Three-Tier Database Application

Project Requirements Document for Hotel Management System (HMS)

San Jose State University

CS 157A - Introduction to Database Management Systems

CS157A-Team 13

Raza Ghulam, Kevin Pham, Bronsin Benyamin Pouran

Dr. Mike Wu

Fall 2019

Table of Contents

1.0 Introduction

Nowadays everyone has their own list of vacation destinations in mind, whether it be Cancun, the Bahamas, or the Caribbean. With so many people wanting to travel, hotels have been a classic way for vacationers to reside at while away from home. In a way, hotels are “home away from home.” With that being said, it is crucial that hotel owners are able to manage their business in a clear, simple and easy manner. In addition, the booking process should be stress-free for customers who wish to stay at a hotel. For this project, we propose the development of a 3-tier architecture application that serves both the hotel owners and hotel clients. The application will take into consideration the management aspects associated with running a business, such as inventory and room availability while also factoring in the clients’ needs to have a simple and concise way of booking a room.

2.0 Objectives

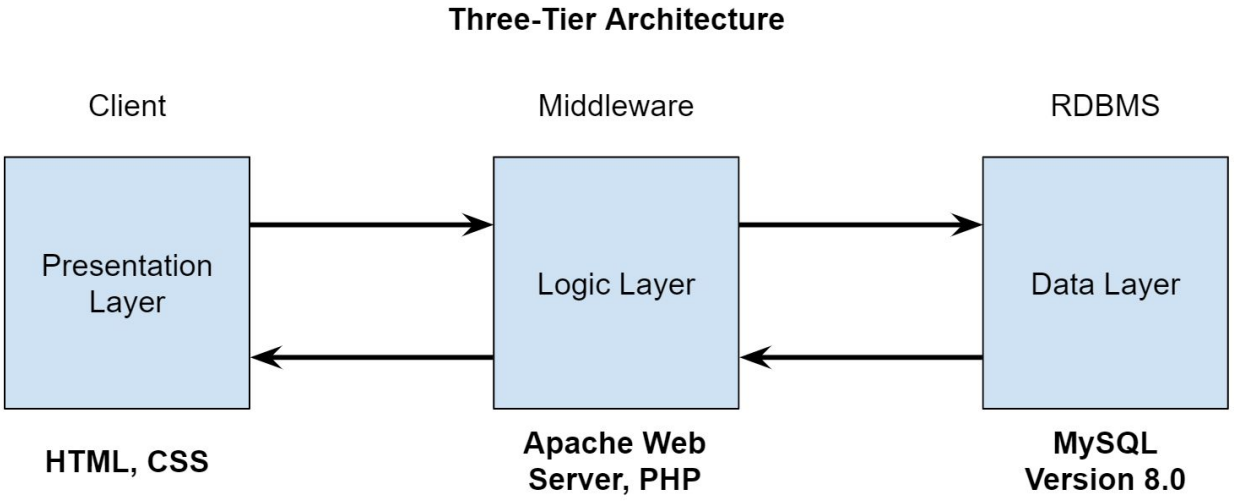
- To provide a simple and easy to use application that provides manager and user functions to both hotel staff and clients respectively.
- Include a realistic web interface for this application
- For manager functions, be able to manage expenses, revenue, inventory, staff, and services.
- For client functions, be able to view room availability, room services, and rooming fees.

3.0 Target Audiences

- Hotel Owners - Owners need a clear and simple way to manage the hotel that they are responsible for.
- Clients & Customers - Clients want an easy, stress-free way to book and room and have their needs catered to.

- Employees & Staff - Staff need to know their pay rates and schedules.

4.0 System Environment



- Presentation Layer: Users will use their preferred device and web browser to interact with the website that will be presented using HTML and CSS.
- Logic Layer: Apache Web Server will be used with server-side language, PHP.
- Data Layer: MySQL version 8.0 will be used to create, store, retrieve and manipulate tables and data from.
- Hardware/Software: Computer running either macOS or Windows will be used with IDE such as Visual Studio Code or Atom to write HTML, CSS, and PHP code. MySQL Workbench 8.0 will also be used to create and manipulate data and tables from MySQL.

5.0 Functional Requirements

The hotel management system is supposed to accomplish the following:

5.1 User authentication and authorization

The system shall provide access to the administrator, and registered members to enter the database. Administrators shall have the permission to read, write and modify the contents while member users will have only read and write permissions. The system will interact with the user as follows:

- User: Log in screen: User enters the email address or member number and password.
- System: Checks the system admin table or guest/member's table and authenticate. After successful authentication, the system will authorize the user to access the contents accordingly.
- User: Enters incorrect email, member number or password
- System: Prompts that the email, member or password is incorrect and if you are not a member, please sign up. The system shall allow unlimited user attempts to log in.
- User: New user shall click 'Join' to become a member.
- System: Shall prompt the user to enter first name, last name, country, zip code, email, and password.
- User: Shall enter the above information.
- System: Will make sure that the email address is unique and does not match any existent one. After checking the uniqueness of email address, the system shall save the information in guest table and specify the user's permissions.
- Members: After successful login, the system will allow the user to see booking history and current booking if there is any.
- Administrators: Can create account with password stored in database. This prohibits regular users from creating an admin account
- Staff: Create account for new account with a code generated by admin. The passcode can only be used once.
- Any User: Clicks log out.
- Systems: Removes his name from the current logged in users table.

5.2 Search for an available room

The database will allow both members and non members to search for available rooms. It shall also allow the authorized user to book rooms.

- User: Clicks the link ‘Rooms’
- System: Displays drop down lists allowing the user to choose booking date and the room type.
- User: Shall choose the check-in date, check-out date and the room type and click the view option to see desired available rooms.
- System: Displays the page that will allow the user to see all available rooms of his choice. The system might offer different better rates for members.
- User: Shall select his desired room and proceed to payment.
    - Alternative: What if the hotel is fully booked. The system shall prompt the user that there is no room available for his search choice.
    - Can also recommend closes sister hotels.

5.3 Room reservation

The system will allow the members, non members, authorized users to reserve the available room. It shall save the client information in the guest table for possible future use. Similarly, it shall allow the user to cancel the booking within 24 to 48 hours without cancellation fee. The user shall communicate with the systems as follows:

- User: Shall click the button ‘Select/Reserve’
- System: Shall display booking details and cancellation policy information
- User: After confirmation the booking detail, the user shall continue to the next step by clicking continue.
- System: For non members- Shall ask for their information such as user first name, last name, email, mailing address, billing address and payment method. In case of in person booking, the system shall allow the user to pay cash.
- User: Shall provide the above information and proceed to payment.

- System: Will ensure the correctness of user information. After confirming the validity of user input, the system shall save the clients information into the guest or member table.
- Alternative: User: Shall choose cancel current booking option.
- Systems shall allow users to cancel the booking. The system shall apply the cancellation fee charges if it is after the deadline. After cancellation The systems shall update both the booked room and available room tables. Furthermore, the system shall return the remaining balance to the user and update the payment or income table.

5.4 Add payment

Allow the user to put the client's credit or debit card information. The application will validate input data and saves the information into the database.

- Users will have the option to add and save their credit card information on file for ease of access and payment.
- User: Select and click on "Save/Update Payment Method"
- System: Prompt open a form will specified fields to be completed by the user. Such fields include "First Name", "Last Name", "Card Number", "Zip Code", "Expiration Date", "Security Code".
- User: Enters and fills required fields with correct and accurate information
- User: Click on "Update Payment Method"
- System: Verify that all fields have been entered in correctly
- System: Secure the information away in the database for future retrieval
- Alternative: User failed to complete all required fields, system will prompt that all fields must be filled out

5.5 Manage rooms

The system will keep track of reserved and booked rooms. Meanwhile, the database will allow the user to add, delete and update rooms in the system.

Note that this option is meant for management or staff use and not client use

- User: Click on “Manage Room Availability”
- System: Retrieve the table of rooms from the database and display on the screen.
- User: Option to choose drop-down menu to sort by “Reserved”, “Booked” and “Available”
- User: *In Reserved* Option to delete in case of cancellation, update in case of confirmed booking
- User: *In Booked* Option to delete in case of cancellation, update to available
- User: *In Available* Option to update to either Reserved or Booked
- System: Database will adjust and configure accordingly

5.6 Record and maintain inventory

The database will allow the user to add, delete and update the hotel inventory table. It will also keep a record of total hotel supplies and goods.

- System: Consists of tables for supplies, product, and miscellaneous items
- User: Click on link named “Maintain Inventory”
- System: Display drop-down menu with option for various tables mentioned
- User: Choose an option displayed by the system
- System: Display the respective chosen option. The format will have item name listed on the left-hand side, followed by the product description, followed by the quantity on hand, followed by the number field and an update button
- User: Option to increase/decrease and adjust the item inventory by entering in the amount in the number field and pressing the update button
- System: Take the input by the user and store the number into the database for future retrieval

5.7 Provide Price and Update

The system will allow the clients to look at various rooms and their pricing. The system will also allow managers to update price information.

- User: Members and Non-members will be able to view the prices of each rooms available in the system. The price will be available when searching for rooms, viewing a room, and during checkout.
- Administrator: Will be able to update the price of rooms when they change.

5.8 Manage Staff

The database will maintain a complete record of staff including their position, work hours, wage and etc.

- User: System will not let regular users to see information about staff.
- Staff: System will provide information their personal information including position, work hours, wages, etc
- Administrator: System will allow managers to modify staff accounts such as changing work hours and wages of employees.

6.0 Nonfunctional Issues

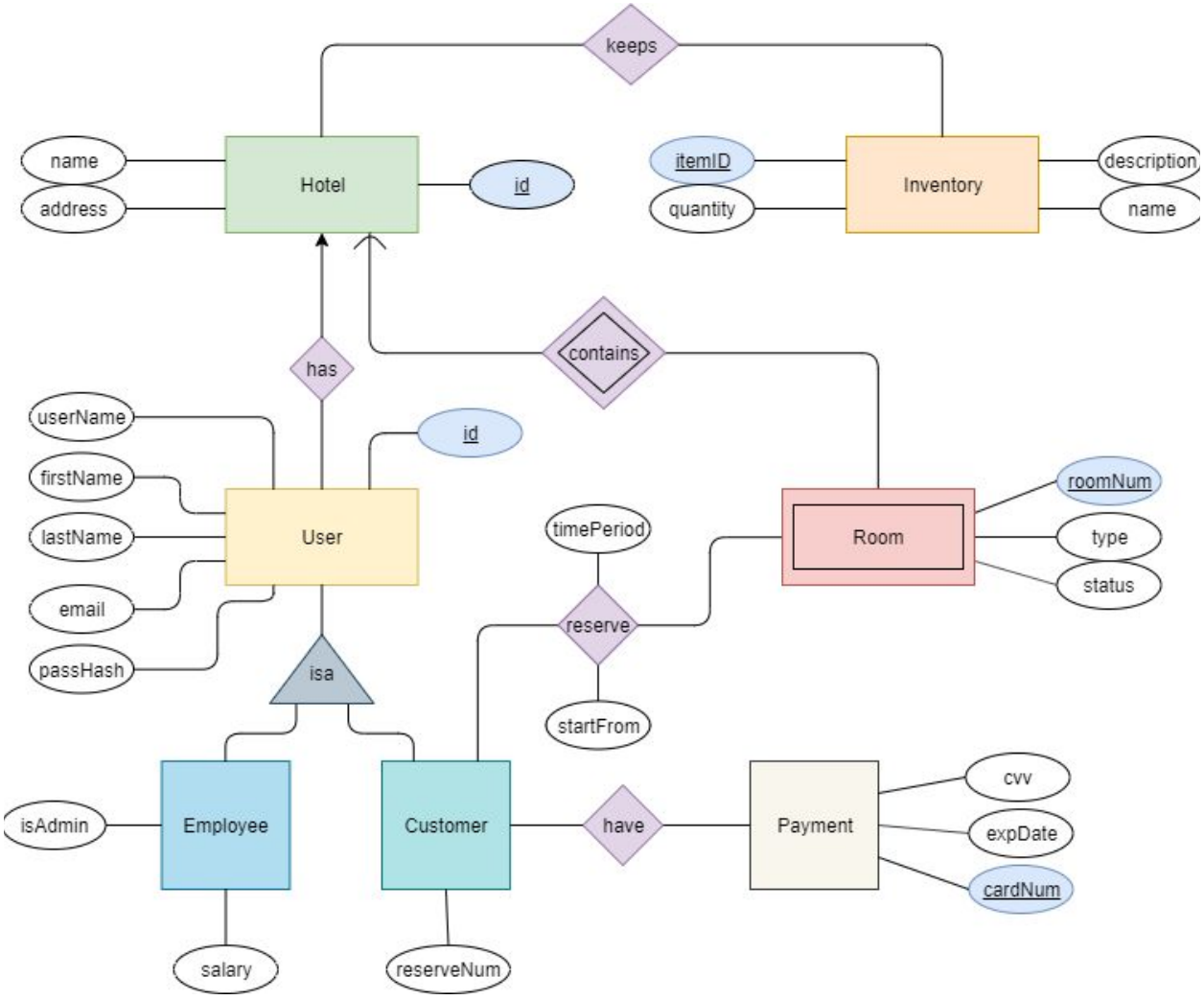
Nonfunctional Requirements (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. For our HMS application, we will mainly focus on secure software tools to build our GUI and ensure database secure access. To make the database secure and reliable, we will take the following steps:

- UI Software: HTML and CSS will be used to create the User Interface of the website
- Security and Access Control:
- Login credentials with hashed passwords will be stored in the database.
- Passwords will be validated to check if they follow certain requirements to make them strong.
- Personal information such as full name, email and payment methods will be stored in the Database.

- Personal information specific to employees such as address, salary, job position and phone number will be stored in the database.
- Data displayed and functionality will depend on the type of account a user has. A user who is a customer can't access employee salary data or an employee can't change his/her own salary.
- Availability: The HMS should work with all modern web browsers and devices.

7.0 E/R Diagram

7.1 Diagram



7.2 Relational Schema

7.2.1 Entity Set

- **Hotel(id, name, address)**: Information about the hotel
    - id: Unique id of the hotel
    - name: Name of the hotel
    - address: Address of the hotel

id	name	address
1	Hotel De Anza	233 W Santa Clara St, San Jose, CA 95113
2	Hyatt Place San Jose/Downtown	282 S Almaden Blvd, San Jose, CA 95113
3	Hotel Fairmont San Jose	170 S Market St, San Jose, CA 95113
4	Four Points by Sheraton San Jose Downtown	211 S 1st St, San Jose, CA 95113
5	Holiday Inn San Jose - Silicon Valley	1350 N 1st St, San Jose, CA 95112
6	Wyndham Garden San Jose Airport	1355 N 4th St, San Jose, CA 95112
7	Staybridge Suites San Jose	1602 Crane Ct, San Jose, CA 95112
8	Hyatt Place San Jose Airport	82 Karina Ct, San Jose, CA 95131
9	DoubleTree by Hilton Hotel San Jose	2050 Gateway Pl, San Jose, CA 95110
10	Hampton Inn & Suites San Jose Airport	2088 N 1st St, San Jose, CA 95131
11	Avatar Hotel	4200 Great America Pkwy, Santa Clara, C...
12	Best Western University Inn Santa Clara	1655 El Camino Real, Santa Clara, CA 95050
13	Hilton Garden Inn San Jose/Milpitas	30 Ranch Dr, Milpitas, CA 95035
14	Hilton Santa Clara	4949 Great America Pkwy, Santa Clara, C...
15	Hyatt Regency Santa Clara	5101 Great America Pkwy, Santa Clara, C...
16	Hyatt House San Jose/Silicon Valley	75 Headquarters Dr, San Jose, CA 95134

- **Payment(cardNum, cvv, expDate)**: Information regarding Customer's card payment
    - cardNum: Number of the card
    - cvv: The card's verification value
    - expDate: Expiration date of card

cardNum	cvv	expDate
4092261171840597	379	2024-03-01
4120398623022402	449	2022-10-01
4148270601126331	852	2021-04-01
4159176781677926	220	2023-08-01
4507542156238116	229	2022-02-01
4512924086141789	342	2021-06-01
4519545549552537	500	2021-07-01
4530024011467314	246	2023-01-01
4557051659435814	803	2023-11-01
4564914461228654	895	2023-11-01
4569617077785679	554	2020-11-01
5190620988663344	876	2022-05-01
5200260353509554	834	2020-04-01
5364384357194734	479	2024-12-01
5495301640879642	488	2024-09-01

- **Inventory(<u>itemID</u>, name, Description, quantity)**: Information about the items used for upkeeping the hotel
    - <u>itemID</u>: Unique id of the inventory
    - Name: Name of the item
    - Description: Describes what the inventory is
    - Quantity: The amount of left of the inventory

itemId	name	description	quantity
1	Dishes	Needed for kitchens and restaurants	5000
2	Chair	Needed by various rooms and lobby	2500
3	Couch	Needed by various rooms and lobby	2000
4	Table	Needed by various rooms and lobby	1000
5	Bed	Needed for rooms	1000
6	TV	Needed for various rooms	800
7	Silverware	Needed for kitchens and restaurants	8000
8	Towel	Needed for rooms and restaurants	15000
9	Steak	Needed for kitchen	3000
10	Chicken	Needed for kitchen	3000
11	Shrimp	Needed for kitchen	1500
12	Vegetable	Needed for kitchen	1500
13	Potato	Needed for kitchen	4000
14	Mirror	Needed for various rooms	1000
15	Hairdryer	Needed for rooms	1000

- **User(<u>id,</u> userName, firstName, lastName, email, passHash)**: Login information of database users
    - <u>id</u>: Unique ID of the database user
    - userName: The username of the user
    - firstName: First name of the user
    - lastName: Last name of the user
    - email: Email of the user
    - passHash: Hashed password of user for authentication

id	userName	firstName	lastName	email	passHash
1	bronsinb	Bronsin	Benyamin	test@email.com	5d41402abc4b2a76b9719d911017c592
2	raza	Raza	Ghulam	test@email.com	5d41402abc4b2a76b9719d911017c592
3	kevin	Kevin	Pham	test@email.com	5d41402abc4b2a76b9719d911017c592
4	johndoe	John	Doe	test@email.com	5d41402abc4b2a76b9719d911017c592
5	Random	Ran	Dom	test@email.com	5d41402abc4b2a76b9719d911017c592
6	Random2	Ran	Dom	test@email.com	5d41402abc4b2a76b9719d911017c592
7	Random3	San	Jose	test@email.com	5d41402abc4b2a76b9719d911017c592
8	Random4	David	Smith	test@email.com	5d41402abc4b2a76b9719d911017c592
9	Random5	John	Smith	test@email.com	5d41402abc4b2a76b9719d911017c592
10	Random6	Smith	David	test@email.com	5d41402abc4b2a76b9719d911017c592
11	Random7	Ben	Bron	test@email.com	5d41402abc4b2a76b9719d911017c592
12	lebronja...	LeBron	James	test@email.com	5d41402abc4b2a76b9719d911017c592
13	kobe	Kobe	Bryant	test@email.com	5d41402abc4b2a76b9719d911017c592
14	curry	Steph	Curry	test@email.com	5d41402abc4b2a76b9719d911017c592
15	jamesbond	James	Bond	test@email.com	5d41402abc4b2a76b9719d911017c592
16	mikewu	Mike	Wu	test@email.com	5d41402abc4b2a76b9719d911017c592

*Note the emails and hash will be unique when website is created

- **Room(HotelId, <u>roomNum</u>, type, status)**: Information about room
    - HotelId: The primary key of the hotel
    - <u>roomNum</u>: Unique room number of the hotel
    - type: The type of room (Single, Double, Triple, Suite)
    - status: Availability of the room (Booked, Available)

hotelID	roomNum	type	status
1	1	Single	Available
2	1	Double	Available
3	1	Triple	Available
4	1	Suite	Available
5	1	Single	Booked
6	1	Triple	Booked
7	1	Suite	Available
8	1	Double	Available
9	2	Single	Booked
10	10	Triple	Booked
11	8	Double	Available
12	13	Double	Booked
13	4	Single	Available
14	8	Suite	Available
15	10	Double	Booked
16	9	Triple	Booked

- **Employee(isAdmin, salary)**: Hotel employee user with information about his employment
    - isAdmin: Defines if the employee is an admin (privileges)
    - salary: Employee's monthly salary

userId	isAdmin	salary
1	1	100000
2	1	100000
3	1	100000
7	0	40000
9	0	80000
10	0	47000
13	0	90000
14	0	30000
15	0	60000
26	0	40000
41	0	76000
43	0	60000
51	0	55000
72	0	70000
84	0	70000

- **Customer(reserveNum)**: Keeps track of returning customers
    - reserveNum: Amount of times customer booked/reserved a room with hotel

user_id	reserveNum
1	1
2	2
3	0
4	10
5	11
6	9
7	5
8	12
9	1
10	7
11	9
12	15
13	11
14	2
15	10

7.2.2 Relationships

- **keep(HotelId, InventoryItemID):** Relationship between hotel and its inventory
    - HotelId: The primary key of the hotel
    - InventoryItemID: The primary key of the Inventory

hotelId	inventoryItemId
1	2
1	3
1	5
2	1
2	3
3	4
4	1
5	10
6	4
7	8
8	7
9	5
12	2
12	3
14	11

- **reserve(Customerid, StartFrom, TimePeriod, RoomNum)**: Information in relation to customer, its room and the time period the room will be booked for.
    - CustomerId: the guest reserve number
    - TimePeriod: Defines the guest's stay period.
    - RoomNum: The guest's room number

Customerid	StartFrom	TimePeriod	RoomNum
1001	2019-12-31	2	101
1009	2019-12-31	2	101
1011	2019-12-31	5	102
1012	2019-12-21	1	105
1021	2019-12-21	3	301
1010	2019-10-31	2	401
1100	2019-11-21	2	510
1110	2019-11-11	2	413
1101	2019-12-01	3	110
1013	2019-12-10	4	111
1014	2019-10-10	3	220
1015	2019-12-09	2	310
1016	2019-12-25	1	331
1017	2019-12-21	6	102
1018	2019-11-19	2	420

- **has(HotelId, UserId)**: Relationship between hotel and its users
    - HotelId: The primary key of the hotel
    - UserId: The primary key of the hotel

hotelID	userID
1	2
2	13
3	5
4	1
5	8
6	2
7	4
8	8
9	2
10	3
11	9
12	7
13	1
14	4
15	6
16	8

- **have(CustomerId, PaymentCardNum)**: Relationship between customer and their payment information
    - CustomerId: The primary key of the hotel
    - PaymentCardNum: The primary key of the payment

userId	cardNum
1	4120398623022402
1	4148270601126331
1	4564914461228654
2	4159176781677926
2	4507542156238116
3	4148270601126331
4	4148270601126331
5	4507542156238116
6	5364384357194734
7	5364384357194734
8	5364384357194734
9	5364384357194734
12	4557051659435814
12	4564914461228654
14	5190620988663344