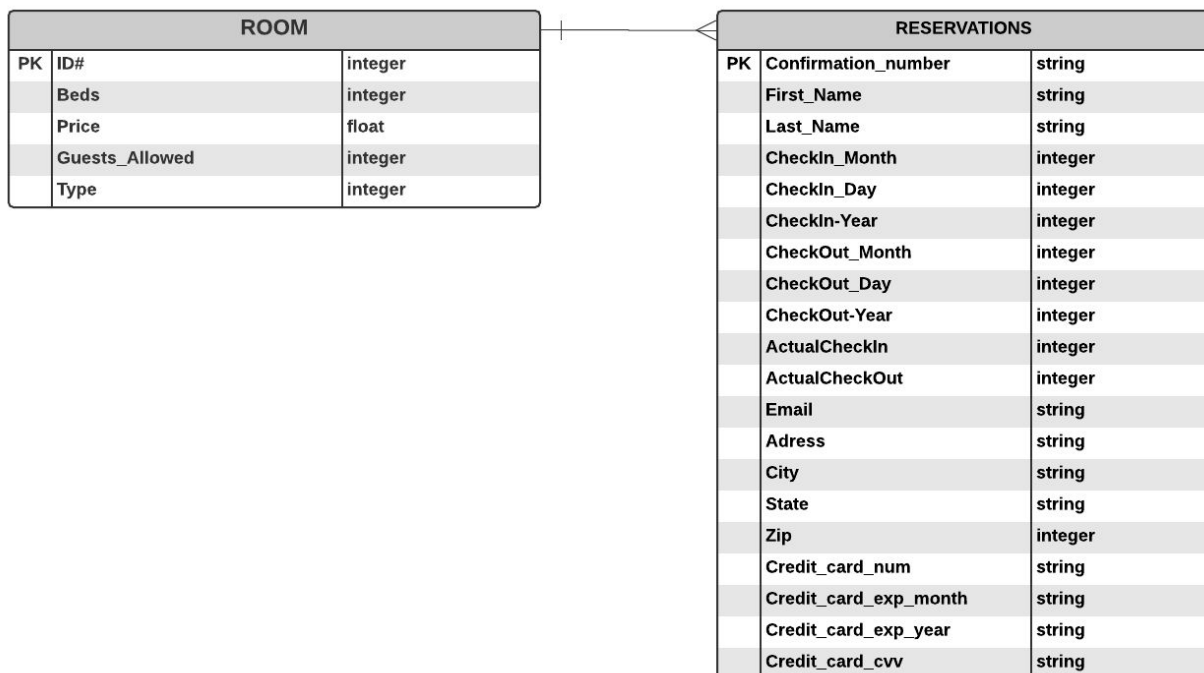**Database:**
- SQL Server

Deployment:
- Amazon Web Services (AWS)
  - Simple Storage Service (S3)
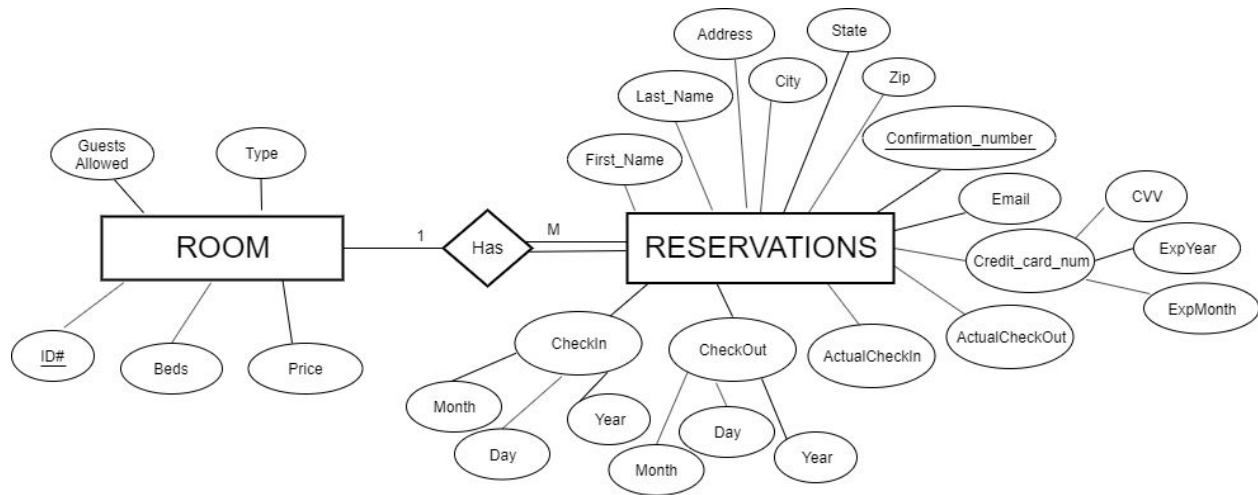 - Amazon RDS
- Microsoft Azure

Other Technologies and Resources:
- Google Drive
- Github
- LucidChart
- Visual Studio
- Visual Studio Code
- Sql Server Management Studio

Data Model:

ROOM		
PK	ID#	integer
	Beds	integer
	Price	float
	Guests_Allowed	integer
	Type	integer

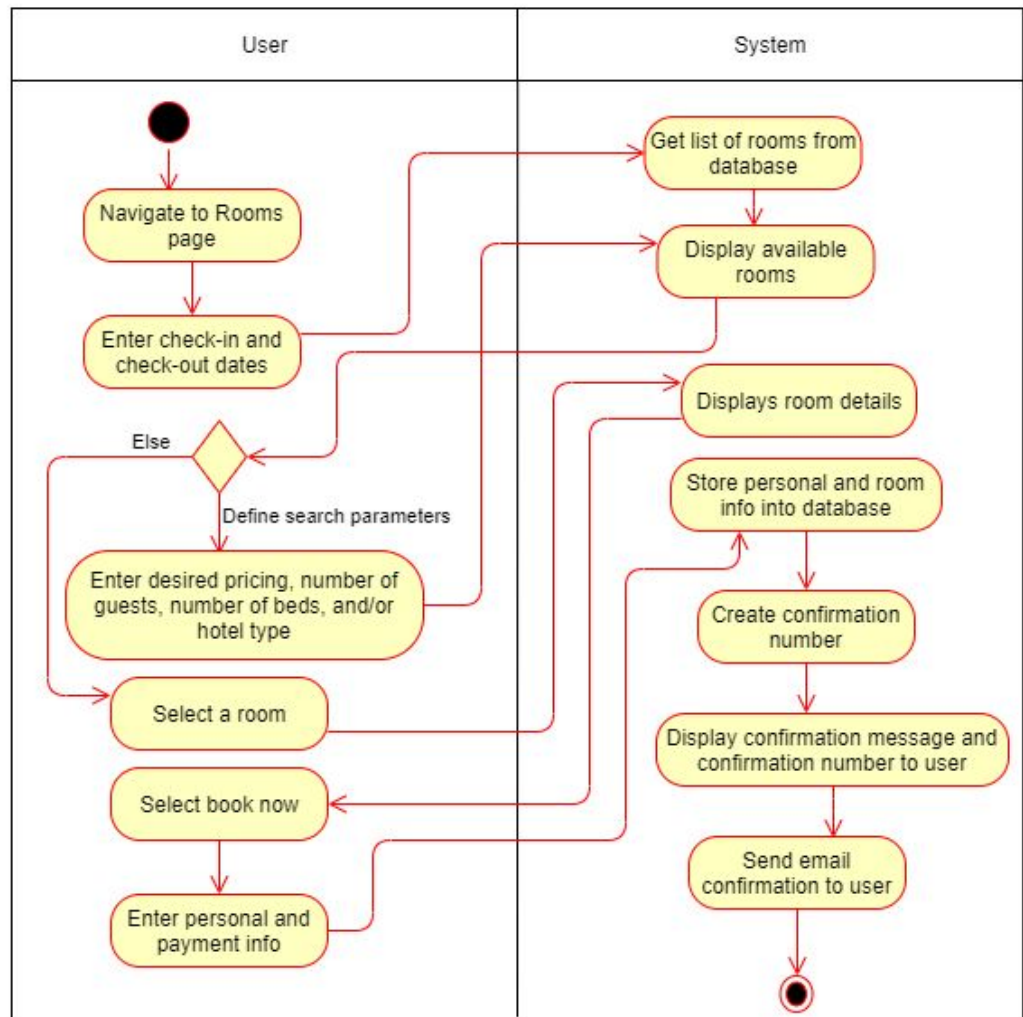| RESERVATIONS		
PK	Confirmation_number	string
	First_Name	string
	Last_Name	string
	CheckIn_Month	integer
	CheckIn_Day	integer
	CheckIn-Year	integer
	CheckOut_Month	integer
	CheckOut_Day	integer
	CheckOut-Year	integer
	ActualCheckIn	integer
	ActualCheckOut	integer
	Email	string
	Adress	string
	City	string
	State	string
	Zip	integer
	Credit_card_num	string
	Credit_card_exp_month	string
	Credit_card_exp_year	string
	Credit_card_cvv	string

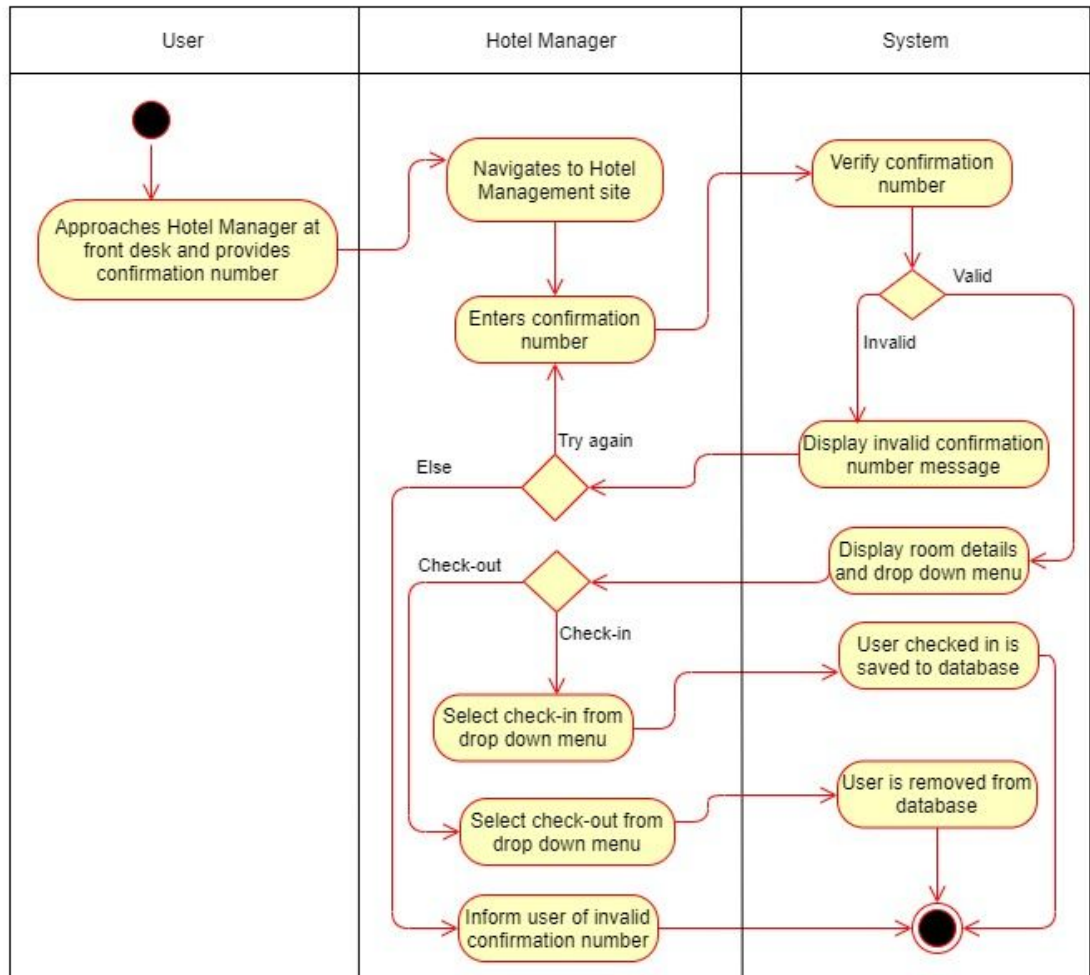## Database ER Diagram:

Important Note About Database:

      While it was originally intended that the hotel manager would serve as an entity represented by the database, all authentication related to hotel managers (which was the primary function of the hotel manager table in the database) can actually be taken care of by an identity provider (discussed later in the document). This means that we do not have to represent the hotel manager in the database, hence why there are only two entities shown in the ERD.
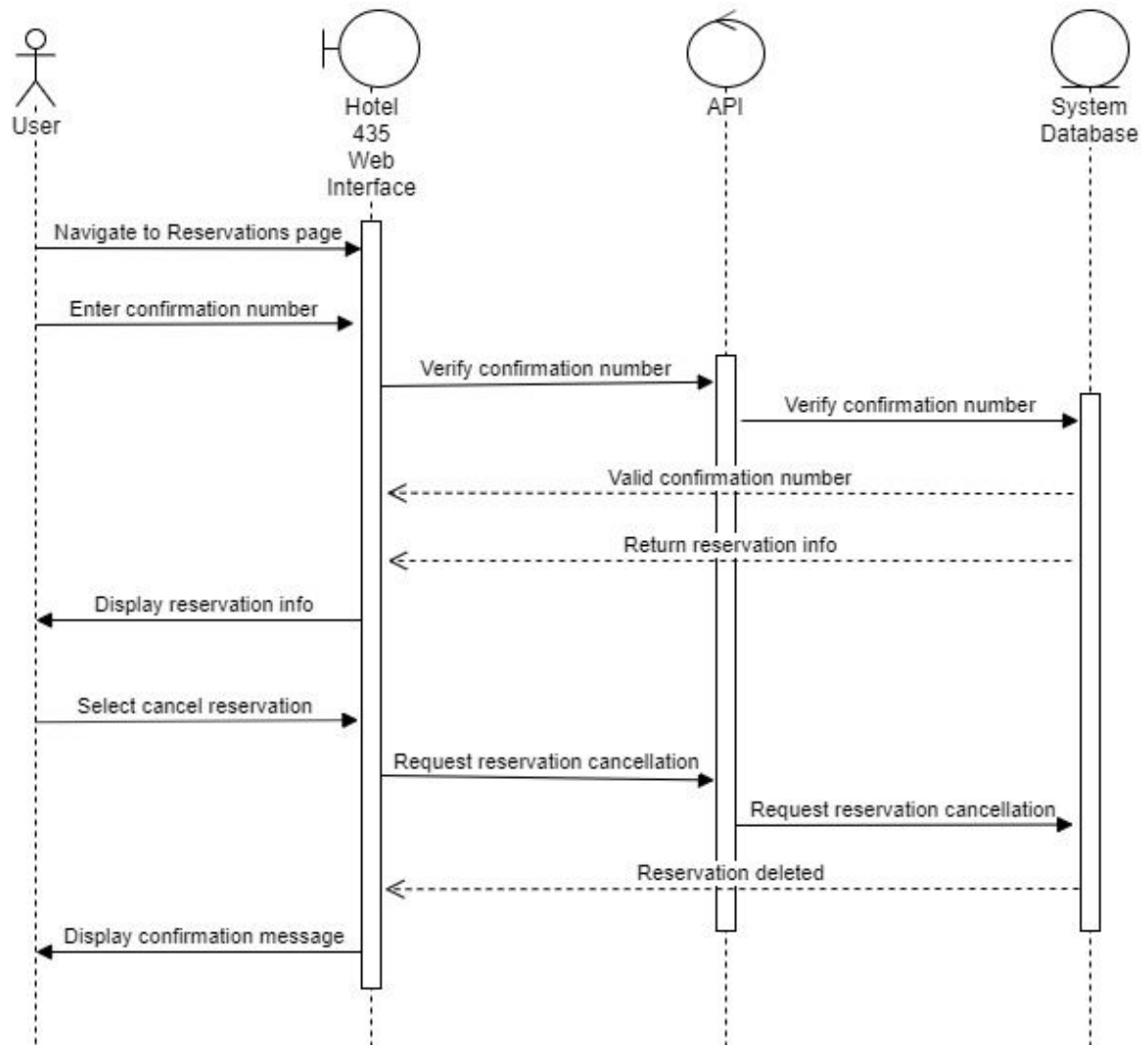
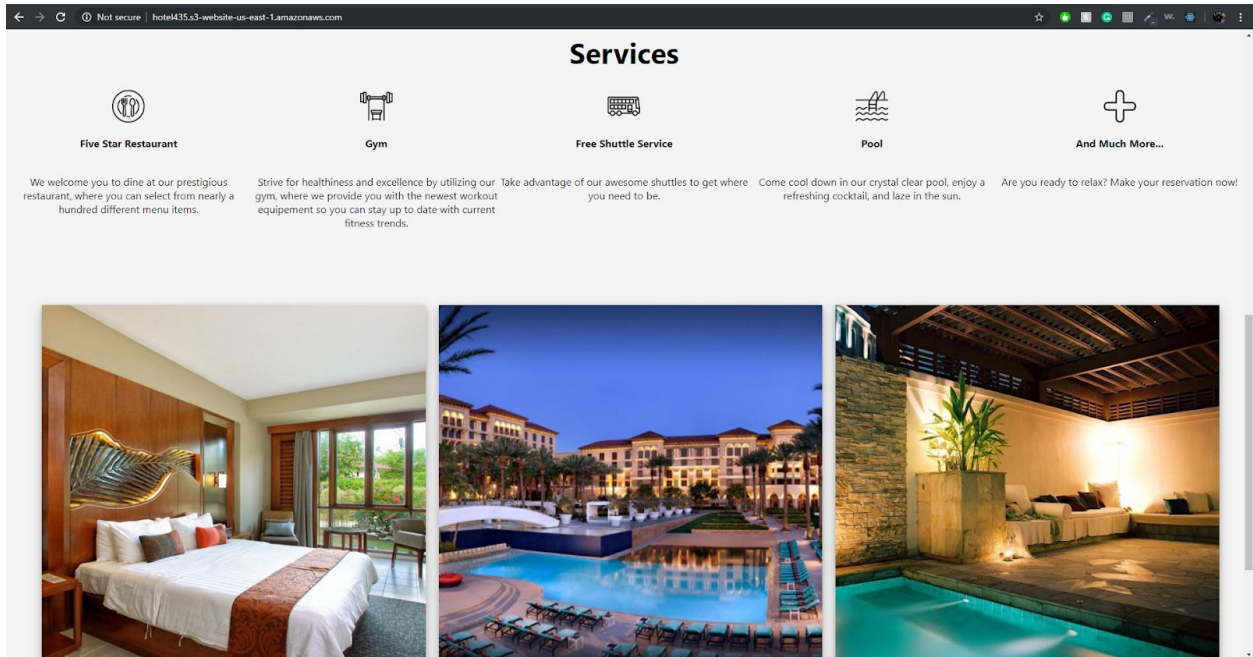# Activity Diagrams:

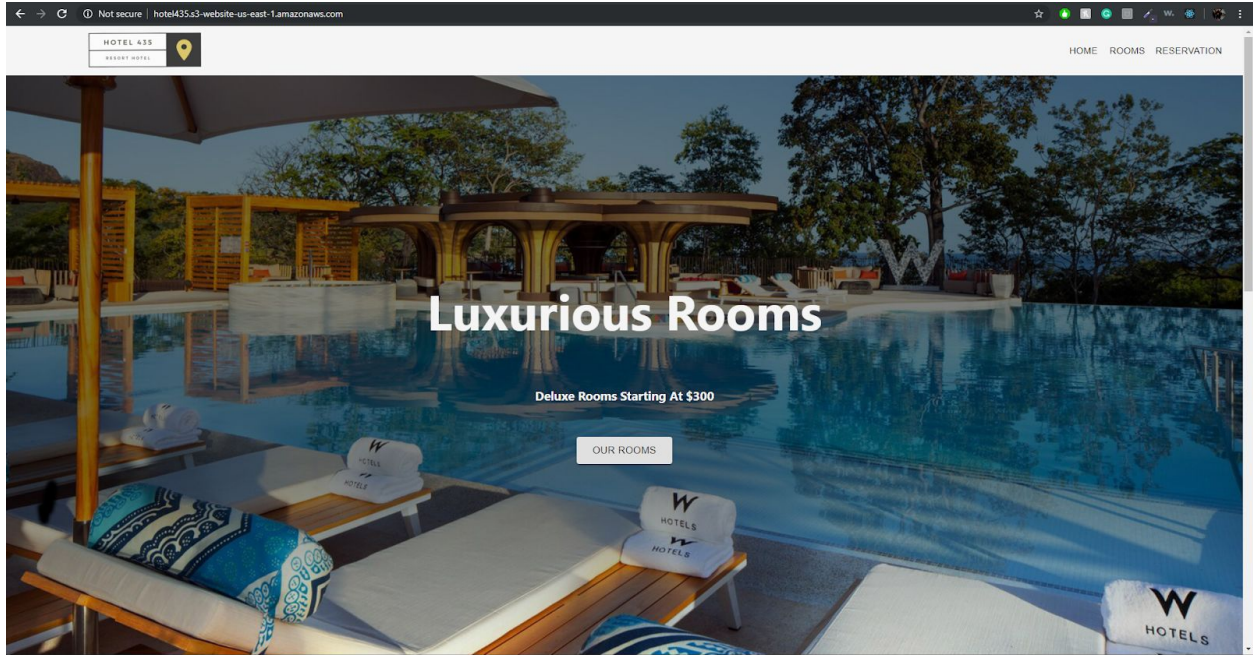Booking a Room

Hotel Check-in/Check-out

User	Hotel Manager	System

User

(start)

Approaches Hotel Manager at front desk and provides confirmation number

Hotel Manager

Navigates to Hotel Management site

Enters confirmation number

Try again

Else

Check-out

Check-in

Select check-in from drop down menu

Select check-out from drop down menu

Inform user of invalid confirmation number

System

Verify confirmation number

Valid

Invalid

Display invalid confirmation number message

Display room details and drop down menu

User checked in is saved to database

User is removed from database

(end)

Sequence Diagram:

Cancelling a Reservation

User Interface Design:
      Sample Images from UI:

HOTEL 435
RESORT HOTEL

HOME   ROOMS   RESERVATION

Luxurious Rooms

Deluxe Rooms Starting At $300

OUR ROOMS

Services

Five Star Restaurant

Gym

Free Shuttle Service

Pool

And Much More...

We welcome you to dine at our prestigious restaurant, where you can select from nearly a hundred different menu items.

Strive for healthiness and excellence by utilizing our gym, where we provide you with the newest workout equipement so you can stay up to date with current fitness trends.

Take advantage of our awesome shuttles to get where you need to be.

Come cool down in our crystal clear pool, enjoy a refreshing cocktail, and laze in the sun.

Are you ready to relax? Make your reservation now!

Unwind In Our State Of the Art Bedrooms

With rooms that are designed to provide the most comfort, you'll never want to get out of bed. Select from a variety of rooms that fit your specific needs.

Soak In the Sun At Our Amazing Pool

What's better on a hot day than lazing by a pool and an occasional dip? Come see for yourself why our guests can't help but fall in love with our amazing pool.
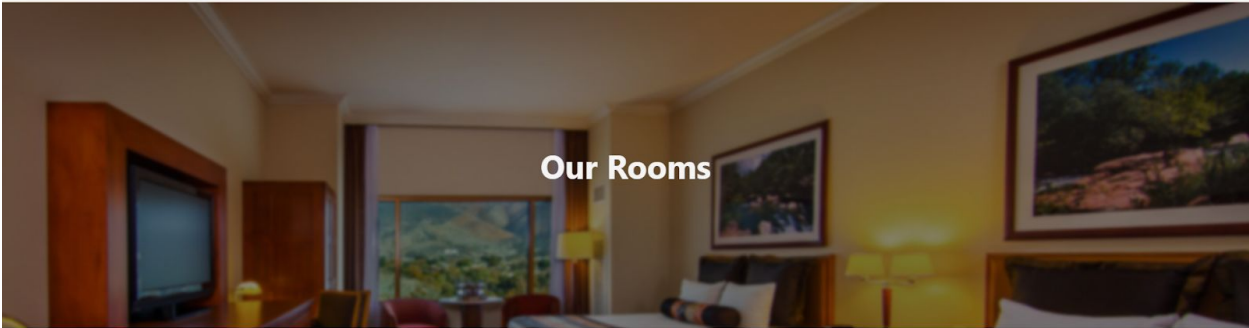
Forget the World At Our Blissful Spa

Experience our Spa treatments that are therapeutic, relaxing, and a great opportunity to alleviate the stresses of work life.

HOTEL 435
RESORT HOTEL

HOME   ROOMS   RESERVATION

Our Rooms

Search Rooms

Check-In
11-04-2019

Check-Out
11-05-2019

SEARCH

Search Rooms

Check-In
11-04-2019

Check-Out
11-05-2019

SEARCH

Price

Number of Guests

Number of Beds

Hotel Type
All

RESET

Room Title

Max Guests	Beds	Room Type
3	2	Regular

Starting Price: $100 SELECT

Room Title

Max Guests	Beds	Room Type
3	2	Deluxe

Starting Price: $300 SELECT

Room Title

Max Guests	Beds	Room Type
6	3	Family

Starting Price: $400 SELECT

HOTEL 435
RESORT HOTEL

HOME   ROOMS   RESERVATION

Room Name
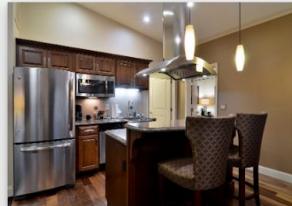
Beds: 2   **Max Guests Allowed: 3**   **Room Type: Deluxe**

Check-In: 11-04-2019   **Check-Out: 11-05-2019**   **Price: $300 X 1 Days = $300**

BOOK NOW

cto beatae vitae dicta sunt explicabo. Nemo enim ipsam voluptatem quia voluptas sit aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos qui ratione voluptatem sequi nesciunt. Neque porro quisquam est, qui dolorem ipsum quia dolor sit amet, consectetur, adipisci velit, sed quia non numquam eius modi tempora incidunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim ad minima veniam, quis nostrum exercitationem ullam corporis suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur? Quis autem vel eum iure reprehenderit qui in ea voluptate velit esse quam nihil molestiae consequatur, vel illum qui dolorem eum fugiat quo voluptas nulla pariatur

Featured Amenities

Wifi   Television   Safe   Phone   Hair Dryer

HOME   ROOMS   RESERVATION

Check Out

Name

First Name   Last Name

Email Address
Email Address

Address

Address
Address

City
City

State   ▾   Zip Code

Payment Information

Credit / Debit Card Number

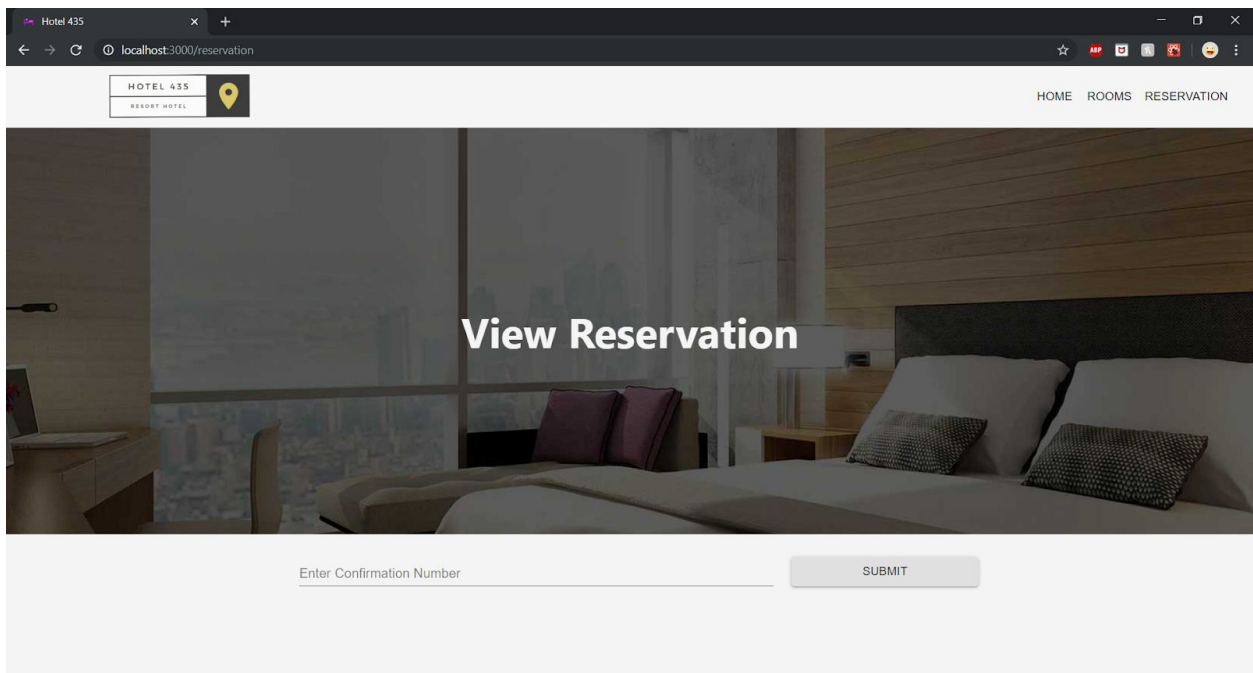Expiration Month   ▾   Expiration Year   ▾
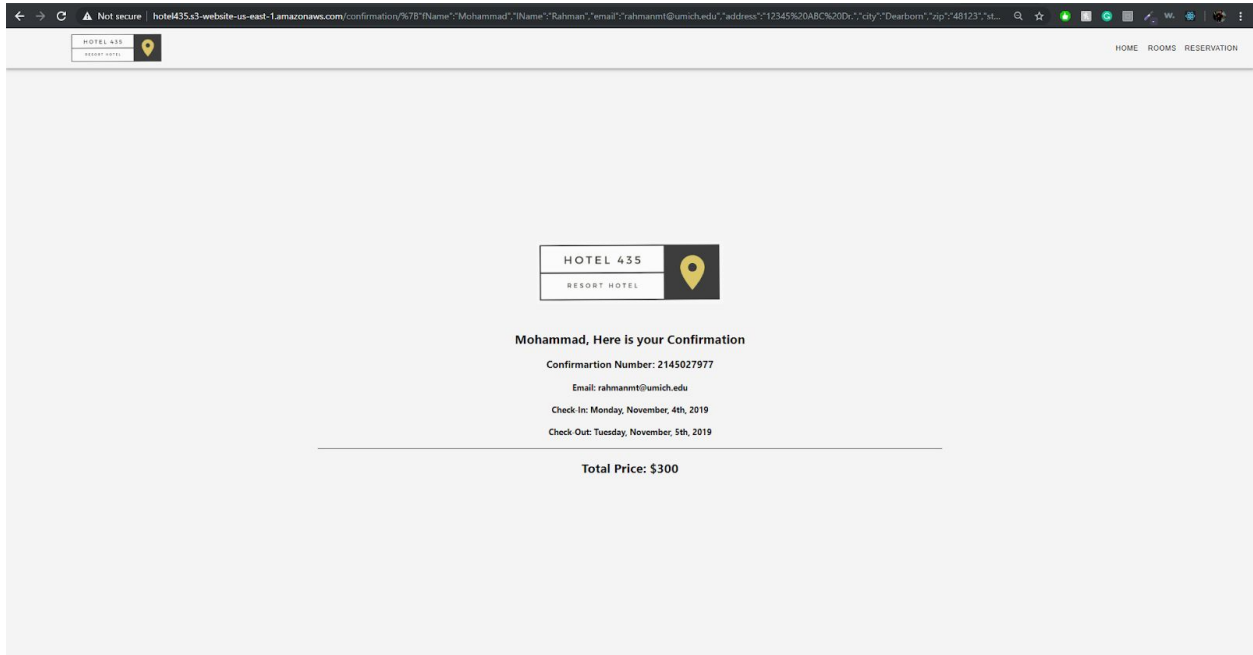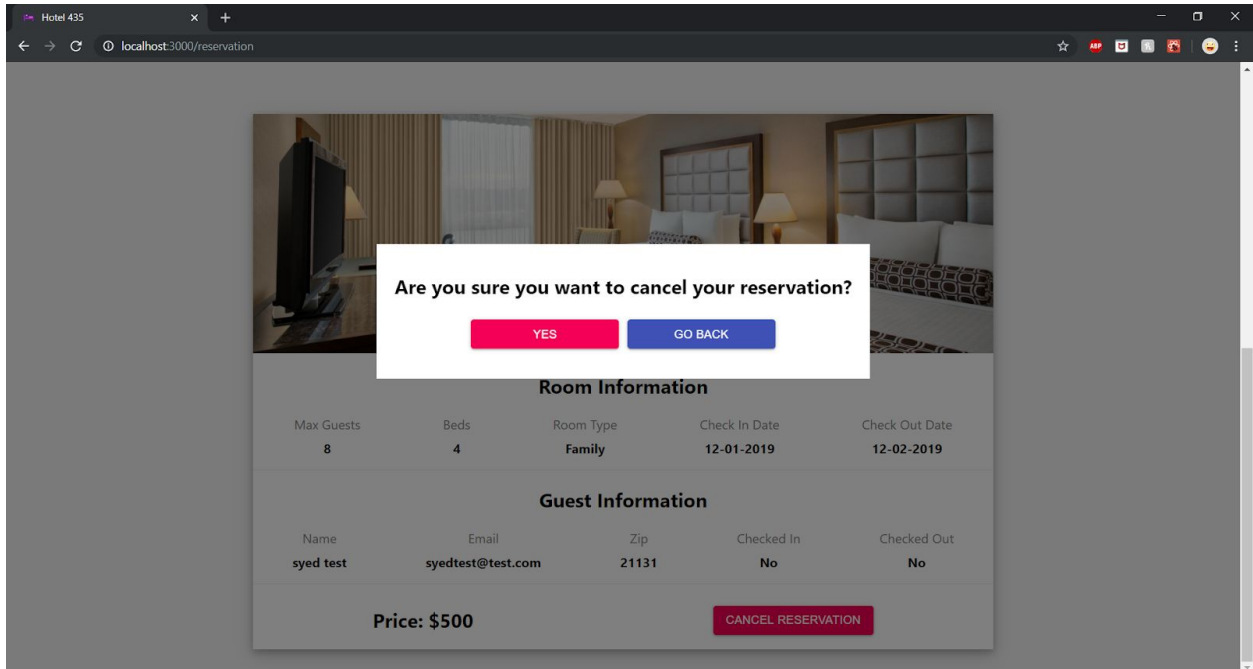
CVV

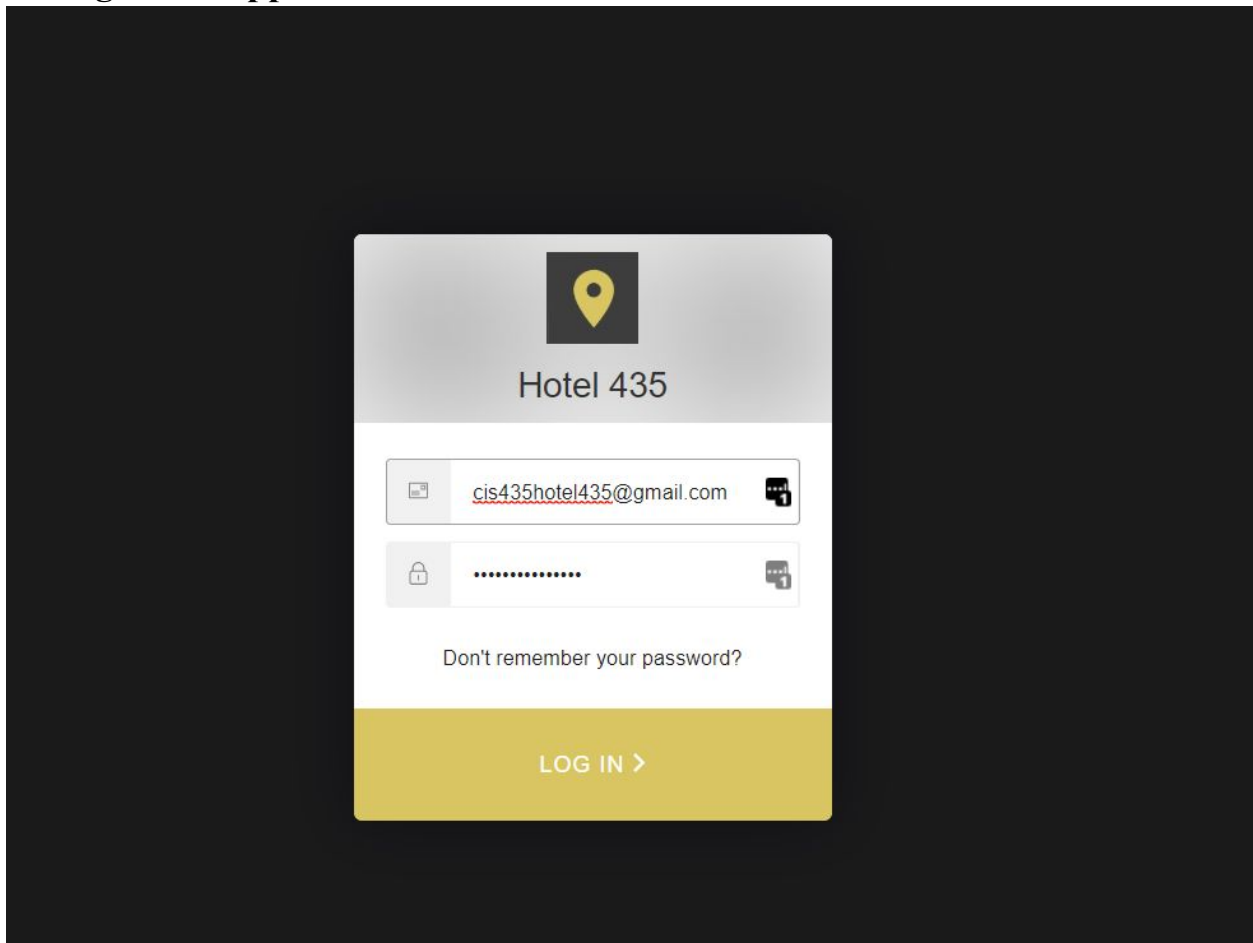**Check In: Monday, November, 4th, 2019   Check Out: Tuesday, November, 5th, 2019   Days: 1   Price: $300**

Book Now

HOME   ROOMS   RESERVATION

HOTEL 435
RESORT HOTEL

Mohammad, Here is your Confirmation

Confirmartion Number: 2145027977

Email: rahmanmt@umich.edu

Check-In: Monday, November, 4th, 2019

Check-Out: Tuesday, November, 5th, 2019

Total Price: $300

HOTEL 435
RESORT HOTEL

HOME   ROOMS   RESERVATION

View Reservation

Enter Confirmation Number   SUBMIT

Management Application:

HOTEL 435
RESORT HOTEL

Reservations

Name	Email	Reservation Dates	Room Details	Actions
Mahfuzul	Haque	Check In Date: 11/30/2019, 12:00 AM Check Out Date: 12/1/2019, 12:00 AM Actual Check In Date: 11/30/2019, 8:00 PM Actual Check Out Date: 11/30/2019, 8:00 PM	Type: Family Beds: 4 Guests Allowed: 8 Price: $500	CHECK IN CHECK OUT
Syed	Test	Check In Date: 11/30/2019, 12:00 AM Check Out Date: 12/5/2019, 12:00 AM	Type: Regular Beds: 2 Guests Allowed: 4 Price: $300	CHECK IN CHECK OUT
syeda	kanjum	Check In Date: 12/6/2019, 12:00 AM Check Out Date: 12/8/2019, 12:00 AM	Type: Deluxe Beds: 3 Guests Allowed: 6 Price: $400	CHECK IN CHECK OUT
Tasnim	Syed	Check In Date: 12/2/2019, 12:00 AM Check Out Date: 12/6/2019, 12:00 AM	Type: Regular Beds: 2 Guests Allowed: 4 Price: $300	CHECK IN CHECK OUT
Rashed	Rahman	Check In Date: 12/26/2019, 7:00 PM Check Out Date: 12/28/2019, 7:00 PM Actual Check In Date: 11/29/2019, 4:14 PM Actual Check Out Date: 11/29/2019, 4:14 PM	Type: Deluxe Beds: 3 Guests Allowed: 6 Price: $400	CHECK IN CHECK OUT

Rows per page: 5 ▾   1-5 of 9 |<   <   >   >|

Reservations

Logout

Sample Images From Mobile Device:

Price

$300

Number of Guests

3

Number of Beds

2

Hotel Type

Regular

RESET
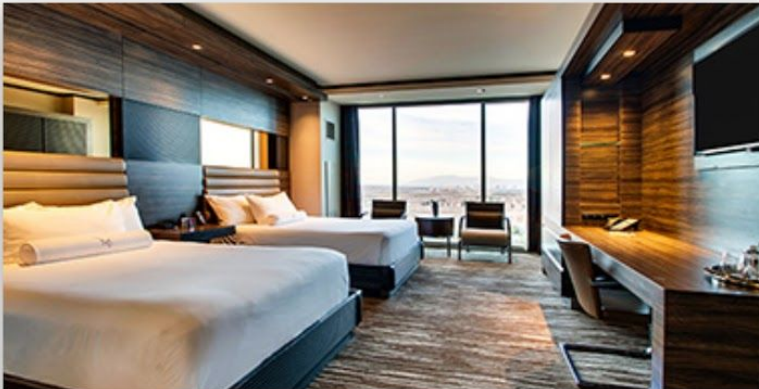
Room Title

Max Guests	Beds	Room Type
3	**2**	**Regular**

Starting Price: $100   SELECT

Beds: 2

Max Guests Allowed: 3

Room Type: Deluxe

Check-In: 11-05-2019

Check-Out: 11-06-2019

Price: $300 X 1 Days = $300

BOOK NOW

cto beatae vitae dicta sunt explicabo. Nemo enim ipsam voluptatem quia voluptas sit aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos qui ratione voluptatem sequi nesciunt. Neque porro quisquam est, qui dolorem ipsum quia dolor sit amet, consectetur, adipisci velit, sed quia non numquam eius modi tempora incidunt ut labore et dolore magnam aliquam

SUBMIT

Room Information

Max Guests **8**

Beds **4**

Room Type **Family**

Check In Date **12-01-2019**

Check Out Date **12-02-2019**

Guest Information

Name **syed test**

Email **syedtest@test.com**

Zip **21131**

Checked In **No**

Checked Out **No**

Price: $500

CANCEL RESERVATION

Name	Email	Reservation Dates
Mahfuzul	Haque	Check In Date: 11/30/2 Check Out Date: 12/1/2 Actual Check In Date: 1 Actual Check Out Date:
Syed	Test	Check In Date: 11/30/2 Check Out Date: 12/5/2
syeda	kanjum	Check In Date: 12/6/20 Check Out Date: 12/8/2
Tasnim	Syed	Check In Date: 12/2/20 Check Out Date: 12/6/2
		Check In Date: 12/26/2 Check Out Date: 12/28/

UI Description:

Our web-based application contains four webpages; Home, Rooms, Reservation, and Checkout. The Home page is the landing page of the website which showcases the hotel's services and presents several images of the hotel. The Rooms page allows a user to search for hotel rooms by entering their desired check-in and check-out dates. Users are also allowed to narrow down room search by entering their desired parameters for the price, number of guests, number of beds, and the hotel type (regular, family, deluxe, or all). The Reservations page allows a user to view their hotel reservation by entering their confirmation number. Here, users are also given the opportunity to cancel their reservation if they wish. The Checkout page allows a user to confirm their hotel reservation by entering their personal information and payment info. They are given a confirmation number after payment info has been processed.

Each page of the web app contains the main navbar, which includes links to all other web pages and the hotel logo. Each page contains a simple title to describe the page's contents. Our buttons and forms are created using ReactJS and Material-UI.

There will also be a separate site for hotel managers. In this site, hotel manager will be able to let a user check-in to the hotel and check-out of it as well. When a user checks-out of the hotel, their information is removed from the database.

Team Member Roles:

Tasnim Syed:

Team Lead
- Overseeing project
- Running meetings
- Measuring progress

Back-end development
- Set up tables in database using entity framework
- Set up migrations for entity framework
- Configured controllers to handle requests from the UI
- Added email confirmation service

Database development
- Create database diagrams schema and implementation from architectural standpoint
- Created tables and logic for reservations and rooms
- Populated hosted database with mock data

Documentation
- Perform edits of all documentation, including design documents
- Created Proposal Document
- Worked on Progress Report and Final Report
- Worked on each PowerPoint
- Created and proofread all final drafts of documents for turn-in

Mahfuzul Haque:

Technical Lead
- Establish programming patterns for our API and directing team members on how to follow them
- Assist team members with anything relevant to our stack (react and .net core)
- Ensuring team members are able to run the API locally and how to hit the API endpoints.
- Ensuring team members are able to retrieve data from the API when hosted from azure
- Ensuring team members are able to access our database

Back-end development

- Responsible for creating the management services to handle all management related operations
- Set up a generic database repository pattern to perform CRUD operations with all of our resources
- Configured authorization/authentication services to ensure all management related operations are protected and secure
- Integrated API with Auth0, an OAuth identity provider
- Created the email template to be used to send confirmation emails to users
- Program the logic to use the SmtpClient to send emails
- Set up entity framework core migration processes
- Integrate API with database
- Deployed api to azure

Front-end development
- Created the website used by management using React
- Integrated the web app with Auth0, an OAuth identity provider
- Integrated web app with the back-end api
- Ensure that managers are able to check in and check out reservations through the app
- Deployed web app to azure

Database
- Created amazon RDS database

Github
- Create repositories for the API and the management web app
- Add team members as collaborators

Mohammad Rahman:
UI Design and Development Lead
- Overseen all the UI component development
- Created the client-side front-end application using React
- Integrated front-end with back-end API
- Ensured that customers can book a room
- Ensured that the web app is responsive to a multitude of different screen sizes
- Ensured that the web app handles the routing between pages properly
- Deployed the app to AWS

Component Design
- Designed UI components/overseen for the front-end application

Documentation Review
- Helped create, edit and proofread all the documents

Syed Miah:
UI Design
- Sequence and activity diagram write-ups
- ERD and data model write-ups

Reservation page

- UI design and development

Documentation Lead
- Drafting Progress Report and Final Report

Updates on Implementation:

UI:
- UI is hosted on AWS
- All aforementioned UI related components built and tested
- Integrated UI with Backend APIs
- Increased responsiveness of application and resolved various bugs
- Hotel Management UI was built and integrated with the rest of the application

Backend APIs:
- Entity Framework set up
  - Models and migrations related to database creation were set up and implemented
  - Controllers and services to handle requests were made
  - Email confirmation for reservations implemented
- Manager Backend included in same API
  - Security policies related to identity provider implemented and tested
  - Email Confirmation from manager after checkout added

Database:
- Database setup and local SQL Server instance set up
- Database hosted on AWS to allow for sharing of same database instance
- Mock room data included for use
- Database integrated with the rest of the application and is accepting reservation data

What Changed?
- Identity Provider Vs. Identity Server:
  - Due to the complexities involved in creating an identity server from scratch relative to the scope of this project, our team has decided to scrap the idea and instead move forward with an existing identity provider to manage our authorization/authentication policies. After doing some research, our team came across an identity provider called Auth0 which contains all the necessary functionality to leverage OAuth technology into our web application and API. As a result, we will be using the services provided by Auth0 to implement our login logic. This, as mentioned earlier in the report, will take care of our server side needs for hotel managers so that we will not actually need an entity in the database as the identity provider handles the authentication for us
- Changed DBMS from MySQL to SQL Server
  - Works better with Visual Studio and ASP.NET (Microsoft's own product)

System Evaluation (based on initial goals and usage scenarios):

Req. No.	Requirement Description	Evaluation Result	Status
1	User can navigate to the site	The site is deployed to AWS and accessible via the given link in the report	Completed
2	User is met with a welcome screen on the landing page	The home page describes the hotel in detail to the user	Completed
3	Welcome screen provides highlights of the hotel	Services and features are highlighted on the home page	Completed
4	User can browse available rooms through navigation bar at the top of the page	Navigation bar is present on top of all pages and allows users to traverse the web app, including the rooms page	Completed
5	User is prompted to enter start and end dates for reservation	User is asked to provide check in and check out dates on rooms page	Completed
6	Price, number of guests, number of beds, and room type are valid filters for room browsing	All four paramaters can be used to narrow room search	Completed
7	System will alert user if no rooms matched their search parameters	No rooms are shown if no rooms match user's search parameters	Completed
8	User can select from available rooms to a details page for a specific room	When room browsing, the select button takes users to a details page about the room	Completed
9	User can check out the details screen for a room with detailed information	A "book now" button on the details screen takes users to the checkout screen	Completed
10	User can book a reservation for a specified room for a specified date range	User can enter check in and check out dates on the rooms page	Completed
11	User will recieve an email verification for the reservation	Email confirmation is sent to user after booking a reservation	Completed
12	The email will contain the necessary information for the reservation, including information to check back in the website to manage the reservation	User is given a unique confirmation number to their email after booking a room. The confirmation number can be used to manage the reservation	Completed
13	User enters confirmation number in prompt	The reservations page asks users for their confirmation number in order to manage their reservations	Completed
14	Details of reservation pops up when user enters their confirmation number	Valid entries of confirmation numbers will display the reservation details to the user, as well as an option to cancel the reservation	Completed
15	Status of reservation	Reservation page shows user if they are checked in or not	Completed

What We Learned:

- Syed Miah
  - Learned how to work with React
  - Learned how to use Material UI framework for React
  - Learned how to make api calls and implement the data gathered into the web page
  - Expanded my understanding of Github
  - Practiced and enhanced understanding of newly learned concept of ER diagrams and data modeling
  - Enhanced my understanding of activity and sequence diagrams
- Tasnim Syed
  - Increased understanding of ASP.NET
    - Using services and leveraging dependency injection to perform data access
    - Using services and the factory pattern to abstract data access from controllers into said services
    - Increased understanding of SOLID principles
  - Learned about Entity Framework
    - How to create and manipulate database with object through the Entity Framework Object Relational Mapper
  - Gained exposure to how APIs and UI components are integrated
  - Gained knowledge regarding the importance of web security and practices to protect data
    - Encoding strings
    - Restricting endpoints
    - Benefits of identity provider
  - Learned more about deployment of web applications
    - AWS
    - Azure
- Mohammed Rahman
  - Gained further understating of the ReactJs frameworks
  - Gained further understanding of how api works
  - Gained further understanding of UI development
  - Gained further understanding of package management
    - Npm
  - Learned how to deploy web applications on AWS, Heroku
  - Learned how to route to different pages
  - Learned how to deal with cross-browser issues
  - Exposure to .net core 3

- ○ Exposure to multiple new Javascript libraries.
  - ■ Momentjs
  - ■ Axios

- ● Mahfuzul Haque
  - ○ Learned how to create a database using Amazon RDS
  - ○ Learned how to use the SmtpClient from .net core to send emails
  - ○ Learned how to integrate web app and api to Auth0, an OAuth identity provider
  - ○ Enhanced my understanding of .net core programming
  - ○ Enhanced my understanding of react programming
  - ○ Enhanced my understanding of azure deployment strategies