

CIS017-1 – Computer Systems Structure 2022-2023
CIS095-1 – Databases and Computer Networking 2022-2023
Assignment 1 – Design and Implement a Database
University ID: 2214109 Full Name: Roman Humagain

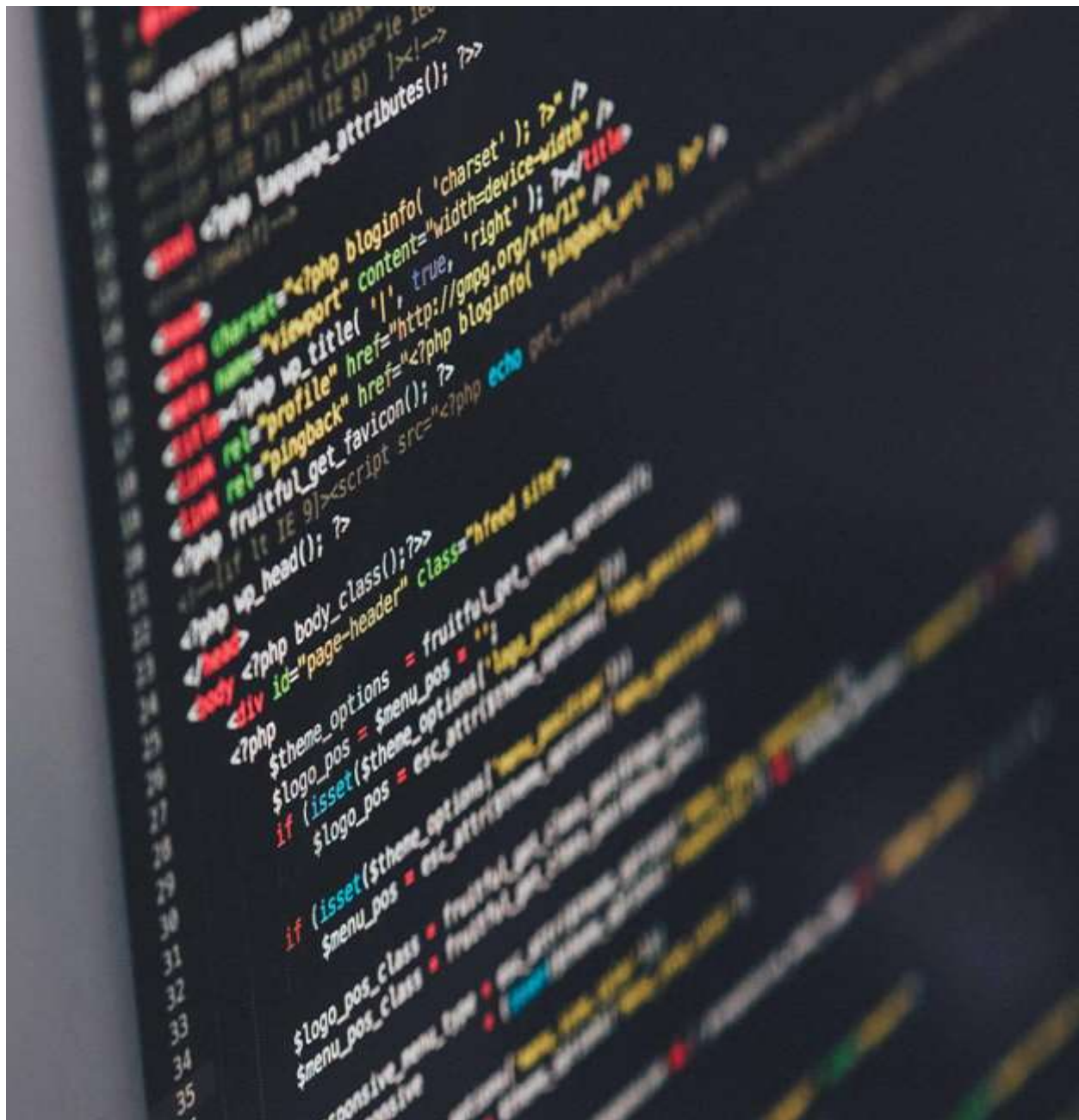


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Introduction

As the hotel wants an online hotel booking system for its customers, we are creating the online hotel booking application so that the customer can easily book their desired room through online. To complete this application, hotels require a database system that can store and manage customer information, booking information, services information, and room information accurately. For this application we should consider the following things so that the system can perform effectively.

Entity Relation Model:

In order to capture the relationship between the many entities and each attribute, an entity relationship model (ERM) is required for this purpose. It also helps to understand the system requirements. It helps make the database work more easily.

Normalization:

In database design, normalization is necessary to reduce data duplication and improve data correctness and consistency. To ensure that the database is properly structured, functional, and able to handle enormous amounts of data, normalization is necessary for this purpose.

Physical database design:

In order to establish the physical structure of the database and offer all the specific information about the attributes utilized in the database, we are creating the physical database design in this assignment.

Implementation of database:

For implementing a database, various queries and commands were used to create a database and different tables.

Task Description

In this assignment, we are assigned to create a database that corresponds to the provided scenario. This entails systematizing the design and implementation of the database in order for it to precisely store and manage customer, booking, service, and room details. A hotel wishes to offer a system

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for online hotel booking and management that makes it simpler for customers to register, book rooms, view their booking status, and cancel them, per this assignment. The customer must have registered with the hotel in order to sign in and make reservations for rooms. If not then they should be first registered by supplying their proper information such as name, address, phone number and email address. Customers' contact information should be recorded in the system together with booking information such arrival and departure dates and preferences for single or double rooms. The hotel manager should also verify that the requested accommodation will be available during the visit. Following a reservation, the hotel manager must assign the appropriate room; for this, the manager should also sign in.

Conceptual/Physical Database Design

Entity Relationship Model

An Entity Relationship Model (ERM) is the visual representation of a database that serves as a blueprint for creating the database. ERM consists of three major components: entity set, attribute set, relationship set. The ER model is designed for the proper implementation of the database based on its structure. (SINGH, n.d.)

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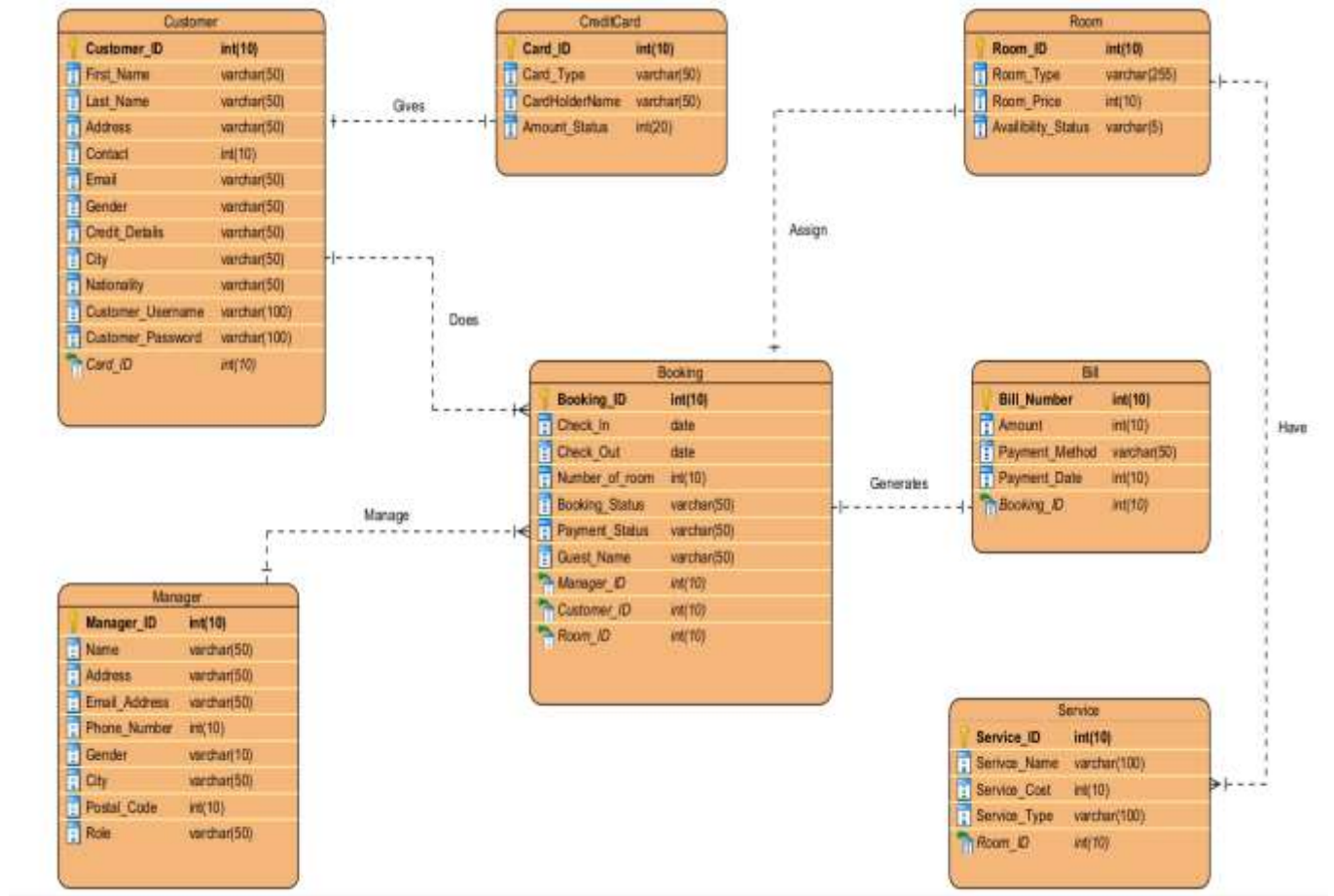


Figure 1 Entity Relationship Model

From the above Entity Relationship Model (ERM), the required entities and attributes are:

Customer entity: It represents to the customer in the Hotel. Major attributes for this entity are (Customer_ID, First_Name, Last_Name, Address, Contact, Email, Gender, CreditCard_Details, City, Customer_Username, Customer_Password). The customer entity will have a primary key of Customer_ID.

Booking entity: It refers to the booking made by the customers in the hotel. It includes major attributes like (Booking_ID, Check_In, Check_Out, Number_Of_Room, Payment_Status, Booking_Status, Guest_Name). The booking entity will have a primary key of Booking_ID.

Room entity: It represent the available room details in the hotel. It includes attributes

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(Room_ID, Room_Type, Room_Price). The room entity will have a primary key of Room_ID.

Manager entity: It represent to the manager of the hotel who manages the booking. It includes the attributes like (Manager_ID, First_Name, Last_Name, Address, Phone_Number, Email_Address, Role). The manager entity will have a primary key of Manager_ID.

Bill entity: It represents the customer's payment made after the booking. . It includes major attributes like (Bill_Number, Payment_Method, Payment_Type). Here, the Bill_Number is the primary key for the bill entity.

Service entity: It represents to the services provided by the hotel. Major Attributes for this entity (Service_ID, Service_Name, Service_Cost). Here, the Service_ID is the primary key for the service entity.

Creditcard entity: It represents to the card details provided during registration. It includes major attributes like (Card_ID, Card_Type, Card_Holder_Name). This entity will have a primary key of Card_ID.

Relation between the entities

Since a customer can have many bookings, but each booking is associated with only one customer, the relation between the customer and the booking is one-to-many. Here, the primary key of the customer entity (Customer_ID) will be the foreign key in the booking entity.

One booking can only be associated with one room, and only one room can be associated with one booking. so the relationship between the room and the booking is one-to-many. In this case, the primary key of the room (Room_ID) will be the foreign key in the booking entity.

Since during the time of registration, one customer provides one credit card number to the hotel, the relationship between the customer and the credit card will be one-to-one. Here the primary key of the creditcard entity (Card_ID) will be the foreign key in the customer entity.

As the manager's role in the hotel is to manage bookings , one manager can manage many bookings, so the relationship between the manager and the booking is one-to-many. The primary key of the manager entity (Manager_ID) will be the foreign key in the booking entity.

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As each booking has only one bill associated with it, and each bill can only be associated with a single booking booked by the customer, the booking and bill entities have a one-to-one relationship. The primary key of the booking entity (Booking_ID) will be the foreign key in the bill entity.

As a single room can have many more services provided, the relation between the room entity and the service entity will be one-to-many. The primary key of the room entity (Room_ID) will be the foreign key in the service entity in this case.

Normalization

Normalization is a database design technique that reduces data redundancy and removes unwanted characteristics. (Peterson, 2023). In other words, normalization is the process of dividing a large table into smaller tables in order to reduce data redundancy and improve data consistency. (Mohan Bala & Kipp Martin, 1997)

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UNF	1NF	2NF	3NF
<u>Customer ID</u>	<u>Customer ID</u>	<u>Customer ID</u>	<u>Customer ID</u>
First_Name	First_Name	First_Name	Card_ID*
Last_Name	Last_Name	Last_Name	First_Name
Address	Address	Address	Last_Name
Contact_No	Contact_No	Contact_No	Address
Email	Email	Email	Contact_No
Gender	Gender	Gender	Email
CreditCard_Details	CreditCard_Details	CreditCard_Details	Gender
City	City	City	CreditCard_Details
Nationality	Nationality	Nationality	City
Customer_Username	Customer_Username	Customer_Username	Nationality
Customer_Password	Customer_Password	Customer_Password	Customer_Username
Manager_ID	CreditCard_ID	CreditCard_ID	Customer_Password
First_Name	Card_Holder_Name	Card_Holder_Name	
Last_Name	Card_Type	Card_Type	<u>Manager ID</u>
Email_Address	Amount_Status	Amount_Status	First_Name
Phone_Number			Last_Name
Gender	<u>Customer ID</u>	<u>Manager ID</u>	Email_Address
City	<u>Booking ID</u>	First_Name	Phone_Number
Postal_Code	Check_IN	Last_Name	Gender
Role	Check_Out	Email_Address	City
Boooking_ID	Number_Of_Room	Phone_Number	Postal_Code
Check_IN	Booking_Status	Gender	Role
Check_Out	Payment_Status	City	
Number_Of_Room	Guest_Name	Postal_Code	<u>Booking ID</u>
Booking_Status	<u>Room ID</u>	Role	Customer_ID*
Payment_Status	Room_Type		Manager_ID*

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Guest_Name	Room_Price	Customer_ID	Room_ID*
Room_ID	Availability_Status	<u>Booking_ID</u>	Check_IN
Room_Type	Bill_Number	Check_IN	Check_Out
Room_Price	Amount	Check_Out	Number_Of_Room
Availability_Status	Payment_Method	Number_Of_Room	Booking_Status
Bill_Number	Payment_Date	Booking_Status	Payment_Status
Amount	Service_ID	Payment_Status	Guest_Name
Payment_Method	Service_Type	Guest_Name	
Payment_Date	Service_Cost	Bill_Number	<u>Service_ID</u>
Service_ID	Manager_ID	Amount	Room_ID*
Service_Type	First_Name	Payment_Method	Service_Type
Service_Cost	Last_Name	Payment_Date	Service_Cost
Card_ID	Email_Address		
Card_Holder_Name	Phone_Number	<u>Room_ID</u>	<u>Bill_Number</u>
Amount_Status	Gender	Room_Type	Booking_ID*
Card_Type	City	Room_Price	Amount
	Postal_Code	Availability_Status	Payment_Method
	Role	Service_ID	Payment_Date
		Service_Type	
		Service_Cost	<u>Room_ID</u>
			Room_Type
			Room_Price
			Availability_Status
			<u>Card_ID</u>
			Card_Holder_Name
			Card_Type
			Amount_Status

Table 1 Normalization

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The above table is the normalized table for the online hotel booking system. Four stages of normalization are shown in the above table

In an Unnormalized table (UNF), the attributes are not atomic/single valued, and the attributes are placed randomly.

The column (1NF) shown above is in first normal form (1NF), meaning that all the attributes are single-valued and there are no repeating values. Any repeating values have been separated into a separate table to ensure adherence to 1NF principles.

Whereas in the column of 2NF from the above table, the attributes that have partial dependence are separated into a separate table. So, in this way, we can say that the column of 2NF is in Second Normal Form.

The 3NF column in the above table follows the principles of third normal form, as it separates any attributes that have transitive dependencies into separate tables. For example, attributes such as Service_ID, Bill_Number, and CreditCard_ID have been separated into distinct tables based on their dependencies.

Physical Database Design

Skeleton Tables

Customer (**Customer_ID**, First_Name, Last_Name, Address, Contact, Email, Gender, Creditcard_Details, City, Nationality, Customer_Username, Customer_Password, **Card_ID***)

Booking(**Booking_ID**, Check_In, Check_Out, Number_of_room, Booking_Status, Payment_Status, Guest_Name, **Manager_ID***, **Customer_ID***, **Room_ID***)

Manager (**Manager_ID**, Name, Address, Email_Address, Phone_Number, Gender, City, Postal_Code, Role)

Room(**Room_ID**, Room_Type, Room_Price, Availability_Status)

Bill(**Bill_Number**, Amount, Payment_Method, Payment_Date, **Booking_ID***)

Service(**Service_ID**, Service_Name, Service_Cost, Service_Type, **Room_ID***)

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Creditcard(**Card_ID**, Card_Type, CardHolderName, Amount_Status)

Data Dictionary

The process of converting a data model into the physical data structure of a specific database management system is known as physical database design. (Banister, 2021)

Customer Table

Description: Customers Details

Field Name	Datatypes	Field Length	constraints	Null	Validation Rule	Description
Customer_ID (primary key)	int(15)	15	Primary Key	No	It must be unique	It uniquely define every costumer details
Card_ID (Foreign Key)	int(15)	15	Foreign Key	No		Foreign key reference to CreditCard entity
First_Name	varchar(50)	50	Not Null	No		First name of the customer
Last_Name	varchar(50)	50	Not Null	No		Last name of the customer
Address	varchar(60)	60	Not Null	No		Address of the customer
Contact	int(20)	20	Not Null	No		Contact of the customer
Email	varchar(100)	100	Not Null	No	It must be in email format Containing an @ and a ‘.’	Email address of the customer
Gender	varchar(20)	20	Not Null	No		Gender of the customer
City	varchar(50)	50	Not Null	No		City where customer live
Nationality	varchar(50)	50	Not Null	No		Nationality of the customer
DOB	date		Not Null	No		Date of birth of the customer

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Customer_Password	varchar(100)	100	Not Null	No	It must have at least 8 character	Password of the customer
Customer_Username	varchar(100)	100	Not Null	No		Username of the customer

Table 2 Customer table

Indexes

key name	Type	Unique	Column Name	Null
PRIMARY	BTREE	Yes	Customer_ID	No
FOREIGN	BITRE	No	Card_ID	No

Booking Table

Description: Booking's Details

Field Name	Datatypes	Field Length	constraints	Null	Validation Rule	Description
Booking_ID (primary key)	int(15)	15	Primary Key / Auto Increments	No	It must be unique	It uniquely define every booking details
Customer_ID (Foreign key)	int(15)	15	Foreign key, Reference customer	No		Foreign key reference to customer entity
Manager_ID (Foreign key)	int(15)	15	Foreign key, Reference manager	No		Foreign key reference to manager entity

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Room_ID (Foreign Key)	Int(15)	15	Foreign key , Reference Room	No		Foreign key reference to room entity
Check_In	date	-	Not Null	No		Arrival date of the customer
Check_Out	date	-	Not Null	No		Departure date of the customer
Number_Of_Room	int(10)	10	Not Null	No		Number of room available in the hotel
Guest_Name	varchar(50)	50	Not Null	No		Name of guest

Table 3 Booking table

Indexes

key name	Type	Unique	Column Name	Null
PRIMARY	BTREE	Yes	Booking_ID	No
FOREIGN	BTREE	No	Customer_ID/reference Customer entity	No
FOREIGN	BTREE	No	Manager_ID/ reference Manager entity	No
FOREIGN	BTREE	No	Room_ID/reference Room entity	No

Room Table

Description: Room's Details

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Field Name	Datatypes	Field Length	constraints	Null	Validation Rule	Description
Room_ID (primary key)	int(15)	15	Primary Key / Auto Increments	No	It must be unique	It uniquely define every room details
Room_Type	varchar(50)	50	Not Null	No		Types of room
Room_Price	int(20)	20	Not Null	No		Price of the room
Availability_Status	Varchar(5)	5	Not Null	No		Availability status of the room

Table 4 Room table

Indexes

key name	Type	Unique	Column Name	Null
PRIMARY	BTREE	Yes	Room_ID	No

Bill Table

Description: Payment's Details

Field Name	Datatypes	Field Length	constraints	Null	Validation Rule	Description
Bill_Number (primary key)	int(15)	15	Primary Key / Auto Increments	No	It must be unique	It uniquely define every payments details
Booking_ID (Foreign key)	int(15)	15	Foreign key ,Reference Booking	No		Foreign key reference to booking entity

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Amount	int(50)	15	Not Null	No		Amount paid by Customer
Payment_Method	varchar(100)	100	Not Null	No		Methods to pay the hotel
Payment_Date	date	-	Not Null	No		Date where payments are successful

Table 5 Bill table

Indexes

key name	Type	Unique	Column Name	Null
PRIMARY	BTREE	Yes	Bill_Number	No
FOREIGN	BTREE	No	Booking_ID/reference Booking	No

Manager Table

Description: Manager's Details

Field Name	Datatypes	Field Length	constraints	Null	Validation Rule	Description
Manager_ID (primary key)	int(15)	15	Primary Key / Auto Increments	No	It must be unique	It uniquely define every manager details
Name	varchar(50)	50	Not Null	No		Name of the manager
Address	varchar(50)	50	Not Null	No		Address of the manager
Email	varchar(50)	50	Not Null	No	It must be in email format containing an @ and a '.'	Email of the manager
Phone_Number	int(10)	10	Not Null	No		Phone number of the manager

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City	varchar(50)	50	Not Null	No		Place where manager live
Roles	varchar(50)	50	Not Null	No		Roles played by the manager

Table 6 Manager table

Indexes

key name	Type	Unique	Column Name	Null
PRIMARY	BTREE	Yes	Manager_ID	No

Service Table

Description: Services Details

Field Name	Datatypes	Field Length	constraints	Null	Validation Rule	Description
Service_ID (primary key)	int(15)	15	Primary Key / Auto Increments	No	It must be unique	It uniquely define every costumer details
Room_ID (Foreign key)	int(15)	15	Foreign key ,Reference Room	No		Foreign key reference to room entity
Service_Name	varchar(100)	100	Not Null	No		Service name provided by the hotel
Service_Type	varchar(100)	100	Not Null	No		Service type provided by the hotel
Service_Cost	int(10)	10	Not Null	No		Cost of the service

Table 7 Service table

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Indexes

key name	Type	Unique	Column Name	Null
PRIMARY	BTREE	Yes	Service_ID	No
FOREIGN	BTREE	No	Room_ID/reference Room	No

Creditcard Table

Description: Card Details

Field Name	Datatypes	Field Length	constraints	Null	Validation Rule	Description
Card_ID (primary key)	int(15)	15	Primary Key /Auto Increments	No	It must be unique	It uniquely define every card details
Card_Type	varchar(50)	50	Not Null	No		Type of the card
Cardholder_Name	varchar(50)	50	Not Null	No		Name of the card holder
Amount_Status	int(20)	20	Not Null	No		available amount on the card

Table 8 Creditcard table

Indexes

key name	Type	Unique	Column Name	Null
PRIMARY	BTREE	Yes	Card_ID	No

Implementation of the Database

MySQL RDMS is used for creating the database and tables.

To create a customer table

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```
1 CREATE TABLE Customer (Customer_ID int(10) NOT NULL AUTO_INCREMENT,  
2 First_Name varchar(50) NOT NULL,  
3 Last_Name varchar(50) NOT NULL,  
4 Address varchar(50) NOT NULL,  
5 Contact int(10) NOT NULL,  
6 Email varchar(50) NOT NULL,  
7 Gender varchar(50) NOT NULL,  
8 Credit_Details varchar(50) NOT NULL,  
9 City varchar(50) NOT NULL,  
10 Nationality varchar(50) NOT NULL,  
11 Customer_Username varchar(100) NOT NULL,  
12 Customer_Password varchar(100) NOT NULL,  
13 Card_ID int(10) NOT NULL,  
14 FOREIGN KEY(Card_ID) REFERENCES CreditCard(Card_ID),  
15 PRIMARY KEY (Customer_ID));  
16
```

Figure 2 Creating customer table

The above queries are for creating a customer table, which helps store all the customers details.

Result for successfully created customer table



The screenshot shows a MySQL query result interface. At the top, a green status bar indicates: "✓ MySQL returned an empty result set (i.e. zero rows). (Query took 0.0008 seconds.)". Below this, the SQL query "SELECT * FROM `customer`" is displayed. A toolbar contains options: "Profiling", "Edit inline", "Edit", "Explain SQL", "Create PHP code", and "Refresh". The main area shows the column headers for the 'customer' table: Customer_ID, First_Name, Last_Name, Address, Contact, Email, Gender, Credit_Details, City, Nationality, Customer_Username, Customer_Password, and Card_ID. At the bottom, there is a button labeled "Query results operations".

Figure 3 Result for successfully created customer table

Inserting values into customer table

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```

1 INSERT INTO `customer` (`Customer_ID`, `First_Name`, `Last_Name`, `Address`, `Contact`, `Email`, `Gender`,
  `Credit_Details`, `City`, `Nationality`, `Customer_Username`, `Customer_Password`, `Card_ID`) VALUES
2 ((113, 'Aswin', 'K.C', 'Kathmandu', 984145678, 'aswinkc@gmail.com', 'Male', 'balance transfercard',
  'Kathmandu', 'Nepalese', 'aswin.kc', '##aswin@1200', 9980532),
3 ((112, 'Rahul', 'Shrestha', 'Lalitpur', 986732490, 'rahulshr@gmail.com', 'Male', 'balance transfercard',
  'Lalitpur', 'Nepalese', 'rahul.shrestha', '@rahul@1234', 7766896),
4 ((111, 'Roman', 'Humagain', 'Bhaktapur', 981122345, 'roman07@gmail.com', 'Male', 'balance transfercard',
  'Bhaktapur', 'Nepalese', 'roman.humagain', 'roman@1234', 5550034),
5 ((115, 'Anup', 'Poudel', 'Pokhara', 988856450, 'anup68@gmail.com', 'Male', 'balance transfercard',
  'Pokhara', 'Nepalese', 'anup.poudel', '$anup@1234', 3354411),
6 ((114, 'Sushant', 'Gautam', 'Bhaktapur', 986595611, 'sushant34@gmail.com', 'Male', 'balance transfercard',
  'Bhaktapur', 'Nepalese', 'sushant.gautam', 'sushant@@@', 2250021));
7

```

Figure 4 Inserting values into customer table

Result of inserting values into the customer table

Customer_ID	First_Name	Last_Name	Address	Contact	Email	Gender	Credit_Details	City	Nationality	Customer_Username	Customer_Password	Card_ID
112	Rahul	Shrestha	Lalitpur	986732490	rahulshr@gmail.com	Male	balance transfercard	Lalitpur	Nepalese	rahul.shrestha	@rahul@1234	7766896
111	Roman	Humagain	Bhaktapur	981122345	roman07@gmail.com	Male	balance transfercard	Bhaktapur	Nepalese	roman.humagain	roman@1234	5550034
113	Aswin	K.C	Kathmandu	984145678	aswinkc@gmail.com	Male	balance transfercard	Kathmandu	Nepalese	aswin.kc	##aswin@1200	9980532
115	Anup	Poudel	Pokhara	988856450	anup68@gmail.com	Male	balance transfercard	Pokhara	Nepalese	anup.poudel	\$anup@1234	3354411
114	Sushant	Gautam	Bhaktapur	986595611	sushant34@gmail.com	Male	balance transfercard	Bhaktapur	Nepalese	sushant.gautam	sushant@@@	2250021

Figure 5 Result of inserting values into customer table

To create a booking table

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```
1 CREATE TABLE Booking (Booking_ID int(10) NOT NULL AUTO_INCREMENT,  
2     Check_In date NOT NULL,  
3     Check_Out date NOT NULL,  
4     Number_of_room int(10) NOT NULL,  
5     Booking_Status varchar(50) NOT NULL,  
6     Payment_Status varchar(50) NOT NULL,  
7     Guest_Name varchar(50) NOT NULL,  
8     Manager_ID int(10) NOT NULL,  
9     Customer_ID int(10) NOT NULL,  
10    Room_ID int(10) NOT NULL,  
11    FOREIGN KEY(Manager_ID) REFERENCES manager(Manager_ID),  
12    FOREIGN KEY(Customer_ID) REFERENCES customer(Customer_ID),  
13    FOREIGN KEY(Room_ID) REFERENCES room(Room_ID),  
14    PRIMARY KEY (Booking_ID));  
15
```

Figure 6 Creating booking table

The above queries are for creating a booking table that stores all the booking information of the customer.

Result for successfully created booking table

✓ MySQL returned an empty result set (i.e. zero rows). (Query took 0.0268 seconds.)

```
SELECT * FROM `booking`
```

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Booking_ID	Check_In	Check_Out	Number_of_room	Booking_Status	Payment_Status	Guest_Name	Manager_ID	Customer_ID	Room_ID
------------	----------	-----------	----------------	----------------	----------------	------------	------------	-------------	---------

Figure 7 Result for successfully created booking table

Inserting values into the booking table

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```
1 INSERT INTO `booking` (`Booking_ID`, `Check_In`, `Check_Out`, `Number_of_room`, `Booking_Status`,  
2 `Payment_Status`, `Guest_Name`, `Manager_ID`, `Customer_ID`, `Room_ID`) VALUES  
3 (101, '2023-02-15', '2023-02-17', 2, 'approved', 'payed', 'Rahul Shrestha', 353, 112, 12),  
4 (202, '2023-03-06', '2023-03-07', 1, 'approved', 'payed', 'Roman Humagain', 343, 111, 10),  
5 (303, '2023-01-12', '2023-01-13', 1, 'booked', 'pending', 'Aswin K.C', 333, 113, 14),  
6 (404, '2023-03-22', '2023-03-23', 1, 'approved', 'payed', 'Anup Poudel', 363, 115, 10),  
7 (505, '2023-02-09', '2023-02-10', 1, 'booked', 'pending', 'Sushant Gautam', 373, 114, 10);
```

Figure 8 Inserting values into booking table

Result of inserting values into the booking table

Booking_ID	Check_In	Check_Out	Number_of_room	Booking_Status	Payment_Status	Guest_Name	Manager_ID	Customer_ID	Room_ID
101	2023-02-15	2023-02-17	2	approved	payed	Rahul Shrestha	353	112	12
202	2023-03-06	2023-03-07	1	approved	payed	Roman Humagain	343	111	10
303	2023-01-12	2023-01-13	1	booked	pending	Aswin K.C	333	113	14
404	2023-03-22	2023-03-23	1	approved	payed	Anup Poudel	363	115	10
505	2023-02-09	2023-02-10	1	booked	pending	Sushant Gautam	373	114	10

Figure 9 Result of inserting values into booking table

To create a manager table

```
1 CREATE TABLE Manager (Manager_ID int(10) NOT NULL AUTO_INCREMENT,  
2 Name varchar(50) NOT NULL,  
3 Address varchar(50) NOT NULL,  
4 Email_Address varchar(50) NOT NULL,  
5 Phone_Number int(10) NOT NULL,  
6 Gender varchar(10) NOT NULL,  
7 City varchar(50) NOT NULL,  
8 Postal_Code int(10) NOT NULL,  
9 Role varchar(50) NOT NULL,  
10 PRIMARY KEY (Manager_ID));  
11
```

Figure 10 Creating manager table

The above queries are for creating the manager table, which stores the data of the manager and also stores the data about the booking made by the customer.

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Result for successfully created manager table



Figure 11 Result for successfully created manager table

Inserting value into the manager table



Figure 12 Inserting values into manager table

Result of inserting values into the manager table

Manager_ID	Name	Address	Email_Address	Phone_Number	Gender	City	Postal_Code	Role
353	Bikash Thapa	Kathmandu	bikas111@gmail.com	981393287	Male	Kathmandu	44600	administrator
333	Sunanda Regmi	Kathmandu	sunanda01@gmail.com	984543229	Male	Kathmandu	44600	managing director
343	Krishna Shrestha	Lalitpur	krishna45@gmail.com	986743200	Male	Lalitpur	44700	administrator
363	Ajay Sharma	Pokhara	ajay45@gmail.com	986573299	Male	Pokhara	33700	managing director
373	Prakash Shrestha	Lalitpur	prakash99@gmail.com	984375232	Male	Lalitpur	44700	administrator

Figure 13 Result of inserting values into manager table

To create a room table

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```
1 CREATE TABLE Room (Room_ID int(10) NOT NULL AUTO_INCREMENT,  
2                      Room_Type varchar(255) NOT NULL,  
3                      Room_Price int(10) NOT NULL,  
4                      Availability_Status varchar(6) NOT NULL,  
5                      PRIMARY KEY (Room_ID));  
6
```

Figure 14 Creating room table

The above queries are for creating room table, which store the data of the available rooms in the hotel.

Result for successfully created room table

✓ MySQL returned an empty result set (i.e. zero rows). (Query took 0.0007 seconds.)

```
SELECT * FROM `room`
```

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Room_ID	Room_Type	Room_Price	Availability_Status
---------	-----------	------------	---------------------

Figure 15 Result for successfully created room table

Inserting values into the room table

```
1 INSERT INTO `room` (`Room_ID`, `Room_Type`, `Room_Price`, `Availability_Status`) VALUES  
2 (10, 'single', 2500, 'true'),  
3 (12, 'double', 3000, 'true'),  
4 (14, 'twin', 3500, 'true');  
5
```

Figure 16 Inserting values into room table

Result of inserting values into the room table

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Room_ID	Room_Type	Room_Price	Availability_Status
10	single	2500	true
12	double	3000	true
14	twin	3500	true

Figure 17 Result of inserting values into room table

To create a bill table

```
1 CREATE TABLE Bill (Bill_Number int(10) NOT NULL AUTO_INCREMENT,  
2 Amount int(10) NOT NULL,  
3 Payment_Method varchar(50) NOT NULL,  
4 Payment_Date int(10) NOT NULL,  
5 Booking_ID int(10) NOT NULL,  
6 FOREIGN KEY(Booking_ID) REFERENCES booking(Booking_ID),  
7 PRIMARY KEY (Bill_Number));  
8
```

Figure 18 Creating bill table

The above queries are for creating a bill table, which stores all the billing details made by the customers.

Result for successfully created bill table

✓ MySQL returned an empty result set (i.e. zero rows). (Query took 0.0007 seconds.)

SELECT * FROM `bill`

☐ Profiling [[Edit inline](#)] [[Edit](#)] [[Explain SQL](#)] [[Create PHP code](#)] [[Refresh](#)]

Bill_Number	Amount	Payment_Method	Payment_Date	Booking_ID
-------------	--------	----------------	--------------	------------

Figure 19 Result for successfully created bill table

Inserting values into the bill table

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```
1 INSERT INTO `bill` (`Bill_Number`, `Amount`, `Payment_Method`, `Payment_Date`, `Booking_ID`)
  VALUES
2 (1023, 10000, 'online payment', '2023-03-07', 202),
3 (1025, 12000, 'cash', '2023-02-17', 101),
4 (1026, 9000, 'cheque', '2023-03-23', 404);
5
```

Figure 20 Inserting values into bill table

Result of inserting values into the bill table

Bill_Number	Amount	Payment_Method	Payment_Date	Booking_ID
1025	12000	cash	2023-02-17	101
1023	10000	online payment	2023-03-07	202
1026	9000	cheque	2023-03-23	404

Figure 21 Result of inserting values into bill table

To create a service table

```
1 CREATE TABLE Service (Service_ID int(10) NOT NULL AUTO_INCREMENT,
2     Service_Name varchar(100) NOT NULL,
3     Service_Cost int(10) NOT NULL,
4     Service_Type varchar(100) NOT NULL,
5     Room_ID int(10) NOT NULL,
6     FOREIGN KEY(Room_ID) REFERENCES room(Room_ID),
7     PRIMARY KEY (Service_ID));
8
```

Figure 22 Creating service table

The above queries are for creating a service table, which stores all the service details provided to the customer by the hotel.

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Result for successfully created service table

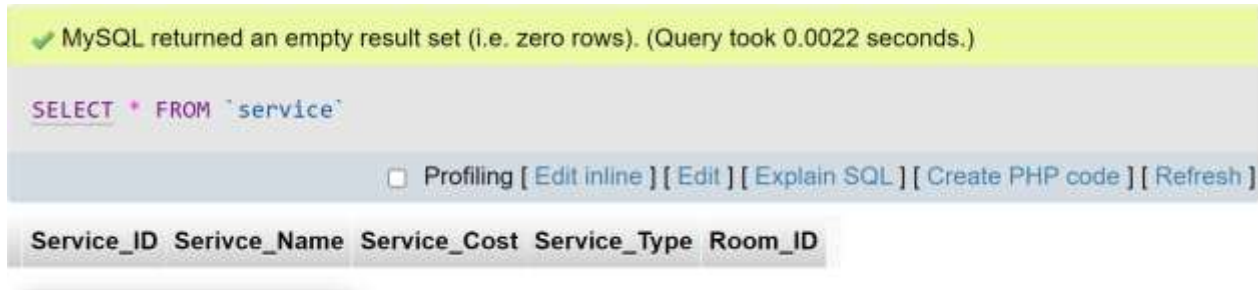


Figure 23 Result for successfully created service table

Inserting values into the service table

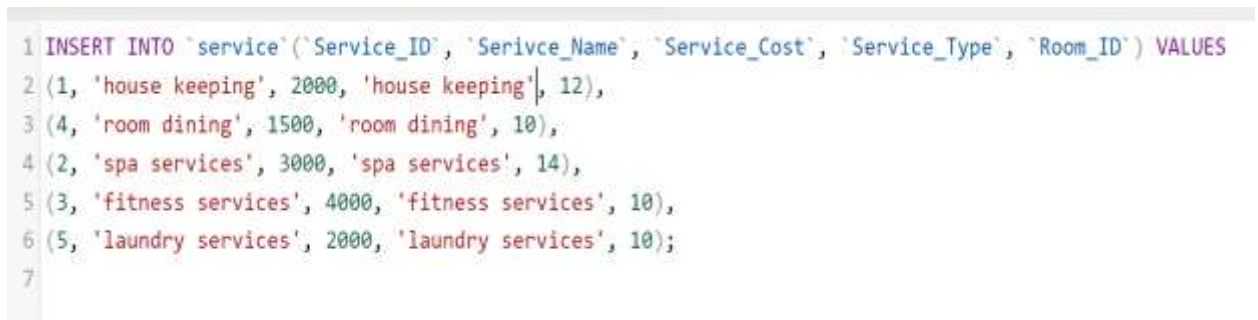


Figure 24 Inserting values into service table

Result of inserting value into the service table

Service_ID	Service_Name	Service_Cost	Service_Type	Room_ID
1	house keeping	2000	house keeping	12
4	room dining	1500	room dining	10
2	spa services	3000	spa services	14
3	fitness services	4000	fitness services	10
5	laundry services	2000	laundry services	10

Figure 25 Result of inserting values into service table

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To create a creditcard table

```
1 CREATE TABLE CreditCard (Card_ID int(10) NOT NULL AUTO_INCREMENT,  
2 Card_Type varchar(50) NOT NULL,  
3 CardHolderName varchar(50) NOT NULL,  
4 Amount_Status int(20) NOT NULL,  
5 PRIMARY KEY (Card_ID));  
6
```

Figure 26 Creating creditcard table

The above queries are for creating a creditcard table, which stores all the credit card details provided by the customer at the time of registration.

Result for successfully created creditcard table

✓ MySQL returned an empty result set (i.e. zero rows). (Query took 0.0008 seconds.)

```
SELECT * FROM `creditcard`
```

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Card_ID	Card_Type	CardHolderName	Amount_Status
---------	-----------	----------------	---------------

Figure 27 Result for successfully created creditcard table

Inserting values into the creditcard table

```
1 INSERT INTO `creditcard` (`Card_ID`, `Card_Type`, `CardHolderName`, `Amount_Status`) VALUES
2 (7766896, 'balance transfer card', 'Rahul Shrestha', 100000),
3 (55500342, 'balance transfer card', 'Roman Humagain', 200000),
4 (9980532, 'balance transfer card', 'Aswin K.C', 50000),
5 (2250021, 'balance transfer card', 'Sushant Gautam', 150000),
6 (3354411, 'balance transfer card', 'Anup Poudel', 80000);
```

Figure 28 Inserting values into creditcard table

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Result of inserting values into the creditcard table

Card_ID	Card_Type	CardHolderName	Amount_Status
7766896	balance transfer card	Rahul Shrestha	1000000
5550034	balance transfer card	Roman Humagain	200000
9980532	balance transfer card	Aswin K.C	50000
2250021	balance transfer card	Sushant Gautam	150000
3354411	balance transfer card	Anup Poudel	80000

Figure 29 Result of inserting values into creditcard table

Query Design and implementation

Query 1: To select all the customer with their booked room type and checkin and checkout date.

Description: Information on the rooms that guests have booked is important for hotel management to know. This allows them to keep track of room availability.

```
1 SELECT c.Customer_ID , CONCAT(c.First_Name , ' ' ,c.Last_Name) AS Fullname
   ,b.Check_In AS Arrival_Date,b.Check_Out AS Departure_Date ,r.Room_Type
2 FROM customer c
3 LEFT JOIN booking b
4 ON c.Customer_ID = b.Customer_ID
5 left JOIN room r
6 ON r.Room_ID = b.Room_ID;
7
```

Figure 30 Query 1

Result of the above queries

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Customer_ID	Fullname	Arrival_Date	Departure_Date	Room_Type
112	Rahul Shrestha	2023-02-15	2023-02-17	double
111	Roman Humagain	2023-03-06	2023-03-07	single
113	Aswin K.C	2023-01-12	2023-01-13	twin
115	Anup Poudel	2023-03-22	2023-03-23	single
114	Sushant Gautam	2023-02-09	2023-02-10	single

Figure 31 Result of query 1

This result provides information about the customer's ID, full name, arrival and departure dates, and the type of room they booked.

Query 2: To select all the customer who has booking approved

Description: The ability for management to select customers whose booking requests have been approved is critical for hotel operations management. This enables the administration to keep track of all bookings that have been approved.

```
1 SELECT b.Booking_Id, b.Check_In as Checkin_Date, CONCAT(c.First_Name, ' ', c.Last_Name) AS  
   FullName, c.Email, b.Booking_Status  
2 FROM customer c  
3 INNER JOIN booking b  
4 ON c.Customer_Id = b.Customer_Id  
5 WHERE b.Booking_Status LIKE '%approved%'  
6 GROUP BY b.Booking_Id;
```

Figure 32 Query 2

Result of the above queries

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Booking_Id	Checkin_Date	FullName	Email	Booking_Status
101	2023-02-15	Rahul Shrestha	rahulshr@gmail.com	approved
202	2023-03-06	Roman Humagain	roman07@gmail.com	approved
404	2023-03-22	Anup Poudel	anup68@gmail.com	approved

Figure 33 Result of query 2

This result shows that the booking status of 3 out of 5 customers has been approved.

Query 3: To select the customer name with highest payment along with booking_id

Description: This helps the hotel's management team identify which customer has paid the highest amount.

```

1 SELECT CONCAT(c.First_Name, ' ', c.Last_Name) AS FullName , b.Booking_ID, bi.Amount as Total_Amount
2 FROM customer c
3 INNER JOIN booking b ON c.Customer_ID = b.Customer_ID
4 INNER JOIN bill bi ON bi.Booking_ID = b.Booking_ID
5 GROUP BY c.First_Name
6 ORDER BY Total_Amount DESC
7 LIMIT 1;

```

Figure 34 Query 3

Result for this query

FullName	Booking_ID	Total_Amount
Rahul Shrestha	101	12000

Figure 35 Result of query 3

This shows that Mr. Rahul Shrestha with Booking_ID 101 made the highest payment among all customers.

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Query 4: To find the customer who haven't paid till

Description: It is important for hotel management to be able to see customers who have not paid for their bookings. This enables management team to communicate with customers and collect payments on time.

```
1 SELECT b.Booking_ID, CONCAT(c.First_Name , ' ' , c.Last_Name) AS Customer_Name, b.Payment_Status
2 FROM customer c
3 LEFT JOIN booking b
4 ON c.Customer_ID = b.Customer_ID
5 WHERE b.Payment_Status LIKE '%pending%'
6 GROUP BY b.Booking_ID;
7
```

Figure 36 Query 4

Result for the above queries

Booking_ID	Customer_Name	Payment_Status
303	Aswin K.C	pending
505	Sushant Gautam	pending

Figure 37 Result of query 4

The above result shows that there are two customers who have not yet paid for their purchases or services.

Query 5: To know the customer, booking and payment card information

Description: To confirm a booking request and change its status from reserved to booked, management must have access to the customer's information.

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```
1 SELECT c.Customer_ID , CONCAT(c.First_Name, ' ' ,c.Last_Name) AS Name ,c.Email , b.Check_In
   AS CheckIn_Date ,b.Check_Out AS CheckOut_Date , cd.Card_ID as CardNumber
2 FROM customer c
3 LEFT JOIN booking b
4 ON c.Customer_ID = b.Customer_ID
5 LEFT JOIN creditcard cd
6 ON c.Card_ID= cd.Card_ID;
7 |
```

Figure 38 Query 5

Result for this query

Customer_ID	Name	Email	CheckIn_Date	CheckOut_Date	CardNumber
112	Rahul Shrestha	rahulshr@gmail.com	2023-02-15	2023-02-17	7766896
111	Roman Humagain	roman07@gmail.com	2023-03-06	2023-03-07	5550034
113	Aswin K.C	aswinkc@gmail.com	2023-01-12	2023-01-13	9980532
115	Anup Poudel	anup68@gmail.com	2023-03-22	2023-03-23	3354411
114	Sushant Gautam	sushant34@gmail.com	2023-02-09	2023-02-10	2250021

Figure 39 Result of query 5

The above result displays information for each customer, including their name, customer ID, arrival date, departure date, and card number.

Query 6: To select the room type which has highest number of booking along with room id.

Description: This helps the management team to know about the availability status of a particular room and also helps to know about the room with the highest number of bookings. This also makes it easier to assign rooms to customers.

```
1 SELECT r.Room_ID, r.Room_Type, COUNT(b.Booking_ID) AS Booking_Count
2 FROM room r
3 LEFT JOIN booking b ON r.Room_ID = b.Room_ID
4 GROUP BY r.Room_ID, r.Room_Type
5 ORDER BY COUNT(b.Booking_ID) DESC
6 LIMIT 1;
7 |
```

Figure 40 Query 6

Result of the above query:

Room_ID	Room_Type	Booking_Count
10	single	3

Figure 41 Result of query 6

This result reveals that room having room id 10, a single room, has been booked the most number of times so far, with a total of 3 bookings.

Query 7: To select the managers who have managed bookings for at least one room type along with the manage booking count .

Description: This data helps to make clear the specific bookings that have been made and the number of bookings made by the manager.

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```
1 SELECT m.Name AS Manager_Name, COUNT(DISTINCT r.Room_Type) AS  
   Manage_Booking_Counts  
2 FROM manager m  
3 INNER JOIN booking b  
4 ON m.Manager_ID = b.Manager_ID  
5 INNER JOIN room r  
6 ON b.Room_ID = r.Room_ID  
7 GROUP BY m.Manager_ID  
8 HAVING COUNT(DISTINCT r.Room_Type) >=1;
```

Figure 42 Query 7

Result of the above queries

Manager_Name	Manage_Booking_Counts
Sunanda Regmi	1
Krishna Shrestha	1
Bikash Thapa	1
Ajay Sharma	1
Prakash Shrestha	1

Figure 43 Result of query 7

This result displays the manager's name along with the number of bookings they have made.

Query 8: To select the room number with customer name Roman

Description: From their registered name, the customer must be able to identify which room they have booked.

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```
1 SELECT CONCAT(c.First_Name , ' ' ,c.Last_Name) AS Name, r.Room_ID
2 FROM customer c
3 LEFT JOIN booking b
4 ON c.Customer_ID = b.Customer_ID
5 LEFT JOIN room r
6 ON b.Room_ID =r.Room_ID
7 WHERE c.First_Name LIKE '%Roman%'
8 GROUP BY c.First_Name;
9
```

Figure 44 Query 8

Result of above queries

Name	Room_ID
Roman Humagain	10

Figure 45 Result of query 8

This result indicates that Mr. Roman has booked a room with ID 10.

Query 9: To calculate the total earnings generated by booking made for each type of hotel room that is offered.

Description: This query helps to know about the total earnings made by each room type in the hotel.

```
1 SELECT r.Room_Type, SUM(b.Number_Of_Room *r.Room_Price) AS Total_Earnings|
2 FROM room r
3 INNER JOIN booking b
4 ON r.Room_ID =b.Room_ID
5 GROUP BY r.Room_Type;
```

Figure 46 Query 9

Result of the above queries

Room_Type	Total_Earnings
double	6000
single	7500
twin	3500

Figure 47 Result of query 9

This result displays the revenue generated by each type of room. The double rooms generated Rs 6,000 in revenue, the single rooms Rs 7,500, and the twin rooms Rs 3,500.

Query 10: To select the customer who have booked expensive room among all

Description: This query helps to get the data of the customers who have booked expensive rooms in comparison to other customers.

```
1 SELECT c.First_Name, c.Last_Name, r.Room_Type, MAX(r.Room_Price) AS Price
2 FROM customer c
3 LEFT JOIN booking b ON c.Customer_ID= b.Customer_ID
4 LEFT JOIN room r ON b.Room_ID = r.Room_ID
5 GROUP BY c.Customer_ID
6 HAVING MAX(r.Room_Price) = (SELECT MAX(Room_Price) FROM room);
```

Figure 48 Query 10

Result of query 10

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First_Name	Last_Name	Room_Type	Price
Aswin	K.C	twin	3500

Figure 49 Result of query 10

This result shows that Mr. Aswin has booked a twin room for the price of 3500, which is the most expensive room compared to other customers.

Critical Analysis/Reflection

A database system for online hotel booking and management system has been successfully created and tested. Data dictionaries were used to create tables, and the data was normalized in order to improve the database's efficiency and manage the data in the database more accurately and conveniently. The data was then implemented using MySQL's SQL programming language.

This project provided a wonderful opportunity to study and helps in gaining extra knowledge about the database management system and the proper implementation of the database. This project gives us a clearer understanding of how data are arranged in a real world. This assignment provides a clear understanding of how to design and implement a database for use in a business environment. A well-structured and effective system was designed by assuming various entities and their attributes, and then normalizing unmanaged attributes in accordance with those assumptions.

The project included a variety of SQL commands, including select, insert, update, delete, and join, which helped us to learn the language better. This allows the data to be stored securely and systematically so that it can be readily retrieved. Understanding SQL terminology and syntax was simplified by using real-world examples.

I found it difficult to build a database that was intended to solve a real-life problem, as it was difficult to differentiate between entities and attributes. Initially, I faced difficulties and had to change the concept and alter the database in order to complete the task. I spent some time and

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effort trying to accomplish this task. It was, however, thrilling for me to work on real-world situations, and I appreciated it greatly when I recognized my own weaknesses and worked hard to correct them using research. Even though it was difficult to combine so many different topics at once, I found that learning and dedicating time and effort to it helped me to gain a greater understanding of the subject and made it more interesting.

It was an excellent learning opportunity to develop a hotel booking database system and improve practical abilities in designing, normalizing, and implementing databases. A successful completion was achieved, and all requirements were met. With constant learning and study, all problems were resolved, and all duties were fulfilled.

Conclusion

In conclusion, the university's assignment for developing a database, an entity relationship model, and normalization for an online hotel booking and management system has been successfully completed. All assignment requirements have been met, including the creation and use of the database.

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Appendix